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PATIENT SAFETY

1 Perioperative patient safety and the challenges and approaches to implement the requirements of the Helsinki declaration on patient safety in anaesthesiology

Johannes Wacker

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The following summary outlines two contributions to an upcoming Patient Safety Symposium during the XIII Serbian Congress of Anesthesiologists and Intensivists in Belgrade on November 23, 2018. They provide a short overview of patient safety in the perioperative setting, and of the current efforts undertaken by the Leadership and the Patient Safety and Quality Committee (PSQC) of the European Society of Anaesthesiology (ESA) to translate the goals and requirements of the *Helsinki Declaration on Patient Safety in Anaesthesiology*[1] (HD) into clinical practice. The HD should not be mistaken for the World Medical Association's *Declaration of Helsinki* that defines ethical principles for medical research involving human subjects.[2] In contrast to the Declaration of Helsinki, the HD is a landmark patient safety declaration addressing the field of anaesthesiology.[1] It has been launched by ESA and its partner organisations in 2010, provides a framework of patient safety principles (called "heads of agreement") and a practical list of protocols and requirements (called "principal requirements") for anaesthesia departments in order to provide anaesthetic care safely,[1] and has been signed by all European National Anaesthesiologist's Societies, and by many other societies and organisations worldwide. However, it remains unclear to what extent the requirements of the HD have been translated into clinical practice across Europe.[3,4]

Patient safety is about the reduction and if possible elimination of avoidable harms to patients. Charles Vincent, professor at the University of Oxford in the UK and eminent patient safety researcher and leader has defined patient safety as „the avoidance, prevention and amelioration of adverse outcomes or injuries stemming from the process of healthcare"[5] – in contrast to adverse outcomes or injuries stemming primarily from the underlying disease or injury that brings the patient to the hospital. To

1

clarify the relation between patient safety and quality: patient safety is just one of several particular aspects of quality. Generally speaking, quality is a much broader concept, and is about the different and sometimes competing expectations of different groups in healthcare - expectations of patients and their families, of healthcare professionals, administrators, authorities, politicians, and the public.[6]

What is the approximate range of perioperative patient safety issues? Due to varying definitions used in research and routine data collections, it is not easy to provide reliable figures. Estimates indicate that patient safety issues, in particular preventable complications, are a major public health problem. The US report "To Err is Human – Building a Safer Health System" published by the US Institute of Medicine in 2000[8] estimated that between 44'000 and 98'000 patients per year died in the US because of medical errors,[8] and later estimates were even higher.[9] In the perioperative setting, the speciality of anaesthesiology has contributed significantly to improve perioperative patient safety. The specific risk of anesthesia is very low today,[10] but anaesthesia contributes to the overall perioperative risk of patients: Anaesthesia management has an impact on respiratory, infectious, neurologic, cardiovascular, thromboembolic, and other complications.[11] According to some studies, adverse events occur in about 30% to 40% of hospital admissions, and about 50% of them are thought to be preventable.[9,12] In line with other studies, surgical in-hospital mortality may be as high as 4% on average in Europe,[13] and even higher if measured later after surgery.[14]

Yet mortality as such is influenced by many other factors and is therefore not a very reliable indicator of quality and safety. Therefore, the concept of "failure to rescue", defined as deaths after (major) complications,[15,16] is increasingly seen as an indicator for the safety and quality of hospital care, because it is thought to provide information about the ability of healthcare institutions to manage complications once they occur.[17] Research actually indicates that failure to rescue rates may differ significantly even between hospitals that have comparable complication rates.[15] To know more about failure to rescue as an indicator of quality and safety in a given hospital it seems obvious that local measurement of complications and of deaths following complications is needed. Furthermore, singular measurements are unlikely to reflect failure to rescue along the time axis: As other studies show, preventable adverse events vary over time.[12] It seems plausible that ongoing knowledge of the current failure to rescue rates as an institutional safety and quality indicator would require constant measurement – monitoring - of complications and death rates.

What would be a motivation to know these numbers? Certainly the goal of improving patient safety and quality locally. Ideally, the causes of undesired patient outcomes should be addressed and specifically corrected – but in clinical reality, measurable outcomes are often caused in a complex way by multiple factors, making it difficult to reliably establish single culprit root causes. Systems analysis can help to narrow down the most important contributory factors.[5] Causality however is not always easy to es-

tablish, and it is advisable to keep track of the overall results produced by a system like a hospital or a department. For the same reasons, not all necessary safety and quality interventions can be tailored locally, and some interventions should be adopted as general basic standards.

The HD represents a bundle of such standards, and many of them are based on a solid fundament of increasingly differentiated evidence, e.g., the WHO Surgical Safety Checklist.[18-20] And as the intraoperative period has become very safe over the last decades, complications now occur increasingly during the postoperative period.[21] Consistently, anaesthesiologists have started to expand their role beyond the operating room to the perioperative setting, for example to intensive care medicine and to pain management.[21,22] In line with this development, the HD requirements are not restricted to the intraoperative period, but extend to other perioperative and further responsibilities of anaesthesiologists. The HD's principal requirements include a detailed list about required monitoring in line with EBA recommendations, required patient safety protocols (e.g. difficult/failed airway protocol; sedation standards; WHO Surgical Safety Checklist, etc) and facilities (e.g., critical incident reporting), data that should be collected, and reports that should be annually prepared.[1]

How well has the HD been implemented? A survey of members of the ESA Council of National Anaesthesiologists' Societies and of ESA members conducted in 2012 suggested that the implementation of the HD into clinical practice was slow, and incomplete in most European countries.[4] According to a review of the current state, implementation of the HD still seemed a "major task" in most countries.[23] Individual experiences and communications by European anaesthesiologists add to this impression, but the extent and causes of these shortcomings remain unclear. To improve implementation of the HD, ESA has started numerous educational strategies (e.g., patient safety (PS) publications, an online PS "starter kit", a PS basic course and masterclass) and instituted a PS task force that later was transformed into the PSQC. In 2017, the PSQC has started a comprehensive umbrella project in order to better understand obstacles to the implementation of the HD, and to improve the implementation of the HD requirements. This umbrella project involves a research project that is supported by some of ESA's industry partners https://www.esahq.org/patient-safety/patient-safety/hd-follow-up-project/. Led by Andrew F. Smith and realized at the Lancaster Patient Safety Research Unit, UK, this project will use a multi-method approach to evaluate the HD as a complex safety intervention[24] by using electronic surveys e.g. of ESA members, document analyses in hospitals, and extensive focused in-depth interviews in a small number of hospitals in different countries in order to better understand differences in the local context. Beyond research-based evaluation, other steps are planned, including elaboration of a practice document to facilitate integration of the HD requirements by practicing anaesthesiologists. The HD cannot just be "ordered" top-down, but needs to be embraced by frontline clinicians to be successful.

Meanwhile, individual anaesthesiologists can check the local level of compliance with the HD patient safety requirements by downloading the HD from the ESA homepage and using it as a checklist: "Walking the hospital", verifying which protocols are actually in place, and talking to colleagues is an interesting and insightful experience (tested by the author!). Wherever possible, local measurement of patient outcomes as a specific starting point would likely be a most important initial step to be taken.

In conclusion, preventable perioperative patient harm remains an important challenge, and the HD provides useful framework of safety protocols address this challenge. However, the HD has been inconsistently adopted in clinical practice. ESA has started several efforts designed to better understand the potential obstacles to implementation, and to improve the realisation of the safety strategies promoted by the HD at the clinical frontline.

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2 Preoperative evaluation: Past and present in an US institution

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The assessment of the surgical patient has been a primary concern for the anesthesiologists. Over the years the goals of the preoperative evaluation have maintained few fundamental goals: understanding the current clinical conditions, anticipation and prediction of possible failures and complications, and optimization of patients pre-existing physical status. The preoperative evaluation has also been recognized as the professional establishment of the clinician-patient relationship. However, besides the clinical point of view, the interpretations regarding the goals of the preoperative assessment recognize other objectives: improvement of the surgical schedule and effectiveness of the operating-room flow and organization, such as reduction in case cancellations, case delays and unexpected change in postsurgical admission type and rate.

The timing and place of the preoperative evaluation is still reason of debate. It is though recognized that the creation of a formal preoperative anesthesia or assessment clinic is of value for the organization and perioperative management of surgical cases. In particular the recent evolution of care into surgical and medical homes, at least in the USA, have made necessary to recognize a process where patients are assessed and educated, as well as where care coordination be comprehensively managed. In that sense then the conception of a Preoperative Anesthesia/Assessment Clinic is customary.

In the current presentation we discuss the history of preoperative assessment from the establishment of the traditional concept to the modern interpretation. Through a narrative review the value of the PAC in the context of the US Perioperative Surgical Home is debated, in particular the experience at our institution, the McGovern Medical School UTHealth at Houston which co-owned the clinic with Memorial Hermann Hospital at the Texas Medical Center.

At the end of the lecture the attendant will have a better understanding of nature and objectives of the preoperative evaluation, the function and objectives of a PAC, the

experience and activity (clinical, academic and research) at Memorial Hermann TMC-PAC, and the future developments.

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3 Learning from incidents and errors

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Introduction

In the complex organized systems like military, industry or aviation, which include people and technology, accidents are expected, human errors are recognized as contributing factors and anticipation of hazard with the possible defend mechanisms in place are the part of standard operation procedures. Although, complex as well, healthcare system has long been placed on the assumption of error free performance based on discipline and training. It was after the published reports ~To Err is Human ~ by the Institute of Medicine in the USA 1999, that the attention has been raised regarding errors in medicine and the necessity of developing safety culture as one of the basic elements in improving patient care. It was emphasized in report that in USA between 44000-98000 of patients every year die of medical error and that even more patients are subjected to medical error that does not necessarily lead to death or bad outcome. Additionally, there are 230 million major surgeries every year with around 7 million complications and 1 million deaths. The incident of adverse events is 10 %, but it is estimated that 50% of them are avoidable. All of this has lead to increasing awareness, developing knowledge, recommendations and guidelines, as well as changing clinical practice in order to improve patient safety within the healthcare system. All actions are underlining thinking beyond the individual person, but getting the insight into characteristics and weaknesses of the system as a whole.

Introducing Patient Safety: Fundamentals

Understanding error is one of the first steps towards developing safety culture and more reliable healthcare system. But, error is often perceived as individual and leads toward delegating the blame to one person. On the other hand, blaming culture is one of the main barriers in learning and preventing future accidents.

Errors are present in everyday practice and can be divided in:

1) Omissions and commissions - related to attention and memory, such as slips (for example: using the wrong syringe and giving the wrong drug) or lapses (forgetting to follow the plan and giving no drug), and
2) True mistakes: rule based (not following the protocol) or knowledge based (making the wrong decision).

Whichever error identified, in medicine attention is usually focused on harm, weather the event made impact on the bad outcome. This is why it is preferable to establish the idea of ***adverse event*** defined as: ~ An ***unintended injury*** caused by medical management, rather than the disease process, sufficiently serious to lead to prolonged hospitalization, temporary or permanent disability at the time of discharge ~ (Charles Vincent, Patient safety, BMJ Books 2011).

Out of the definition of adverse event, the definition of the Patient Safety is as follows: "the ***avoidance, prevention and amelioration*** of adverse outcomes or injuries stemming from the ***process of healthcare***" (Charles Vincent, Patient safety, BMJ Books 2011).

Obviously, the focus is put on the system, away from the person, usually the last link connected to the error made. Doctors and nurses included in medical system do not intend to harm the patients, but still wrong actions and decisions may take place. Every error should be put in context, the ill process should be identified and lessons drown from the adverse event. Promotion of the teamwork and support for the individuals is one of the cornerstones in developing the patient safety culture.

Critical Incidence Reporting

Incident reporting systems are not new and they have been used as the quality improvement tools in different fields: nuclear plants, military, industry or aviation. Basic philosophy is to create a window with the view into the process and recognize the weaknesses that can be eliminated, while future incidents anticipated and prevented.

Systems for critical incidents reporting may be operating on different levels: national, regional or local. Usually, there are standard incident forms, narrative by nature, where the whole event is described. Different systems have been introduced and developed, some of them are already well known such as Australian Incident Monitoring Study or Critical Incidence Reporting System (CIRS) in Switzerland, which is the first one that was Internet based.

Basic requirement for the successful incident reporting is confidentiality and non-judging attitude towards the error. People involved have to be sure that reporting will not be used against them. Also, receiving feedback on the reported incident is important for further reporting. Analytical framework should be applied in order to draw some conclusion and learning points form the incident. It is usually put in the context that several weaknesses and failures of the defense mechanisms should be aligned for adverse event to take place, which is often explained as ~Swiss cheese model~. Very

often, with this model, human error is recognized, but there are more elements that are contributing to the final outcome.

Furthermore, different approaches exist that are looking at the whole system and used to investigate reported adverse event. The one often practiced is ~root cause analysis~. This is structured interview consisted of few questions that can help in identification of different layers of the event (what happened, how did it happen, why did it happen). Focus is always on the process and possible prevention, not the blame and punishment. Multiple factors should be covered: training, equipment, fatigue, communication, personnel, environment, rules or available protocols.

Recommendations resulting from the analysis should address the problem and give advise for improvement, but they should be realistic, easy to understand and focused on the problem.

The major weakness of the reporting system is underreporting which is happening for various reasons. The most of reporting is voluntary, meaning that aside for having fewer cases than happening in reality, there can be a lot of bias in estimating incidence or true problems. Training and education, user-friendly reporting systems and encouragement, followed by regular feedback and analysis are good ways to improve reporting.

Reckless behavior should not be supported and encouraged. But, errors are most of the time result of more than one reason and usually are not connected with the lack of responsibility or bad intentions. Reporting incidents may help in prevention of serious accidents and all together add to the safer patient environment.

Critical Incidence Reporting in Serbia

In Serbia, The Low of Patient Rights and Strategy of the Hospital Accreditation Agency of Serbia offer good framework for improving patient safety. Even though that accredited hospitals have obligation of reporting critical incidents, practice proves that this is very seldom happening.

Serbian Association of Anesthesiologists and Intensivists is offering created Internet platform for critical incidents reporting in anesthesia and intensive care (Critical Incidents Reporting System Serbia – CIRSS). It is a pilot project including few hospitals but also, reporting by individuals that are not specifically allocated to any hospital. Specialty based reporting system might offer better insight in local and specific problems related to anesthesia practice in our country. Central administrators are obliged to perform feedback and annual report with the analysis of the reports submitted.

Launch of the platform is planned for the First Patient Safety Symposium, which will be held as the precongress activity of the XIII Serbian Congress of Anesthesiologists and Intensivists.

Key messages and future work

Adverse events are happening to the patients in the healthcare system and the avoidance, prevention and amelioration of them is the basic framework for Patient safe-

ty. Creating no blame culture and reporting critical incidents in order to analyze them and improve patient care are the pillars of safety improvement.

Critical Incidence Reporting System Serbia (CIRSS) is the pilot project including hospitals and individuals in critical incidence reporting in anesthesia and intensive care. The aim is to analyze incidents in Serbia and create reports and recommendations for improvement of the safety environment. Challenges will include voluntary reporting and cultural barriers in overcoming blaming practice related to medical errors.

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Session I

AIRWAY ON THE MENU

4 Awake videolaryngoscope guided intubation

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Learning points

- Why use awake videolaryngoscopy (VL) when flexible fibreoptic scope (FOS) is already established standard
  - VL is a skill that is easier to learn with more opportunities to maintain this skill
  - VL creates space within the airway hence easier secretions/blood removal, witnessed tube advance and tracheal placement
  - VL are devices that are faster to intubate with and no difference in success rate, complication rate and patient acceptance
- Patient selection for awake VL guided intubation
  - Most patients can be intubated using either awake VL or FOS guided intubation. Patients with distorted anatomy (ie peri-glottic tumours, neck mass distorting the airway) may benefit more from awake VL than FOS guided intubation. Remember that VL are used much more frequently than FOS (few times weekly against once or twice a year respectively) so likely to be very good with VL and not so skilful with FOS
- Videolarygnoscope design review with respect to suitability for awake intubation
  - Very little evidence as to the preferred VL design for awake intubation
  - Anecdotal evidence suggests that channelled VL may work better for awake intubation
- Administration of local anaesthetic for awake laryngoscopy
  - No difference to whatever technique you use apart from the fact that you have to be more meticulous and more generous when anaesthetising oral cavity and base of tongue.

Awake fibreoptic intubation (FOI) is becoming more and more obsolete and used only by a few airway enthusiasts. Recent published evaluations of the awake videola-

ryngoscope-guided intubation (VLI) strongly suggest that this technique is not only a suitable alternative to awake FOI but should now be the 'gold standard' for managing anticipated difficult airway [1].

Videolaryngoscopes have become freely available, allowing their use in a greater number and wider variety of patients, gaining the advantage of *familiarity and experience*. Videolaryngoscopy is also a skill that is *simple to learn and easy to maintain*.

In addition, there are a number of *advantages of awake VLI inherent in the device design and intubation technique*. Videolaryngoscopy creates space within the airway, allowing for effective clearance of secretions/blood and the application of atomised local anaesthetic under direct view from the VL. This technique of intubation avoids blind railroading associated with awake FOI, but allows the tube placement to be observed throughout the intubation process. Videolaryngoscopes provide a fixed wide view of the glottis that aids recognition of the airway landmarks, which is particularly relevant in patients with distorted airway anatomy. In addition, there is no diminution of view associated with fiberscope advance towards the glottis. Awake VLI is also an *effective awake intubation technique [2,3]* for managing an anticipated difficult airway. This is illustrated by a number of well-conducted comparative studies and meta analysis [4] suggesting that awake VLI is faster than awake FOI with no difference in patient comfort between the two techniques of awake intubation.

The time has come for awake videolaryngoscopy to become the new 'gold standard' for managing an anticipated difficult airway [5].

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5 Difficult airway in thoracic surgery

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Disclosure: The speaker received free airway device samples from Ambu US in April 2014 and Airtraq UK in March 2015 for use in three published studies and he has no direct financial or other interest in Ambu or Airtraq (in the context of this talk and his studies).

Recent advances in minimally-invasive and robotic thoracic surgery require lung separation/isolation to facilitate surgical access. Regional surveys showed that the vast majority of worldwide thoracic anaesthesiologists are frequently using double-lumen endobronchial tubes (DLT) rather than the bronchial blockers (BB) for lung isolation.

Difficult lung separation can be encountered due to (1) potential difficult upper airway management, (2) difficult lower airway isolation due to distorted anatomy, or (3) incomplete or inadequate lung deflation.

This highlights the importance of the *ABC approach* for lung separation (A: understanding the **A**natomy of tracheobronchial tree, B: being skilled in using the **B**ronchoscopy for examining the tracheobronchial tree, and C: careful preoperative reviewing the **C**hest X ray and **C**T scan.

Difficult airway management is a real daily challenge for the worldwide practicing anaesthetists. There are several implemented protocols for securing the airway in patients with potential difficult airway like as Difficult Airway Society (DAS) and American Society of Anesthesiologists (ASA).

Compared with the single-lumen tracheal tube (SLT), lung separation using DLT in patients with predicted or unanticipated difficult airway is challengeable because of the larger outer diameter, the distal curvature and the increased rigidity of the DLT.

Several algorithms have been implemented to provide lung isolation in patients with potential difficult upper airway using awake endobronchial intubation, bronchial blockers through either SLT or laryngeal mask airways, videolaryngoscopes,[1] retro-

grade DLT intubation, or exchange of the SLT with a DLT. Additionally, some of these algorithms have addressed lung isolation in patients with front-of-neck surgical stoma.

Inadequate lung deflation can be challenging in patients with COPD, pleural adhesions, tracheal bronchus, or those with history of previous lung resection. There are several adopted tricks to isolate lung in these patients including the use of continuous bronchial suction or disconnection technique, [2] combined use of DLT and BB, or selective lobar isolation.

The speaker will highlight these points during his talk.

Do not miss it out!!

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6 Videolaryngoscopes

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Introduction

An adequate airway management plan is essential for patient safety. Among new tools developed as alternative to direct laryngoscopy and intubation, videolaryngoscopy has gain great popularity for use in patients with difficult airway or as a rescue device in failed intubation attempts, in the operating room, remote places and on the field. Emergent endotracheal intubation outside of the operating theatre is associated with a much higher risk of difficult laryngoscopy and intubation. Also, videolaryngoscope is usefull tool in different clinical scenarios as an alternative intubation technique in awake patients.[1,2]

Classification

Video laryngoscope consists of a laryngoscope blade with a video camera fixed near the distal end of the blade. The camera allows projection of the glottic view on a video screen, presenting the view of the passage along the tongue and into the larynx without the required alignment of the pharyngeal, laryngeal, and tracheal axes.

The most commonly used classification of video laryngoscopes is Macintosh modified, angulated blade, and tube/guide channel. Macintosh-modification integrates video capability to the traditional Macintosh laryngoscope with an ability to perform both indirect and direct laryngoscopy (in the case of video failure or lenses covered with secretions). Video laryngoscopes like McGrath® Mac, Storz® V-Mac, Storz® C-Mac do not require stylet.[3]

Devices with an angulated blade incorporate a more angled curvature into the blade which markedly improves glottic visualization with minimal need for the patient head flexion and neck extension. The endotracheal tube, which requires a matching precurved stylet, is carefully introduced and advanced "around the corner" until it can

be seen on the screen, then pushed between vocal cords followed by the stylet removal and the endotracheal tube push into trachea. GlideScope® GVL, McGrath® Series 5, are examples of angulated blade video laryngoscopes. Tube/guide channel video laryngoscopes use a guide channel to direct the preloaded endotracheal tube towards the glottis. Given the guide channel, a stylet is not necessary. All are designed for oral endotracheal intubation using a standard endotracheal tube. Examples of tube/guide channel scopes are Pentax® AWS and Airtraq®.[1, 4]

Direct versus indirect laryngoscopy

Direct laryngoscopy is the traditional technique used for securing the airway, and it requires a direct line view to align airway axes (oral-pharyngeal-laryngeal) for optimal glottic visualization. This becomes optimal by placing the patient's head on a pillow and extending the head on the neck (sniffing position) to displace the tongue and epiglottis, which frequently obstruct the view. In contrast to direct laryngoscopy, video laryngoscopy utilizes indirect laryngoscopy via its camera, thereby eliminating the need for a direct line view to visualize airway structures.[2]

Manipulations to align these axes include head extension, neck flexion, laryngeal manipulation, and other movements, and they have adverse implications like hemodynamic changes, cervical instability, injury to oral and pharyngeal tissues, and dental damage.[5] Compared with a conventional laryngoscope, a video laryngoscopy is less stressful for the patient, as extension and flexion of the head and neck, pressure on the neck, and distortion of the upper airway are preformed in the less extensive way. Also, with use of video laryngoscopy less force to the base of the tongue is applied, therefore is less likely to stimulate stress response and induce local tissue injury. Certain types of video laryngoscopes produce less cervical movement when compared to direct laryngoscopy.[6]

Recent meta analysis studied use of videolaryngoscopy and direct laryngoscopy by experienced anesthetists in patients with known difficult airway, including 1329 patients from nine studies.[7] Video laryngoscopy provided the higher number of the first attempt success compared with direct laryngoscopy even for highly experienced anesthesiologists. Therefore, the Difficult Airway Society (DAS) guideline underlies the importance of the first-time success. Use of video laryngoscopy was associated with a significantly better glottic view and less mucosal trauma.[7, 8] However, a recent large observational cohort study identified 93% of difficult intubations as unpredicted, and this places video laryngoscopes as very logical choice for use in everyday practice.

Some investigators studied whether video laryngoscopes reduce intubation failure and complications compared with direct laryngoscopy in adults. A systematic review which included sixty-four studies (7044 participants) showed that video laryngoscopes increased incidence of better visualization of glottis and reduced laryngeal trauma.[10] Failed intubations were significantly fewer when a video laryngoscope was

used in participants with an anticipated difficult airway, whilst there was no difference in failed intubations in participants who presented without an anticipated difficult airway. Recently published guidelines from the DAS recommended that all anesthetists should be trained to perform intubations using video laryngoscopy. DAS also advices that immediate access to a video laryngoscope needs to be provided in case of unanticipated difficult intubation.[9, 10]

Advantages and disadvantages of video laryngoscopes

Although direct laryngoscopy is the most often used tool to establish an airway, video laryngoscopy has several potential advantages over it. Video laryngoscopy can be a safe choice when approaching an expected difficult airway, as it can improve the view of the glottic opening and decrease the time needed for intubation. No necessity to align airway axes (oral-pharyngeal-laryngeal) to achieve better view and improve glottic visualization, in patients with limited mouth opening or neck mobility is the main advantage of video laryngoscope. Also, higher endotracheal intubation success rate with non-expert and expert laryngoscopists is shown.[2, 5] Videolaryngoscope allows teaching as others can view the screen and picture and video can be recorded. It represents effective tool for those who infrequently intubate as well as students learning to intubate. And above all it requires less cervical manipulation and enables awake intubation.[1]

The most common disadvantages of video laryngoscopy are increased intubation time, variable learning curve, potential weakening in development of direct laryngoscopy skill set, especially in non-experts, two–dimensional view with loss of depth perception, more complicated and more expensive then direct laryngoscopy. Also, view can be obscured by fogging and secretions cumulated on camera lens, and sometimes, despite improved glottic visualization is difficult to pass endotracheal tube, especially with angulated blade.[1, 2]

Video laryngoscopy versus difficult airways

Securing the airway in the scenario of predicted or unpredicted difficult airway is still anesthesiologist nightmare, therefore it is necessary to be skillful and in using advanced technique and equipment.[11] Videolaryngoscopy is one of the last developed, and mostly used technique in establishing airway. Many studies were conducted to compare video laryngoscopy versus direct laryngoscopy in the settings of difficult airway with at least one predictor of difficulty.[12] It was shown that the first attempt intubation success was increased, Cormack – Lehane view improved and time of intubation was significantly reduced.[13] The Fourth National Audit Project conducted in UK prospectively monitored airway management across the UK and found significant improvement during study period which was linked with the incorporation of the VL.[12] Other studies, conducted later, confirmed improved intubation success in patient with risk of direct laryngoscopy failure. Video laryngoscopy decreases number of intubation attempts in

predicted and non-predicted difficult airways and improves overall safety in the airway management.[13]

Video laryngoscopy versus fiberoptic bronchoscopy

The most important cause of morbidity and mortality in practice of anesthesia are complications of airway establishment.[11] Gold standard technique for tracheal intubation in setting of predicted difficult airway has been changed, as previously dominant fiberoptic bronchoscopy was upstaged by more easily performed videolaryngoscopy.[12] Relatively new and widely available video laryngoscopy is easier for learning and practice. The technical improvements in video laryngoscopes made it dominant over bronchoscopy for orally performed intubation.[13] Video laryngoscopy obtains wide angle view of the airway and provides better orientation. Additionally, wider tube sizes spectrum can be used with the video laryngoscopy than with fiberoptic bronshocopy.[12] Video laryngscopy provides more space within the airway for secretion or blood removal and easier visualization during tube advance towards trachea.

Video layngoscopy versus awake fiberoptic intubation

Although, awake fiberoptic intubation was the first choice to establish the airway in difficult airway settings, it can be challenging for learning and skill maintance.[14] In addition, awake intubation can be followed with risks like nasal bleeding, airway hyper-reactivity and in some situation complete airway obstruction. Video laryngoscopy is easier to perform and quicker to learn.[14] With all advantages of video laryngoscopy intubation, is taking supremacy over fiberoptic awake intubation. Shorter intubation time was found with videolaryngoscopy awake technique compared with fiberoptic intubation.[14] Awake videolaryngoscopy provides continuous visualization of the airway during the tube insertion which is connected with decreased intubation time and incidence of mucosal injuries and bleeding.[14] No improvement in patient satisfaction was found with use of videolaryngoscopyover fiberoptic bronchoscopy for awake intubation. Many studies concluded that awake videolaryngoscopy is a gold standard for management of predicted difficult airway.[11,14] It is important to note that if awake nasal intubation needs to be performed in patient with limited mouth opening and significantly reduced, nasal fiberoptic intubation still presents gold standard.

Cervical spine concerns

Significant movements of the cervical spine during laryngoscopy are noticed with different types of airway devices, such as the conventional laryngoscope with Macintosh blade.[15] C-spine extension varies significantly between different blade types of video laryngoscopes.[16, 17]

In trauma patients with suspected cervical spine injury, any movement of the head and neck should be avoided. Failure to perform adequate immobilization of the cervical

spine during orotracheal intubation in patients with cervical spine injury or in patients at risk of cervical injury may result in a devastating neurological outcome. While cervical immobilization may prevent injury of the cervical spine, it also worsens intubation conditions, as the use of a cervical collar reduces mouth opening, which also complicates orotracheal intubation. [18, 19] Tube/guide channel video laryngoscopes are proved to be successful in solving this problems. Research has shown less cervical spine motion using the Airtraq when compared to Macintosh direct laryngoscopy and suggested its use in case of unstable or limited mobility cervical spine.[20] Recent meta-analysis showed that in situations where the spine is immobilized, the Airtraq device reduces the risk of intubation failure during the first attempt. Other devices (Glide Scope, McGrath) were associated with improved glottis visualization but no statistically significant differences in intubation failure or time to intubation compared with conventional laryngoscopy.[21]

The use of GlideScope for tracheal intubation in patients with potential cervical spine injury remains controversial, Glide Scope video laryngoscopy reduces movements of the cervical spine in patient with unsecured cervical spine and therefore may reduce the risk of the secondary damage during emergency intubation.[22] The other study found that the use of GlideScope produced better glottic visualization, but did not significantly decrease movement of the nonpathologic C-spine when compared with direct laryngoscopy.[23] Some case reports have demonstrate that GlideScope provides better laryngoscopy conditions in patients with ankylosing spondylitis that involves the stiffness of the cervical spine and of the atlanto-occipital, temporomandibular and crico-arytenoid joints.[24]

Conclusion

Video laryngoscopy provids advantages during the first attempt intubation compared with direct laryngoscopy, even compared with some more sophisticated technical solutions. Improved safety during ICU airway maintenance is strongly linked with use of video laryngoscopes. With easiness to learn and use, and cost to benefit ratio, video laryngoscope is one of must have tool in anesthesia department.

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7 Laryngeal Mask Airway

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Introduction

The Laryngeal Mask Airway (LMA) was developed in the 1980s. The LMA Classic (cLMA) received wide recognition in a short time and has had a major impact on anesthesia practice and airway management.[1]The goal of its development was to create an intermediate form of airway management face mask and endotracheal tube. The laryngeal mask airway was designed as a new concept in airway management and has been gaining a firm position in anesthetic practice.[2]

Device

The LAM consists of a triangular mask, the design of which is based on the configuration of hypopharynx. Initial LMA prototypes *(first-generation)* were designed based on plaster casts of cadaveric airways. The LMA Classic (cLMA) is a reusable device made of silicone, latex-free and available in six sizes to fit infants to adults. C-LMA have an elliptically shaped mask attached to a ventilation tube.

The mask has a cuff, a pilot tube, and balloon through which the cuff is inflated and maintenance of intracuff pressure is monitored. A tube, which connects the mask to the anesthetic circuit, is fused at a 30° angle to the back of the mask. A black line along the length of the tube corresponds to the mid-surface of the outer aspect of the mask. Orientation of the black line at both the 12 o'clock position and in the midline of the oral cavity indicates correct positioning of the LAM. Maximizing the laryngeal seal is dependent on obtaining and maintaining the proper seating of the mask within the hypopharynx. The proximal end of the shaft has a standard 15-mm adapter. Properly positioned, the cLMA masks the glottis, maintains an open airway, and makes ventilation easy.

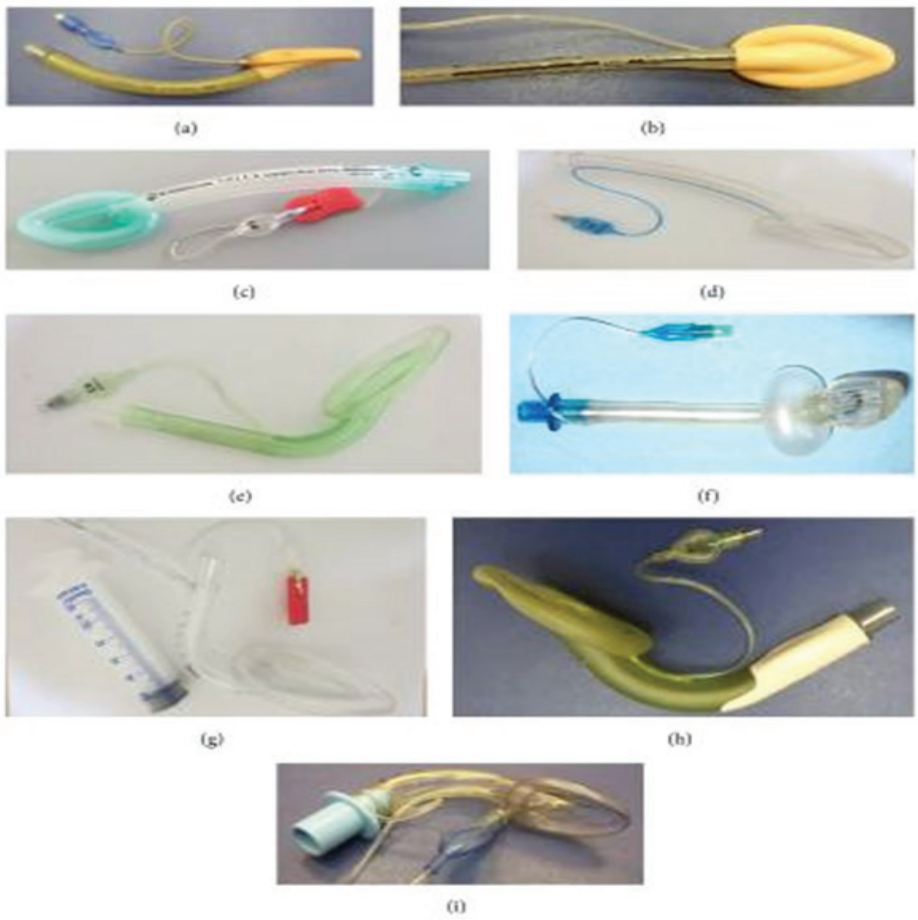

Figure 1. Main commercially available SGA devices without separated gastric channel (1st generation).[2] (a) LMA Classic, (b) LMA Flexible, (c) LM Solus, (d) LM Portex Soft Seal, (e) LM AuraOnce, (f) Cobra PLA, (g) LMA Fastrach, (h) LM Aura-i, and (i) air-Q intubating laryngeal airway. Last three devices are designated as conduits for tracheal intubation

The tip of the LMA sits posteriorly to the cricoid cartilage engaging the proximal esophageal sphincter, and the proximal end of the mask portion of the LMA lies against the base of the tongue. Three factors contribute to the failure of proper placement: lack of experience of the operator, improper technique, and inadequate depth of anesthesia. Insertion of the cLMA during light anesthesia stimulates contraction of the pharyngeal wall, cricopharyngeus, and extrinsic laryngeal muscles. The cLMA may also become twisted during placement or if advanced too far when an undersized device is selected.

Advantages of the LMA over tracheal intubation and facemask

When compering with tracheal intubation there are fewer changes in hemodynamic and intraocular pressure during placement and removal of the cLMA. Awakening with a cLMA in place resulted in less coughing, bucking, and hemodynamic changes than awakening with an endotracheal tube in place. Laryngeal competence and mucociliary function were preserved and laryngeal trauma was less.[3] The cLMA can be placed in 60 seconds after induction of anesthesia without the need for a muscle relaxant and use of a laryngoscope. A meta-analysis that included 3414 patients found a 17% incidence of sore throat with the LMA compared with a 39% incidence after endotracheal intubation ($P<0.0001$).[4] When compared with facemask ventilation, the cLMA is easy to learn and use, it secures the airway better, and decreases OR pollution from volatile anesthetics. With the cLMA, the anesthesiologist's hands are free for other activities and not fatigued from prolonged holding of a facemask. The cLMA circumvents upper airway obstruction and the need for jaw support by bypassing the tongue and epiglottis. Compared to facemask ventilation, the cLMA may also reduce the risk of injury to the eye and facial nerve.

Originally, the cLMA was used in lieu of a facemask in anesthetized patients breathing spontaneously. Over the years, that practice has changed so that now the cLMA is also used with controlled ventilation in complicated operative procedures. The use of the cLMA in anesthesia encouraged individuals and manufacturing companies to introduce other supraglottic airways (SGAs) with many design modifications.

Indications for LMA use

It is indicated for use in achieving and maintaining control of the airway during routine and emergency anaesthetic procedures in *fasted patients* using either spontaneous or Positive Pressure Ventilation (PPV). It is also indicated for securing the immediate airway in known or unexpected difficult airway situations. It is best suited for use in elective surgical procedures where tracheal intubation is not necessary. It may be used to establish an immediate, clear airway during cardiopulmonary resuscitation (CPR) in the profoundly unconscious patient with absent glossopharyngeal and laryngeal reflexes requiring artificial ventilation.

Second generation SGAs enable the application of higher respiratory pressure and possible drainage of regurgitated material or the introduction of a gastric tube via the integrated gastric access (Fig. 2).[2]

SGAs have become much more than a simple airway device, and now enjoy a wide range of applications and indications, some of which were formerly relative contraindications. SGAs have a role now in special situations such as obstetric, pediatric, prehospital, and nontraditional "out of the operating room" settings. SGA devices have saved countless lives because they facilitate ventilation when facemask ventilation and tracheal intubation were not possible. Traditionally, difficult airway management focused on successful tracheal intubation. The SGA has allowed a paradigm shift, chang-

ing the emphasis of difficult airway management from tracheal intubation to *ventilation and oxygenation*.[5] SGA devices have proved to be useful adjuncts to tracheal intubation; in particular, the combination of SGA devices and fiberoptic guidance is a powerful technique for difficult airway management. In addition to its routine use in the Operation Room (OR) during general anesthesia, the laryngeal mask is used for airway management outside of the OR and for management of difficult or failed intubation. It is included in the airway management algorithms of the American Society of Anesthesiologists (ASA) and the Difficult Airway Society of the United Kingdom.[6]

Traditional Contraindications

Due to the potential risk of regurgitation and aspiration, LMA should not be used as a substitute for an endotracheal tube in the following elective or difficult airway patients on a nonemergency pathway:

- Patients who have not fasted, including patients whose fasting cannot be confirmed.
- Patients who are grossly or morbidly obese, more than 14 weeks pregnant or emergency and resuscitation situations or any condition associated with delayed gastric emptying, or using opiate medication prior to fasting.
- Patients with fixed decreased pulmonary compliance, or peak inspiratory pressure anticipated to exceed 20 cm H2O, because the device forms a low-pressure seal (approximately 20 cm H2O) around the larynx.

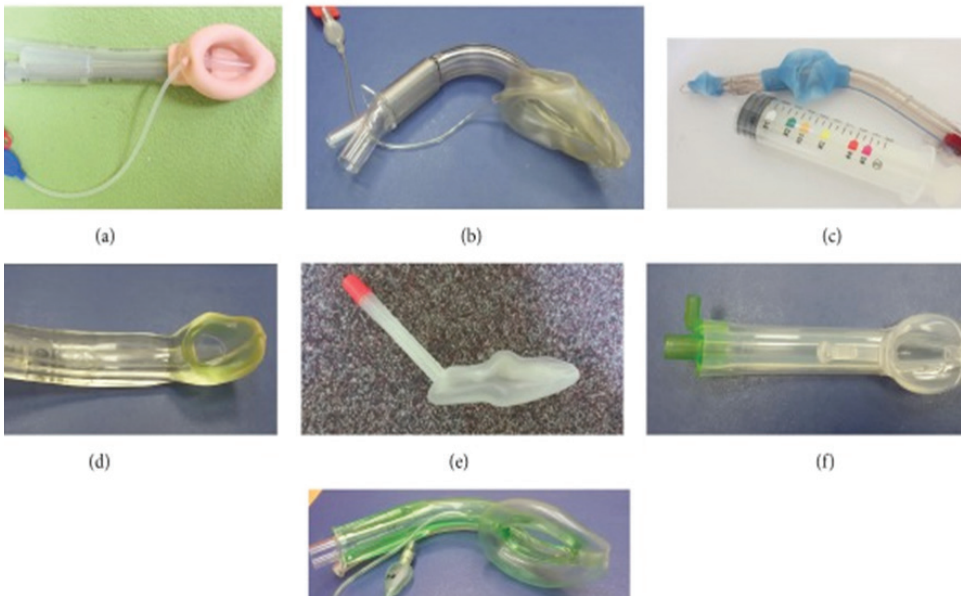

Figure 2. Main SGA devices with a mechanism for drainage of gastric contents (2nd generation).[2] (a) ProSeal LMA, (b) Supreme LMA, (c) Laryngeal Tube Suction-D, (d) i-gel, (e) SLIPA, (f) Baska mask, and (g) AuraGain LM.

Additional Nontraditional Applications of the LMA

The LMA has enjoyed success in routine practice, and enthusiasm for its use has led some to consider an expanded range of applications. The need for prone positioning classically precludes elective LMA placement for most clinicians. Nonetheless, there is experience with LMA use in prone patients. Successful airway rescue of unexpectedly extubated patients in the prone position has been reported.[7] Traditionally, tracheal intubation has been performed for airway management during laparoscopic procedures. The cuffed tracheal tube allows positive pressure ventilation and some protection against regurgitant gastric content aspiration in the presence of a pneumoperitoneum. In contrast, EGAs were thought to be less suited for use in laparoscopic procedures. Design modifications of EGA devices have improved the ability to maintain a tight airway seal, and some devices even provide a drainage tube for the evacuation of regurgitant gastric contents. There are reports of success with the LMA for laparoscopic surgery in both pediatric and adult patients.[8,9] However, definitive data proving safety and efficacy of LMA during laparoscopic surgery are lacking. Parturients and morbidly obese patients are not typically considered ideal candidates for elective LMA placement. Similarly, the use of an LMA for a long procedure or intensive care unit airway management may not be considered appropriate by many practitioners. Nevertheless, reports of the elective use of the LMA in parturients,[10] the morbidly obese[11], and for prolonged airway management have emerged.[12]. Despite reports of nontraditional elective LMA use, it is important to remember that the evidence supporting such applications is scarce.

Complications of LMA use

In many indications, such as for elective procedures outside of the thorax and abdomen in patients without increased risk for gastric content aspiration, SGAs have already replaced tracheal intubation. These devices are still developing in order to overcome their limitations and to minimize the incidence of complications or minor adverse events associated with their insertion.

Complications associated with the correct use of the SGAs are relatively rare and most of them are not life-threatening. They are often associated with a deviation from the manufacturers' advice on usage of their devices. Aspiration remains a problem, which can have serious and even fatal consequences. Its incidence is extremely low, comparable with the incidence of aspiration in tracheal tube anesthesia[14]; however, its real occurrence may be underreported.[15] Although there is some limited evidence that newer devices with an additional gastric channel may offer greater protection from regurgitation and aspiration this still requires robust studies to be carried out. Assessment of the risk of aspiration is a key component of the preanesthetic evaluation and should be used to guide device selection.

Nerve injuries may be avoided by careful insertion and by limiting cuff inflation pressure in accordance with advice from the manufacturer.[16] Limiting cuff pressures may also decrease the incidence of sore throat.

The effects of SGAs on cervical vascular structures and microcirculation of the pharyngeal mucosa are not yet completely explored. It appears that negative effects are directly related to cuff volume and its internal pressure.[17]

Table 1. Sites, types, and mechanisms of traumatic injuries caused by SGAs. [13]

Site of injury	Type(s) of injury	Mechanism(s) of injury
Pharyngeal mucosa	Laceration Bruising	Forceful insertion, inadequate lubrication Prolonged insertion, too high cuf pressures
Laryngeal Apparatus	Arytenoid dislocation Recurrent laryngeal nerve injury	Compression of the nerve in piriform fossa
Uvula	Trauma leading to ischemia and necrosis	Direct trauma, Prolonged compression
Epiglottis	Bruising Laceration	Incorrect or forceful insertion, anatomical abnormalities
Tongue	Compression of inferior or lateral surface	Incorrect or forceful insertion; Lingual nerve injury of the tongue by cuff or tube of SGA
Teeth	Dispalcement; Fracture of roots	Direct trauma Biting on SGA/bite block
Lips	Laceration Nerve injury	Direct trauma Compression by device, taping to device

Conclusion

SGAs have replaced tracheal intubation in menu indications, such as for elective procedures in patients without increased risk for gastric content aspiration. A difficult airway often makes mask ventilation and tracheal intubation problematic. SGA devices have the potential to improve ventilation and often assist in subsequent tracheal intubation. Ventilation via an SGA when intubation and facemask ventilation have failed may be lifesaving procedure. The use of SGAs in formerly contraindicated patients, procedures, and locations continues to challenge conventional methods of airway management.

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Session II:

MECHANICAL VENTILATION: BASICS TO BEYOND

8 Spontaneous Assisted Breathing: Pro and Cons

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Introduction

Increased understanding of the negative effects of neuromuscular paralysis and sedation on clinical outcomes of mechanically ventilated patients led to a great interest in early switch from controlled mechanical ventilation (CMV) to different forms of assisted spontaneous breathing (1). During assisted mechanical ventilation (AMV) both the patient's muscles and the mechanical ventilator contribute to alveolar ventilation. AMV is used as a weaning technique but also as first-attempt ventilatory support in acute respiratory failure patients (2).

Besides important short-term benefit, such as reducing the deconditioning of the inspiratory muscles, improving ventilation and perfusion matching and cardiac filling, AMV carries also some disadvantages, especially in severely hypoxemic patients, therefore its use is debated.

Advantages of spontaneous breathing

It is well known that CMV can lead to both atrophy and contractile dysfunction resulting in a rapid development of diaphragm weakness, known as ventilator induced diaphragm dysfunction (3). Diaphragm dysfunction is linked to difficult weaning from ventilator support, high risk of mortality and complications (4,5). On the opposite, spontaneous breathing maintains inspiratory muscles tone and reduces diaphragm dysfunction (6). Diaphragmatic contraction during inspiration preserves distal airway patency and avoids atelectasis in the dependent part of the lung; it leads to a better lung aeration and optimizes ventilation-perfusion matching, improving gas exchanges and potentially reducing hyperinflation of non-dependent regions (7-9). These data could suggest a protective and therapeutic role of spontaneous breathing in patients with mild ARDS (10), as also confirmed by experimental data from Yoshida et al (11). They

showed that in severe ARDS avoidance of spontaneous breathing reduces lung injury; instead in case of mild or moderate ARDS spontaneous ventilation could prevent worsening of injury and improve pulmonary function by means of more lung recruitment.

Pleural pressure during AMV is lower than during CMV, leading to different hemodynamic consequences. In fact, the venous return to the right ventricle is less impaired during AMV than during CMV, while the left ventricular afterload is increased. This could cause the reduction of cardiac output where ventricular function is impaired. However, the net effect of spontaneous breathing on hemodynamics depends on the balance between intrathoracic pressure, baseline ventricular filling and the ventricular contractile function (9,12).

Physiological advantages of spontaneous breathing may result in better clinical outcomes. Putensen and colleagues reported reduced length of stay in intensive care unit in patients at risk of ARDS undergoing AMV (13). In an experimental study, Xia et al. demonstrated that spontaneous breathing effort ameliorates lung function and decreases lung inflammation's markers as opposed to CMV (14).

Drawbacks of spontaneous breathing

It is crucial to underline that spontaneous breathing effort carries also negative effects, both for the injured lung and for the diaphragm (1).

First, spontaneous breathing effort is associated to an increased Work of Breathing (the amount of effort used to expand lungs, determined by lung and thoracic compliance, airway resistance and by the use of muscles) that causes increase of oxygen consumption. In some patients, heart failure could develop after resuming of respiratory efforts.

Recently, the term P-SILI (Patient self-inflicted lung injury) was introduced, to identify the injury that could develop in the lungs of a spontaneously breathing patient (15). The adjunct of the negative pleural pressure generated by patient's inspiratory effort to the positive alveolar pressure of the mechanical breath results in an increased trans-pulmonary pressure that increases tidal volume and contributes to lung injury (9). Whereas the normal lung is able to tolerate very large increases of tidal volume, the already injured lung is more susceptible to the ventilation-induced lung injury ("two hit" concept) (15), and the application of safe tidal volumes during AMV is not always possible (16). Furthermore, the negative inspiratory pressure during spontaneous breathing increases transvascular pressure, causing fluid shift from intravascular to interstitial space and resulting in edema, especially when vessel permeability is increased due to inflammatory stimuli (15). The inhomogeneous distribution of transpulmonary pressure swings is also involved in the progression of lung injury. In healthy lungs, the swings of local pleural pressure are distributed uniformly across the lung surface ("fluid-like" behavior) resulting in uniform change in transpulmonary pressure, and the resultant lung ventilation is homogeneous. On the contrary, injured lungs ("solid-like"

behavior) shows heterogeneous transpulmonary pressure swings and a heterogeneous lung expansion. In this context, in case of spontaneous effort, additional lung damage might be directly linked to the increase of tidal volume derived from occult pendelluft (the movement of gas between regions with different time constants), which dramatically increases regional distension of already injured lung regions (17). In this context lung protective ventilation is not just supportive but it is also a prophylactic therapy to minimize SILI (15,18).

Lastly, during AMV asynchronies could develop between the patient and the ventilator, leading to high tidal volumes, to ineffective ventilation or to wasted muscular efforts (19).

Monitoring during spontaneous assisted breathing

Spontaneous breathing is a double-edged sword and the monitoring of patient's effort and lung-distending pressure is important; many different methods have been described (20). The reference method to measure the patient's muscular effort (Pmus) is esophageal pressure (Pes) through esophageal catheter. This technique is far from being widespread clinical routine, but it remains the gold standard method for the validation of new techniques introduced in clinical practice (21).

P0,1 is one of the more robust, non-invasive and broadly used methods to monitor breathing effort. It indicates the airway pressure drop in the first 100 milliseconds of an inspiration against occluded airway and it mainly represents the central respiratory drive (22).

The measurement of the Pmus index (PMI) is a technique based on the interruption of the inspiratory flow. PMI can be calculated as the difference between the elastic recoil pressure of the respiratory system, which is represented by the plateau pressure during an end inspiratory occlusion, and the total positive pressure applied to the airways by the ventilator (pressure support and positive end expiratory pressure). PMI is a sensitive indicator of inspiratory effort, and gives a good estimate of the pressure generated by the inspiratory muscle at end inspiration (23).

The monitoring of the electrical activity of diaphragm (EAdi), besides driving NAVA mode of ventilation, provides an excellent monitoring of patient's inspiratory activity and of the presence of asynchronies (24).

Lastly, a bedside tool available to monitor breathing effort is diaphragm ultrasonography. This methodology is increasingly used because it does not need patient's transportation, it gives functional information about the muscle itself and it is reproducible if follow up is necessary (25).

Even now, it is quite uncommon in clinical practice to measure respiratory system mechanical properties (driving pressure and compliance) during PSV, despite plateau pressure and driving pressure are extensively shown to be related to patient outcome during CMV. Preliminary data produced by our group show that driving pressure meas-

ured during PSV is related to patient outcome and could be introduced in the bedside monitoring of intubated spontaneously breathing patients (26).

Conclusion

Spontaneous assisted breathing is an attractive option for the clinician, because it can bring many advantages to the patient. Nevertheless, to exerts its positive effects, AMV needs to be strictly monitored and accurately tailored, basing on patient's respiratory, hemodynamic and neurological status.

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Session III

TRANSFUSION, COAGULATION AND FLUIDS

9 Patient Blood Management

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Patient blood management (PBM) is a multimodal concept that aims to detect, prevent and treat anaemia, optimise haemostasis, minimise iatrogenic blood loss, and support a patient-centred decision to provide optimal use of allogeneic blood products. PBM is intended to reduce 3 major risks as follows:

(1) anaemia - before surgery, about 30% of non-cardiac surgery patients have anaemia with an increased risk of RBC transfusions, complications and post-operative mortality. Consequently, the diagnostics and (if medically possible) the therapy of anaemia are important elements of PBM. Since anaemia in many of these patients is based on a treatable iron deficiency, it is fundamentally crucial to identify anaemic patients and/or iron deficient patients at an early stage (2 to 4 weeks before surgery). The preoperative diagnosis and therapy of anaemia should also be proceed even if the time interval before surgery is shorter in order to enable a more rapid haemoglobin increase after surgery, whenever necessary.

(2) blood loss - The prevention and minimisation of unnecessary blood losses is essential to counteract the occurrence of hospital-acquired anaemia. The following objectives should be pursued: - reduction of the number of blood withdrawals to the necessary minimum, - use of blood sampling tubes with the smallest volume sufficient for the analysis (e.g. use of smaller tube sizes or minimising the filling level of the tubes), - avoidance of discarding diluted blood residues in withdrawal syringes by using closed blood sampling systems. Other important single PBM measures are: coagulation SOPs, maintaining pH, temperature and calcium levels among others.

(3) RBC transfusion - The objective of RBC transfusion is the assurance of a sufficient global oxygen supply and the avoidance of potential complications

which might be associated with acute anaemia. However, a transfusion is the last resort in the treatment of anaemia if a causal therapy of the anaemia had not been possible or satisfactory before. Novel data suggest a safe corridor of a hemoglobin of 7-9 g/dl in clinical medicine. A restrictive transfusion regime in cardiac surgery patients suggested a benefit in comparison to a more liberal transfusion strategy.

(4) study - In a prospective, multicenter study, surgical inpatients from four

German University Hospitals (Frankfurt, Bonn, Kiel and Muenster) were analyzed before (pre-PBM) and after the implementation of PBM. PBM program included multiple measures (ie, preoperative optimization of hemoglobin levels, blood-sparing techniques, and standardization of transfusion practice). Primary aim was to show non-inferiority of the PBM cohort with a margin of 0.5%. Secondary endpoints included red blood cell utilization.

A total of 129,719 patients discharged between July 2012 and June 2015 with different inclusion periods for pre-PBM (54,513 patients) and PBM (75,206 patients) were analyzed. The primary endpoint was 6.53% in the pre-PBM versus 6.34% in the PBM cohort. The noninferiority aim was achieved ($P < 0.001$). Incidence of acute renal failure decreased in the PBM cohort (2.39% vs 1.67%; $P < 0.001$, regression model). The mean number of red blood cell transfused per patient was reduced by approx.. 20% ($P < 0.001$). The implementation of PBM can be achieved even in large hospitals without impairment of patient's safety.

Trial Registration: PBM-Study ClinicalTrials.gov, NCT01820949

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10 Volume loading – Is it possible to make accurate assessment? Opterećenje volumenom – Da li je moguća precizna procena?

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Perioperativna procena hemodinamskih promena i srčane (novonastale) disfunkcije je kompleksan i dinamičan proces na koji utiče niz faktora: hemodilucija, redistribucija cirkulišućeg volumena, perioperativni sistemski inflamatorni odgovor, krvarenje, promene kontraktilnosti miokarda i promene kardiorespiratorne sinergije.

Decenijama hvaljen i osporavan plućni arterijski (PA) kateter i termodiluciono merenje srčanog minutnog volumena i dalje su zlatni standard hemodinamskog monitoringa sa kojim se porede svi savremeni sistemi monitoringa. Merenjem pririsaka u plućnoj i sistemskoj cirkulaciji kao statičkih parametara, pritisaka punjenja desne i leve komore, centralnog venskog (CVP) i plućnog kapilarnog okluzionog pritiska (PCWP) procenjuje se opterećenje komora volumenom. Kako je promena kontraktilnosti i komplijanse komora, kod kritično obolelih, dinamična, proizilazi da pritisci punjenja nisu pouzdan parametar opterećenja volumenom i distribucije volumena.

Okluzijom plućne arterije, balončićem na vrhu PA katetera meri se pritisak (hidrostatski) između mesta okluzije i zatvorene mitralne valvule. Trenutak zatvaranja mitralne valvule označava početak sistole leve komore (LK) i merenjem PCWP-a meri se pritisak u levoj komori izazvan pristiglim volumenom na kraju dijastole (*left ventricular end-diastolic pressure*-LVEDP).

Koristeći izmerene pritiske i volumene izračunavaju se drugi hemodinamski parametri: sistemski vaskularni otpor (SVR) i plućni vaskularni otpor (PVR). Rad leve i desne komore procenjuje se kroz indeks rada (LVSWI i RVSWI) ostvarenog za dati udarni volumen u funkciji razlike u pritiscima opterećenja volumenom i perifernog otpora (plućne ili sistemske cirkulacije).

Pri tumačenju hemodinamskih parametara, posebno pritisaka kao pokazatelja opterećenja volumenom treba imati u vidu da promena pritiska zavisi ne samo od volumena već i od komplijanse (krutosti) srčanih šupljina koja je promenljiva u uslovi-

ma koronarne hipoperfuzije, infarkta miokarda, naglih promena arterijskog pritiska ili akutne promene funkcije srčanih valv

Uvođenjem petlje pritisak/volumen leve komore (*P/V loop*), a odnedavno i desne komore, značajno je doprinelo boljem razumevanju, razlike između levog i desnog srca. Procena sistolne i dijastolne funkcije (disfunkcije), leve i desne komore, nezavisno kao i njihove međusobne interreakcije učinila je i strategiju lečenja sofisticiranom.

Međutim, potreba za kontinuiranim monitoringom kod izraženih hemodinamskih promena, uvela je u svakodnevnu kliničku primenu kontinuirano merenje srčanog minutnog volumena (CCO) i saturacije hemoglobina mešane venske krvi (SvO_2) uz izračunavanje ostalih hemodinamskih parametara udarnog volumena i od njega zavisnih parametara.

Invazivnost metode i nemogućnost procene opterećenja volumenom korišćenjem PA katetera, uvode u upotrebu druge metode (možda i manje invazivne) gde se kalibracija ne vrši termodilucijom već litijumom- LiDCO i transpulmonalnom termodilucijom - TPTD uz anlizu krive arterijskog pritiska – PCCO čime se određuje srčani minutni volumen i procenjuje distribucija intratorakalog volumena u korelaciji sa fukcionalnim kapacitetom LK. Uvođenje TPTD u kliničku praksu, kroz procesore konzola za monitoring (PiCCO - Pulsion i EV 1000 –Edwards) udarni volumen LK se meri kroz površinu grafičkog prikaza arterijskog pritiska uz istovremeno merenje distribucije volumena u intratorakalnom prostoru.

Grudni koš ima vrlo ograničene mogućnosti ekspanzije. Sastoji se od tri osnovna prostora/odeljka: volumena intratorakalnog gasa, intratorakalnog volumena krvi (ITBV) i ekstravaskularne tečnosti u plućima (EVLW).[21]

Analiza forme talasa arterijskog pritiska (*Pulse Contour Analysis*) savremeni je algoritam, koji se koristi u novijoj tehnologiji hemodinamskog monitoringa. Primenjeni algoritam integriše sve relevantne parametre za izračunavanje srčanog minutnog volumena (Pulse Contour Cardiac Output – PCCO) (udarni volumen leve komore, komplijansu i impedancu arterijskog sistema u relaciji s perifernim sistemskim vaskularnim otporom).

Monitoring sistemi u koje je integrisan algoritam analize forme arterijskog talasa (*puls conture analysis*) dele se u dve grupe (kategorije): one kod kojih je potrebna kalibracija i one koji se ne kalibrišu. Zajednička karakteristika ovih sistema jeste da nisu precizni kod pacijenata sa stenozom/insuficijencijom aortne valvule i pri upotrebi intraaortne balon pumpe i poremećaja ritma.

Monitoring platforme sa kalibracijom

Za kalibraciju sistema i izračunavanje srčanog minutnog volumena koristi se transpulmonalna diluciona metoda. Aplikacijom različitih indikatora dilucije: litijum, indocijan zeleno i termodilucija (rastvorima niske temperature) menja se njihova koncentracije obrnuto proporcionalno cirkulišućem volumenu. Prednost ovih sistema je što pri merenju srčanog minutnog volumena mere individualnu komplijansu i impendan-

cu arterijskog sistema svakog bolesnika, i zbog toga treba da se kalibrišu na osam sati. Ukoliko je pacijent hemodinamski nestabilan, i češće.

U kliničkoj praksi su zastupljene monitoring platforme za transpulmonalnu termodiluciju dva proizvođača: *PiCCO* (*Pulsion Medical Systems*, *Germany*); *Volume Veiw/EV1000* (*Edwards Lifesciences*, *USA*). Transpulmonalna termodilucina metoda (TPTD) smatra se manje invazivnom od konvencionalne sa PA kateterom. Da bi se koristio PCCO algoritam, koriste se posebno dizajnirani CV kateter i arterijska kanila (najčešće plasirana u femoralnu ili radijalnu arteriju) sa termistorom na vrhu. Može se meriti: srčani minutni volumen – CO; frekvenca srčanog rada – HR; arterijski pritisak – AP; indeks udarnog volumena –SVI; varijacija udarnog volumena – SVV i sistemski vaskularni otpor – SVR. Dok su izvedeni (izračunati) parametri: ukupni volumen na kraju dijastole – GEDV; kardijalni funkcionalni indeks – CFI; intratorakalni volumen krvi – ITBV i ekstravaskularna tečnost u plućima – EVLW.

Ukupni volumen u srcu na kraju dijastole (GEDV) čini volumen pretkomora (desne i leve) i komora (desne i leve) na kraju dijastole. Ukupni torakalni volumen krvi (ITBV) obuhvata volumen krvi u srcu i plućima (PBV).

Prednost ove metode je što može da izmeri volumen ekstravaskularne tečnosti u plućima (EVLW), koja obuhvata intersticijalnu i alveolarnu tečnost. EVLW predstavlja razliku ukupnog intratorakalnog termalnog volumena i ukupnog intratorakalnog volumena krvi.

EVLW = ITTV – ITBV

Procena ekstravaskularne tečnosti u plućima (EVLW) veoma je bitna. Zavisi od niza faktora: propustljivosti alveokapilarne membrane (ARDS, inflamacija), promene filtracionih pritisaka i srčane funkcije. Normalne vrednosti EVLW su 3–7 ml/kg. Odnos ekstravaskularnog volumena (EVLW) i volumena krvi u plućima (PBV) predstavlja indeks pulmonalne vaskularne permeabilnosti (PVPI), pokazatelj propustljivosti alveokapilarne membrane. PVPI = EVLW/PBV.

Brojnim kliničkim studijama pokazana je visoka senzitivnost EVLW i PVPI, kao nezavisnih parametara u proceni mortaliteta kod bolesnika sa ARDS-om,[28] akutnim oštećenjem pluća ili pacijenata sa sepsom. Ukoliko je PVPI veći od 3 i EVLW ≥ 12 ml/kg, onda se sigurno radi o povećanoj propustljivosti alveokapilarne membrane.

Detaljno poznavanje algoritama integrisanih u pojedinačne sisteme monitoringa preduslov je izbora pravog, i prema kliničkim okolnostima, odgovarajućeg monitoringa u lečenju kritično obolelih sa dinamičnom fluktuacijom hemodinamike

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11 Management of bleeding and coagulopathy during major trauma resuscitation

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Introduction

The leading cause of death after severe trauma is bleeding. The bleeding can be prevented, first of all by rapid transport and adequate initial treatment of traumatized by Emergency Medical Services, a well-organized reception at the Trauma Center, which must have the technical capabilities for quick and accurate diagnosis of injuries, as well as the use of Damage control resuscitation (DCR) and Damage control surgery (DCS) treatment strategy. For a good trauma outcome, understanding of the pathophysiology of endogenous acute coagulopathy, which occurs immediately after injury, as a result of activation of the systemic inflammatory response and coagulation cascade, is also important as well as their timely treatment.

Hemostasis and fibrinolysis

Hemostasis and fibrinolysis, are the consequence of a complex series of cascading enzymatic reactions. After the injuries of the vascular system, the hemostasis is activated, vasoconstriction occurs, and then in the second phase the platelets are activated and platelet plug is formed. Platelet aggregation allows for the von Willebrand factor. Procoagulants are in the inactive state, but when the blood vessel is damaged, blood is exposed to extravascular tissues, which are rich in tissue factor (TF). The complex of TF and factor VIIa activatecascade enzyme reactions termed theexterinsic pathway of coagulation. The result of this reactions is the enzyme complex activator of prothrombin, which inactive prothrombin translates into active thrombin. Thrombin further clears fibrinogen to monomers that connect to build insoluble fibrin, that is, a fibrin net in which the blood cells catch and form a blood clot. Thrombin also activatesthe intrinsic pathway of coagulation by cascading activation of coagulation factors XI, IX, VIII, V, through a positive feedback system, leading to further propagation of the clot.

The balance between the procoagulant and anticoagulant system allows the blood to be in liquid state and generate a clot that islocalized at the site of the injury.Multiple anticoagulant mechanisms include:1.Antithrombin III, which inactivates thrombin and activated factor X. Protein C - which together with the protein S inactivates factor V and factor VIII; 2. The fibrinolytic system - plasminogen activator (tPA) and urokinase-type plasminogen activator (uPA), released from a damaged vessel endothelium, activates the inactive plasminogen to plasmin; 3.On the endothelial surface is thrombomodulin, which binds to thrombin and inactivates it. This complex also activates protein C.

Acute traumatic coagulopathy or trauma-associated coagulopathy

Acute traumatic coagulopathy occurs in 25-30% of traumatized patients and its occurrence is in correlation with the severity of injury. In comparison with traumatized patients without coagulopathy, traumatized with Acute traumatic coagulopathy have a 3 to 4 times higher mortality. Although the pathophysiology of ACT is not a complete investigated, it is considered that the most likely mechanism is dysregulated activation of the thrombomodulin-protein C system.

Tissue hypoperfusion leads to damage to the endothelium and increased release of thrombinodulin, which binds thrombin. This complex activates Protein C. Thus, the role of thrombin from the procoagulant becomes anticoagulant. The level of tissue plasminogen-tPA activator increases, which leads to the conversion of plasminogen to plasmin and to the hyperfibrinolytic state.

Dilution of coagulation factors occurring due to administration of excessive amounts of crystalloid and colloid solution during resuscitation and hypothermia that also directly reduces the activity of coagulation factors, leads to resucitation-associated coagulopathy.

Early control of hemorrhage and Damage control resuscitation

The speed with which the bleeding is stopped determines the outcome of hemorrhagic shock. Even in prehospital management, on the field, measures to stop the bleeding should be applied: hemostatic bandage, tourniquet. Early administration of tranexsmic acid, within 3 h of injury, is recommended because it reduces the overall mortality and transfusion requirements for bleeding patients. If the bleeding source is not known, conduct a imaging without delay: ultrasonography, radiographic, contrast-enhanced CT.

Damage control resuscitation (DCR) is the resuscitation concept that involves initial approach to severely wounded bleeding patient where the emphasis is on early and aggressive correction of coagulopathy. The main components of DCR are: permissible hypotension, namely restrictive application of intravenous fluids, early balanced use of blood and blood products, whole body warming, acidosis treatment.

Initial management of bleeding and coagulopathy

Mechanism of injury, patient physiology, patient's response to initial resuscitation and application specific scores may be useful in predicting critical bleeding, and early activation of the massive transfusion protocol, which includes simultaneous administration of fresh frozen plasma, platelet concentrates and red blood cells in a ratio of 1: 1: 1 or fibrinogen concentrate andred blood cells according to Hb level. The optimal fixed ratio of units of plasma: platelets: red blood cells is not yet defined, but it is certainly in the range of 1:1:1 to 1:1:3. Administration of blood products in a fixed ratio to the bleeding patient can result in some unnecessary use of blood products, which can also have harmful effects. Component therapy guidance, along with estimation of treatment effect, can be achieved by rapid point-of-care (POC) coagulation testing: thromboelastography (TEG), rotational throboelastometry (ROTEM). Goal directed resustitation significantly diminish transfusion requirement and improves outcome due to specific and rapid correction of coagulation abnormalities. Hypocalcaemia is a common complication of massive transfusion and it is necessary to overcome calcium deficiency using intravenous calcium gluconate or calcium chloride.

Management of bleeding in patients receiving Direct Oral Anticoagulants (DOAC)

The use of long-term anticoagulant therapy for the treatment and prevention of thrombosis is widespread.In patients who were on oral anticoagulant therapy prior to injuries, the risk of bleeding is considerably higher.

Vitamin K antagonists (Warfarin) works by blocking vitamin K in the liver and so inhibiting the production of the vitamin K dependent clotting factors II, VII, IX, and X. In the case of massive bleeding in these patients, the reversion is achieved by using prothrombin complex concentrate (PCC) at a dose of 25-50U / kg and suplement with vitamin K, adjusted to actual INR.

Reversal of direct thrombin inhibitors (Dabigatran) and Direct Factor Xa inhibitors (Rivaroxaban, Apixaban) cannot be achived with PCC.For dabigatran, there is an specific antidote- Idarucizumab, a monoclonal antibody which binds dabigatran and neutralises its anticoagulant effect. Since Idarucizumab is not a widely available drug, hemodialysis can be used to emergency reverse the effect of Dabigatran, because Dabigatran is poorly bound to plasma proteins and extensively excreted via the kidney. Andexanet alfa, a recombinant human factor X, which binds direct factor Xa inhibitors such as apixaban, edoxaban, rivaroxaban is still in the clinical trial stage, and is not approved for clinical use. Also, as these drugs are strongly bound to plasma proteins, hemodialysis can not be used for reversion. Apixaban, edoxaban, rivaroxaban may be eliminated by plasmapheresis, but this in emergency situations is hardly feasible and depends on the technical capabilities. If specific antidotes are unavailable, in the case of uncontrolled bleeding, in patients withDOAC therapy, high doses of PCC / aPCC (25-50 U / kg) should be used. It can also be considered the use of recombinant activated

factor VII. When use the high-dose PCCs, there is a incresed risk of both arterial and venous thrombosis during the recovery period. Therefore, it is necessary, after control of bleeding has been achived, to continue, as soon as possible, with thromboprophylaxis.

Conclusion

Improvement in outcome in bleeding trauma patient, largely depends on the early diagnosis of trauma-induced coagulopathy and its appropriate treatment. High-quality studies have proven that early application of high-gradefixed ratio of units of plasma: platelets: red blood cells significantly increases survival. The use of specific coagulation factors (fibrinogen, prothrombin complex and rFVII) shows encouraging results, but still require high quality clinical studies to prove this.

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Session IV:
CRITICAL CARE

12 Do we need scoring systems to identify critically ill people?

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Critically ill patients are those whose general condition (dysfunction or disease of multiple organs and/or organic systems), prognosis and survival depend largely on the application of modern techniques and therapy. These are patients who need intensive care and therapy for more than 5 days and have a 20% risk of dying (1).

In most of life-threatened patients, the dysfunction of multiple organs and organ systems is preceded by an aggravation of the general condition, but the signs of this deterioration are often unrecognizable. For the early identification of life-threatened patients, early warning systems have been created, which include monitoring of basic vital parameters, their scoring and summing up results in the final score. The vital parameters to be followed (according to the National Institute of Health and Clinical Practice (2) are systolic blood pressure, heart rate, respiratory frequency, blood oxygen saturation measured by a pulse oxymeter, temperature and level of consciousness. The use of score systems accelerates and facilitates decision-making regarding accommodation or relocation of patients to intensive care units (ICU) or high dependence units (HDU), reduces the number of hospital days, prevents cardiac arrest and reduces mortality rates in hospital conditions (3) (4). In a prospective study by the authors from Brazil, it has been proven that every hour of delayed relocation of patients from the department to (ICU) was associated with a 1.5% increase in the possibility of fatal outcome in ICU. (5)

A strategy for critically ill patients should be based on the so-called 'track and trigger' score system or clinical assessment. Which scoring system will be used is the point of agreement in the hospital and in relation to the risk of generalized deterioration, patients are classified as low, medium or high risk for further deterioration. Patients who are classified as life-threatening form a separate group, follow-up procedures are absent and are immediately placed in intensive care units. In patients who are in the middle or high risk group, for further deterioration, in addition to the application of

adequate treatment measures, the plan is made or for further monitoring, or, in consultation with doctors from the ICU, transfer to the ICU (2). The identification of patients belonging to a group of life-threatened on general wards that can benefit from treatment in ICU nad HDU is therefore very important. In the United Kingdom, research has shown (6) that changes in vital parameters have preceded cardiac arrest 24 hours, and that as many as 23,000 intrahospital heart failure can be prevented by better monitoring of vital parameters. Early identification of this group of patients also contributes to reducing mortality, shortening the length of stay and costs of treatment. An analysis of 576 deaths by the National Patient Safety Agency (NPSA) over a period of one year within the observational study found that in 66 patients (11%) the deteoriation was not recognised on time(7).

An ideal score system should be based on a simple measurement of daily measurable vital parameters that can be applied, well calibrated, highly discriminated, applicable to all patients in all countries, and has the ability to predict the functional status and quality of life after discharge from ICU or HDU. No scoring systems meets all these criteria in full.

The importance of scoring systems is multiple and almost all have common characteristics:

- warning systems can indicate deterioration of patients' condition and provide invaluable assistance in making final decisions;
- scoring systems can provide a stable basis for studying the efficiency of applied medical methods, advocacy, and cost-effectiveness of applied actions in departments and
- the quality of the provided health care and care at the department can only be seen through the objective parameters and indexes

Early warning systems are systems that identify patients with a risk of developing a fatal outcome e.g. patients who have criteria for admission to ICU. Among these scoring systems, the Modified Early Warning Score (MEWS) is specially highlighted. It is a simple score system that enables improvement of quality and safety in terms of providing medical assistance to patients both in general surgical and internal medicine departments, as well as in ICU and HDU. MEWS enables efficient identification of hospitalized patients requiring a higher level of emergency medical care and therapy, as well as patients at risk of death in a hospital (8). The MEWS score is simply calculated using 6 physiological parameters: systolic pressure, heart rate, respiratory rate, body temperature, diuresis, neurological so-called AVPU score (A - Alert - awake, V - Voice - responds to the call, P - Pain - reacts to pain, U - Unresponssive - does not respond). Each parameter ranges from 0 to 3 points, and summed points form the final MEWS score (Table 1). MEWS parameters provide better information when they are grouped and can provide a patient state over a long period of time. Repeated measurements of parameters allow monitoring of the clinical state of patients after the application of certain medical interventions. The

moment we identify patients with MEWS of 4 or more, his condition should be treated as life-threatening. This score is also an alarm for the implementation of medical interventions, with rapid transport to the appropriate institutions and departments, with the possible application of advanced life support (ALS). In addition to the MEWS score, NEWS (9) and the Quick Sequentional Organ Failure Assessment (10) are used.

There are several so-called Rapid Response Systems (RRS) systems with the teams wich can rapidly identify the general condition of the patient and apply early intervention in these patients. These are, for example, emergency teams (Medical Emergency Teams (MET), Rapid Response Teams (RRT), etc. There are numerous research that examined the effectiveness of rapid response system implementation in everyday practice. In the Oglesby et al survey (11), a system analogous to the generally accepted system called the "Door-to-Needle time", (ie the time that has elapsed since the moment of myocardial infarction with elevation of the ST (STEMI) to the application of thrombolytic therapy) was recommended. This system was named by the researchers Score to Door Time (STDT), that is, the time it takes for patients to be transfer to the ICU with assistants within the rapid response system. In this pilot, the multicentre study included 17 hospitals (177 patients) from Australia, Europe and America, of which 9 university hospitals, with an average of over 600 beds and intensive care units with an average of 20 beds. The so-called "trigger" was recorded i.e.the time when the patient had a high values of MEWS score, which should alert the rapid response team. In addition, the value of APACHE II was recorded at admission in ICU. Also, they measured the time from so-called the "trigger" time to time of admission in the ICU and the median was 4 hours and 32 minutes. (scheme 1). Of the 17 centers that participated in the study, the largest number was from UK (13 centers) with 142 patients (80.2%) and in these patients the STDT median was longer and amounted to 4 hours and 32 minutes. In 94 patients STDT was recorded for more than 4 hours. Reasons for delayed admission to ICU's were clinically justified in 14 (14.9%) patients, in 40 patients (42.6%) this delay was without justified reason, and for the remaining 40 patients the reason for delayed transfer to ICU was waiting for the opinion of an elderly specialist or lack of available beds inICU. In this study, three STDT predictors were selected: treatment in the UK, higher APACHE II score and age of patients. There is no significant correlation between the MEWS score system and STDT. The conclusion of this study is that STDT monitoring is very useful and represents a contribution to previous research on the role of warning systems and the presence of a rapid response team in hospitals.

Contrary to the previous understanding that the implementation of warning systems requires time and special equipment, based on previous research, the need for these scoring systems to be used in the timely identification of life-threatened patients has been demonstrated. Lately, automated monitors are now increasingly available to combine vital parameters with the ability to respond quickly by the RRT based on a disorder value of one or a combination of several vital parameters.

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13

Sedation in the Intensive Care Unit

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Critically ill patients during the treatment in the intensive care unit (ICU) are exposed to various interventions and stressors from the environment that represent a significant source of discomfort. Physical and psychological sequelae among survivors may sustain long after critical illness and they are defined as the post- intensive care syndrome (PICS).(1) Sedative and analgesic medications are commonly administered to provide comfort and improve tolerance to ICU management. Some conditions in critically ill require a continuous deep sedation like intracranial hypertension, severe respiratory failure or refractory epileptic status. However, the current evidence reveals that a deep sedation should always be avoided as long as there is no mandatory clinical indication. (2) It has been recognized that pain and delirium if not addressed properly, along with the oversedation are associated with an increased morbidity and mortality. (3) Routine monitoring with reliable tools enables early detection of agitation and pain thus avoiding excessive sedation and harsh consequences of delirium. The Richmond Agitation-Sedation Scale (RASS) and Riker Sedation-Agitation Scale (SAS) have been broadly validated and shown to be reliable, subjective scales, suitable for daily use. The treatment goal should be to have an alert, cooperative patient who can tolerate the required interventions.

An individualized pharmacological approach implies selection of medications that meet patient's needs at the same time taking into account the presence of organ dysfunction that may influence drug metabolism and predispose a patient to the excessive side effects of sedation.

Sufficient analgesia should be provided for all ICU patients and it represents the cornerstone of the „analgesia first" concept of sedation. (4) Opioids are among the most commonly used sedative and analgesic agents. Context-sensitive half-time should be considered when opioids are meant to be used for a continuous prolonged sedation. Remifentanil, with the shortest context-sensitive half-time and a metabolism independ-

ent of renal and hepatic function, provides the fastest recovery after cessation of continuous infusion. However, it didn't gain much popularity in the European ICUs, possibly because of the higher incidence of pain compared to fentanyl and morphine when stopping the infusion.(5)

Benzodiazepines have the longest history and remain the most widely used sedatives in the critically ill. Prolonged sedation because of their unpredictable accumulation has also been recognized for a long time. Benzodiazepine use in the ICU has been identified as an independent risk factor for delirium.(6) The latest guidelines recommend non-benzodiazepine sedation in ICU whenever feasible.(2)

Propofol allows rapid awakening after a short-time use, but the substantial accumulation with the prolonged infusion may also cause prolonged sedation. A serious adverse event, propofol infusion syndrome (PRIS), usually after long infusion (>48 hours) and high doses (>70mcg/kg/min), is associated with high mortality.(7)

Dexmedetomidine, a selective α-2 agonist produces a unique feature of sedation, very dissimilar to other sedative drugs. Patients respond to verbal stimulation, communicate and cooperate with ICU staff maintaining good neurocognitive characteristics during long-term sedation. (8) It has been demonstrated that an over-night infusion of dexmedetomidine significantly decreases the incidence of ICU delirium.(9) It appears, as suggested by current guidelines that it is a drug of choice for long-term light sedation in critically ill.(2) Besides, since it doesn't produce any clinically measurable respiratory depression, it is currently the only sedative drug indicated for continuous infusion in non-intubated patients.

Inhaled anesthetics have been recently introduced for sedation in critically ill. They offer a potential advantage in situations such as asthmatic and epileptic status, complex sedation, history of psychoactive substance abuse or chronic pain.(10) Limitations for their broader use are technical demands for special, miniature vaporizers, need for scavenging systems in the ICU and the cost of volatile agents.

The mounting evidence for adverse effects of prolonged sedation in the ICU has contributed to the development of strategies aiming to reduce adverse drug events, shorten mechanical ventilation, decrease ICU length of stay and hospitalization, reduce costs and avoid long-term psycho-cognitive consequences. Current guidelines recommend a protocolized sedation in mechanically ventilated patients based on analgosedation which is advantageous compared to hypnosis based approach, along with nocturnal sleep promotion.(2,11) Attempts have been made to implement the „no sedation" approach in the ICU.(12) These encourage control of environmental factors, such as light and noise, harmonization of patient activities with circadian rhythm and require adequate staffing and family support.

Further studies are needed to elucidate the association of non-pharmacological interventions with long-term psychological outcomes.

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14

What is the ideal fluid in critical care?

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Introduction

Fluid therapy is one of the main aspects of treatment of critically ill patients. Despite the fact that reanimation fluids exist for more than one century, this is still an important topic especially after new technical improvements and changes in guidelines for treatment of sepsis, trauma and postoperative complications. Generally speaking, the vast majority of open questions are divided into two groups: the optimal fluid balance group and the group of optimal type of fluids used for the treatment of different critical diseases and their phases. The conceptual model of Hoste et al[1] encompasses both groups of questions into one growing paradigm stating that fluid therapy is, just like other treatments with optimal dose, and different adverse effects, above all individually oriented. And whereas, in the area of optimal fluid balance, there is a new 4 D model by Malbrainet al[2] indicating change, in the area of "ideal" fluid new studies are needed.

The choice of fluids during reanimation phase or "Mission possible"

In the 19th century, the English scientist Thomas Graham divided fluids into crystalloids and colloids according to their diffusion characteristics related with the passing through semipermeabile membrane[3]. Similar to that, reanimation fluids are divided into crystalloids which "are electrolyte solutions with small molecules that can freely diffuse throughout extracellular space" and colloids which" contain large, poorly diffusible molecules that create an osmotic pressure by keeping the water in the vascular space"[4]. Different use of crystalloid and colloid fluids for reanimation is selected according to local guidelines, economic aspects and patient specific factors. This is due to the lack of precise guidelines, at least according to previous data. In the international study of prevalence from 2010, 391 intensive care units were studied in terms of the use of crystalloids or colloids for reanimation of critically ill patients[5]. The study showed

that there were variations among different countries, for example, colloids were more frequently used in The United Kingdom and China whereas crystalloids were more frequently used in The United States. This study also determined that more reanimation episodes were treated with colloids (48%) than with crystalloids (33%)

Table 1. Cristalloids vs. colloids

	Study	Overall mortality	Mortality 90 days	Blood transfusion	RRT	Allergy
Starch RR (95%CI)	Perel[8] 2013.	1.10 (1.02-1.19)	/			
	Lewis[7] 2018.	0.97* (0.86-1.09)	1.01* (0.9-1.14)	1.19* (1.02-1.39)	1.3* (1.14-1.48)	2.59 (0.27-24.91)
Dextran RR (95%CI)	Perel[8] 2013.	1.24 (1.94-1.65)	/			
	Lewis[7] 2018.	0.99* (0.88-1.11)	0.99* (0.87-1.12)	0.92 (0.77-1.10)	/	6.0 (0.25-144.93)
Gelatin RR (95%CI)	Perel[8] 2013.	0.91 (0.49-1.72)	/			
	Lewis[7] 2018.	0.89 (0.74-1.08)	0.89 (0.73-1.09)	5.89 (0.24-142.41)	/	21.61 (1.22-384.05)
Albumin and FFP RR (95%CI)	Perel[8] 2013.	1.01 (0.93-1.10)	/			
	Lewis[7] 2018	0.98* (0.92-1.06)	0.98* (0.92-1.04)	1.31 (0.95-1.8)	1.11 (0.96-1.27)	0.75 (0.17-3.33)

Alb-albumin; FFP-fresh frozen plasma; RRT- renal replacement therapy; RR – relative risk; CI-confidence interval; * moderate certainty.

Ever since 1997, Cohrane group has studied the effect of crystalloids and colloids on the mortality of critically ill patients. According to the results of this group's research from the year 2000, it was concluded that there were insufficient data to demonstrate greater efficacy of colloids versus crystalloids in blood volume expansion[6]. The study of Lewis et al[7] examined 69 randomized studies and 30 020 patients and in addition considered the effect of reanimation fluids on the frequency of blood transfusion and the need for renal replacement therapy in critically ill patients. The authors concluded that the use of starches, dextrans, albumin, fresh frozen plasma (moderate certainty of

evidence) and gelatins (low certainty of evidence) when compared to the use of crystalloids makes little or no difference when it comes to the mortality of critically ill patients (Table 1).

Conclusion

Based on the current evidence, it is likely that reanimation fluid selection does not have any influence on the mortality of critically ill patients. It appears that the use of starches does increase the need for transfusion and renal replacement therapy in these patients. New proposed model for Starling's model of glycocalyx disruption in endothelial dysfunction announces a new era in the studies related with reanimation fluid choice. Finally, the answer might be: - Crystalloid solution in balanced volume.

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Session V:

“MY WORST NIGHTMARE”

15 Just another hemodynamic instability

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Hemodynamic instability is defined as any instability in blood pressure which can lead to inadequate arterial blood flow to organs. I will present case of 50-year-old man who was undergone coronary artery bypass surgery 14 days ago. The early postoperative course was reported to be uneventful. He was discharged from the hospital at postoperative day 6. His past medical history was consistent with hypertension and hypercholesterolemia (HLP). His postoperative medications were aspirin (100 mg daily), Bisoprolol, Zofenopril, Furosemid and Rosuvastatin.

At discharge transthoracic echo was similar to preoperative, no pericardial effusion, LVEF 40%; and laboratory analysis in reference range. Patient was admitted to our hospital because he had an episode of fainting 3 days ago and one more episode of weakness, fatigue and mild dyspnoea 1 day ago. In the emergency department, during examination, patient had loss of consciousness for 1 min. At that moment, we thought about possible causes of this instabillity. Patient was admitted to intensive unit care. We performed physical examination and we found that patient is conscious, cold, pale colour of skin, regular pulse - sharp, small volume, heart rate 98 /min, arterial pressure 120/70 mmHg, with faint heart sounds, emphasized A2 of Aorta, no heart murmors, eupnoeic, respiratory rate 16 /min. Possible causes included acute malignant arrhythmia, acute myocardial infarction/ischemia, acute decompensation, pulmonary embolism or pericardial tamponade? We needed additional tests for making diagnosis.

Monitoring of hemodynamic instabillity can help determine which type of shock is present in a patient. We performed transthoracic echocardiography. There was no significant pericardial clot. Although ECG is a cheap and rapid diagnostic test, it has some limitations in the differential diagnosis. Acute pulmonary embolism (PE) is a frequent life-threatening condition. Careful diagnosis is important, and different diagnostic tests such as electrocardiogram (ECG), biochemical markers, echocardiogram, and comput-

ed tomography are required. Given the potentially devastating effects of missing a pulmonary embolism, a failure to make the diagnosis when it exists is of greatest concern, even if this results in an overreferral of patients. Late cardiac tamponade may present either early or late postoperatively and may be difficult to diagnose due to atypical clinical, haemodynamic or echocardiographic findings. Late cardiac tamponade occurring in a patient, is an extremely rare complication following coronary artery bypass surgery.

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It`s not over until it`s over: postoperative apnea in infants

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The preterm infant presenting for anaesthesia during the first 6 months of life is a major anaesthetic challenge. One of the most serious post-operative complications is apnoea with or without bradycardia.1 Reducing the risk of apnea and identifying infants at risk of apnea may reduce morbidity and guide clinicians on the optimal age for surgery and the length and intensity of post-operative observation.2

A lot has changed in neonatology and pediatric anesthesiology since the 1980s when the studies that formed the current recommendations for anesthesia and perioperative care for young infants at risk of post-operative apnea were conducted (in particular, the shorter acting anesthetic sevoflurane has replaced halothane, and surfactant administration has decreased lung morbidity in premature infants). The story of postoperative apnea began more than 30 years ago with an index case: death of a healthy former premature infant after an uneventful general anesthetic and post anesthesia care unit (PACU) for an inguinal hernia repair in which apnea and cardiac arrest occurred during transport to the ward. From 1982 to 1992, many studies investigated postoperative apnea in infants undergoing surgery during the initial months of life. These studies concluded that the incidence of postoperative apnea is inversely proportional to post-conceptual age (PCA); younger gestational age (GA) and anemia are additional risk factors; postoperative apnea can occur even though there is no preoperative history of apnea; the first apnea usually occurs in PACU, but it can also occur several hours later on the ward.3

Inguinal hernia (IH) is a common neonatal disease, particularly in premature and low-birth-weight infants. There is no agreement about the optimal time to repair the asymptomatic IH discovered in a premature infant. Multiple studies have reported postoperative apnea with routine doses of anesthetics and its association with GA less than 37 weeks or PCA under 60 weeks at the time of operation. In preterm infants un-

dergoing herniorrhaphy, episodes of apnea and bradycardia are likely during the postoperative period. Apnea in premature infants is associated with many complications such as bradycardia, cyanosis, brain damage, hypotension, hypotonia, hydrocephalus, neurologic complications, and even death. The main cause of apnea and respiratory problems in premature infants is an incomplete development of respiratory centers. Other factors, such as early fatigability of the diaphragm, airway obstruction, hypothermia, side effects of muscle relaxants, infections, sepsis, metabolic and cardiac diseases, and anemia have also been shown to be associated with apnea in these infants.

Although awake spinal or caudal blockade is recommended to provide safe anesthesia to ex-premature infants undergoing IH repair, many anesthesiologists prefer adding light general anesthesia because 1) awake spinal block carries a risk of failure, either directly or because the block wears off too quickly; 2) an awake infant sometimes needs some sedation (sugar, nitrous oxide, midazolam etc.) in order to remain still during the surgical procedure even if the block is excellent and 3) because it is easier to perform a regional block on an immobile target. Moreover, the advantages of awake regional anesthesia by comparison with modern general anesthesia are not evident.1

Balent et al4 investigated whether the use of caudal anesthesia with sedation (CAS) had theoretical benefits over general anesthesia (GA) in high risk neonates undergoing inguinal hernia repair and concluded that CAS (caudal block - 1 ml/kg of 0.2% ropivicaine combined with 5 μg of epinephrine per milliliter, sedation - a mixture of ketamine 3–4 mg/kg and midazolam 0.1 mg/kg injected intramuscularly) is a safe, effective anesthetic option for high risk neonates undergoing inguinal hernia repair and also that patients requiring conversion to GA from CAS may be at increased risk for complications. The possible lack of this study was that no regional block technique (caudal or ilioinguinal block, for example) was used in the GA group in order to avoid or reduce fentanyl use. Secondly, the dose of ketamine and midazolam administered IM in the caudal group was quite high and probably resulted in very deep sedation or general anesthesia in some cases: this probably explained some of the intraoperative or postoperative events observed in 24% of the patients. In fact, caudal anesthesia can be associated with other agents, resulting in titratable light general anesthesia. Brenner et al5 used IV sedation with nalbuphine 0.1 mg/kg and propofol 1 mg/kg (with supplemental doses of propofol 0.5 mg/kg if necessary) before performing a caudal block with 1 ml/kg of ropivacaine 0.2%. All infants were spontaneously breathing and received a mixture of oxygen in air by facemask. In the 89 infants born prematurely reported in their publication, 47 were operated upon before 46 weeks postconceptual age and received prophylactic caffeine to prevent postoperative apnea. Intraoperatively, 4 experienced apnea, 2 laryngospasm and 2 stridor: all these events were easily managed with short bag-valve-mask ventilation.

Veyckemans et al6 preferred using an inhalation agent such as sevoflurane because its effects on consciousness, ventilation and upper airway muscles are shorter lasting than those of IV anesthetics. The following technique was used in more than 250 infants

with neither major morbidity nor mortality. Anesthesia was induced with sevoflurane and an intravenous line was inserted as soon as the baby loosed consciousness. A caudal block was performed in the lateral decubitus position with 1 ml/kg ropivacaine 0.2% with epinephrine 1/400.000. The infant was turned supine as soon as the injection had been completed. A light level of anesthesia was thereafter maintained with sevoflurane around 2% in a mixture of air and oxygen administered via a facemask and a Mapleson D breathing circuit. Surgery started approximately 10 minutes after the caudal injection. Great care was taken to preserve the infant's spontaneous breathing but ventilation was easily assisted if necessary. An intraoperative episode of apnea occurred in 7 cases: all presented with at least one comorbidity and the episode was easily managed by bag-mask ventilation, 2 of those 7 cases also presented with a short-lasting episode of apnea in the PACU: which resolved either spontaneously or with gentle stimulation, no late postoperative apnea episode was observed.

Based on animal studies, there are possible deleterious cerebral effects (neuroapoptosis) when general anesthetics are administered to neonates and young infants. Changes in physiologic variables such as blood pressure, pCO2, blood glucose level etc. could also contribute to these effects. A prospective multicentric study (under the acronym: GAS)2 evaluated both the immediate and late effects of awake regional versus general anesthesia for hernia repair in ex-premature infants. The investigators concluded that despite medical advances during the past few decades, inguinal hernia repairs in former premature infants using regional anesthesia (RA), RA with sedation, or GA are still associated with life-threatening apnea, which usually begins in the PACU but can also begin several hours later on the ward. The main difference between GA and RA was the timing of the apnea, being more common in the PACU after GA; the study demonstrated a slight advantage of RA.

Although overnight monitoring is mandatory in small infants with low GA and PCA, the recommendations for outpatient surgery have remained uncertain and reflect the risk tolerance of the anesthesiologist.

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17 Dark Side of the Weaning

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Introduction

Difficult weaning from mechanical ventilation is an unsuccessful attempt of spontaneous breathing trial or need for reintubation in the first 24-72 hours (1). Approximately 30% of patients face difficult weaning even after the underlying disease that has led to intubation has been solved (2). Except complex pulmonary and cardiological disorders, conditions such as delirium, depression, sleep disorders, anxiety and myasthenia gravis can also be the causes of difficult liberation from mechanical ventilation.

Case report

We presented the case of a 29-year-old woman who was treated for depression. She was admitted to the Intensive care unit (ICU) of Institute for Pulmonary Diseases of Vojvodina for the treatment of community-acquired pneumonia with development of respiratory insufficiency requiring mechanical ventilation. ICU stay was accompanied by difficult weaning despite the resolution of pneumonia and correction of psychiatric therapy. After receiving heteronamnestic data on the inability to walk independently and perform basic daily activities, myasthenia gravis was suspected. Positive prostigmine test led to successful liberation from mechanical ventilation. Suspicion of myasthenia gravis was confirmed by electromyography and nerve conduction study. Video-assisted thorascopic thymectomy was preformed, histopathological analysis proved hyperplastic thymus. Pyridostigmine bromide was introduced in regular therapy and the patient was discharged in a good condition.

Conclusion

Diverse conditions can cause difficult weaning. Tailored treatment strategy and structured diagnostic approach before extubation are recommended in order to shorten the time of mechanical ventilation and increase the number of successfully weaned patients.

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Session VI:
PERIOPERATIVE COMORBIDITY

18 Surgical outcome global disparities: How to change reality?

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Efficacy of surgical program is not always so obvious. Assessment of surgical outcome is difficult and implementing of high standards in surgical practice is very hard to measure thru its final outcome. Complications of surgery and deterioration of general medical condition may be much delayed and follow-up of patients is limited and potentially biased.[1]

Perioperative clinicians, surgeons, anaesthesiologists, intensivists, transfuziologists, epidemiologists, public health experts and researchers are traying to develop strategy to transform research into practice, to address disparities in access and outcomes in perioperative, surgical care. Collaboration, together with strategically guided population-based research and clinical practice, may allow the perioperative healthcare team of the future to implement strategies to achieve health equity, an important dimension of quality, in surgery.[2]

There is a global need to detect structural measure that can show characteristics of efficient surgical and medical health care service. Number of procedures is the most often used variable illustrating surgical volume. Often, quality is analyzed in correlation of high procedure volume and improved long-term survival. Hospital resources and organization as well as manpower planning strategy certainly have significant impact. Level of training, the organization of hospital personnel, the availability of up-to-date technology and financial resources are structural components that should be focused on.[3]

A number of risk factors are often included: American Society of Anesthesiologists Physical Status classification, urgency of surgery, high-risk surgical procedures (gastrointestinal, thoracic, vascular), surgical severity, cancer dissemination and age. [4] One of the burning issues and potentially significant part of the solution may be systematic approach to education and global manpower problem in anaesthesioliology, surgery and intensive medicine professionals, recently documented. Massive disparities in the number of anesthesia and other healthcare providers, with particularly low workforce density in low and middle income countries are detected.[5]

In 2015, the World Health Assembly accepted Resolution 68.15 which calls on member states to strengthen anesthesia and surgical care, and encourages the development of appropriate core competencies that are part of relevant health curricula, training and education.[6] Main concern are at the inadequate training of the surgical workforce and suggests member states to promote emergency and essential surgery and anaesthesia capacity as components integral to achieving universal health coverage (UHC). The resolution goes on to ask the World Health Organisation (WHO) to support member states "to devise policies and strategies that enhance the skills of the appropriate health workforce for emergency and essential surgical care and anaesthesia, especially at primary health care and first-referral hospital levels".

The WFSA has an official liaison role with the WHO. Recently, the leadership of the WFSA initiated larger mission to increase access to safe anesthesia services worldwide. Substantial efforts have been invested in basic drafted document that will provide an framework, as well as a tool that anesthesiologists around the world can use to expand the number of training programs while ensuring high-quality education and safe care.

"Surgery is as strong as the weakest link, anaesthesia manpower. It is not a competition. If surgeons realize the importance of anaesthesia and perioperative care and the need for physician anaesthetists, they will promote the scaling up of anaesthesia practice instead of looking to replace physicians with whoever they think will serve their purpose" are the words of Professor Bisola Onajin-Obembe, an anaesthesiologist from Nigeria.

Education must be at the heart of our global response. Increased numbers of safe anesthesia providers and intensive medicine professionals will only be possible if we have good quality educational programs tailored to meet the growing needs. The final result would be better patient care.[7]

We are still looking for the measure based on socio-economic, demographic, geographical and clinical factors associated with access to quality surgical care. In last several years, international research groups have been focused on patient safety and published results that promote careful impact assessment in surgery.

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Anesthesia and perioperative care in metabolic syndrome

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Background

The metabolic syndrome (MetS) has been documented in medical papers since the 1950s., MetS originally described by Reaven in 1988 as "syndrome X" or "insulin resistance syndrome," is a cluster of common abnormalities, including insulin resistance, impaired glucose tolerance, abdominal obesity, reduced HDL-cholesterol levels, elevated triglycerides, and hypertension, processes with an increased risk of death. Various names became associated with this condition – Reaves Syndrome, Syndrome X, and Insulin resistance syndrome are but a few.

Discussion

Surgical patients with MetS are at significantly higher risk perioperative, of a range of adverse outcomes including death, morbid cardiovascular events, coma, stroke, renal failure, myocardial infarction, and surgical site infections. Ongoing hypoventilation would usually mandate admission to high dependency unit (HDU). Monitor pulse oximetry postoperatively on the ward until Sp02 returns to baseline without supplemental oxygen, and parenteral opioids are no longer required. Terapy are with long-acting opioids and sedatives with caution, multimodal analgesia, including local anaesthetics, the patient's CPAP machine early in the postoperative period. Based on available data, MetS significantly affects mortality and morbidity rates in general surgery patients. Specifically, patients with the modified MetS experienced nearly two- to three-fold higher risk of cardiac adverse events, a 1.5- to 2.5-fold higher risk of pulmonary complications, a two-fold higher risk of neurological complications, and a three- to seven-fold higher risk of acute kidney injury compared with patients of normal weigh.

Conclusion

Metabolic syndrome probably contributes to even more perioperative events, with the most common being cardiac, pulmonary, renal, cerebrovascular, thromboembolic, sepsis, and wound infection. MetS has been correlated with a prolonged length of hospital stay after major surgery and a higher need for posthospitalization care, resulting in additional cost. Despite several definitions of MetS currently in use, the recognition of MetS as a group of risk factors for perioperative adverse outcomes urges clinicians to recognize the syndrome, to familiarize themselves with its characteristics, and most importantly, to formulate management strategies that could possibly lead to a reduction of perianaesthetic and perioperative risks.

Keywords: metabolic syndrome, anesthesia, postoperative outcome

Valvular heart disease in non-cardiac surgery

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Vavular disorders are an increasingly frequent comorbidity in patients who undergo elective surgery. Understanding the valvular disease is a guarantee that we will safely perform the patient through anesthesia and surgical intervention. The most common valvular heart diseases are aortic stenosis, aortic regurgitation, mitral stenosis, and mitral regurgitation. Each of them has its own specificity in terms of pressure, load in ventricles and atriums, as well as increased pressure in the lung blood vessels. The use of antiarrhythmic, vasopressor and volume are the basic methods of maintaining adequate cardiac output and pulmonary flow. In patients with moderate and severe valvular cardiac failure, monitoring is continued in the intensive care unit with the appropriate administration of the medicament to maintain the hemodynamic stability of the patients.

Valvular heart disorders are the result of congenital anomalies (6%), degenerative disease (60%) , rheumatic (10%), functional disorders (15.5%), prosthetic dysfunctions in 5.5% and as a consequence of endocarditis.[1] In one population study the prevalence of this disease ranges around 5.2%. The prevalence of valvular heart disease increases with age. In this study, mitral regurgitation is the most common (0.1-10.9%), and mitral stenosis is the rarest valvular defect (0.1-0.8%). The aortic regurgitation prevalence ranges from 0.1 to 2.7% and aortic stenosis from 0.1 to 3.7% .[2] However, in the case of patients with cardiovascular comorbidity, moderate to severe valvular diseases were diagnosed with echocardiographic examination in 23.4% of these patients, with 33% of these patients being registered with two valves and three in 5.7%. Significant mitral valve disease was observed in 39% of these patients and aortic valves at 48%.[1]

Valvular heart disease is a common cause of atrial fibrillation (AF). AF are occurs as an early manifestation of mitral stenosis and regurgitation or late manifestation of aortic stenosis. The reason for this is the distension of the left atrium. As a result of

the existence of valvular heart defects, the remodeling of the heart chambers results in overloading by volume and pressure. In people with mitral regurgitation we have an increase on the left ventricle (measured as a chamber diameter) without left ventricular hypertrophy (measured as the mass of the chamber). Aortic regurgitation leads to enlargement of the left ventricle with hypertrophy and aortic stenosis to left ventricular hypertrophy without enlargement. Mitral stenosis leads to an enlargement of the left atrium, but without a change in the left ventricle. A population study showed that five-year and eight-year survival was statistically significantly higher in people with no heart failure compared to those with heart failure (93% and 86% versus 79 and 68%).[2,3]

Valvular heart disese are significantly prevalent in the population of patients who undergo surgical interventions. They affect hemodynamic stability of the patient, the burden of pulmonary circulation, the supply of heart muscle with oxygen. It is very important that the anaesthesiologist be aware that the patient has some valvular deficiency and that he knows the effect of this disorder on the haemodynamic characteristics of the patient. Therefore, in the context of prepoperativne preparation, is necessary to examine in detail the type and degree of severity of the disease. There are several valvular defects at the same time.

Basically diagnosis of these disorders is the use of echocardiography. Very often patients do not have information, or they have the knowledge that somebody has sometimes noticed them during the examination that there is "some sound" or a valvular defect. With this diagnostic method we will get information on cardiac anatomy, heart muscle thickness, blood vessel layout, atrial and ventricular function. Using Doppler we will get information on hemodynamics, pressure gradient, blood flow, ... If we do not get enough information on this way, we can require additional checks and consultative examinations cardiologist or cardiac surgeon.

In patients with these disease, we can expect significant disorders in the rhythm and haemodynamic stability during surgery or anesthesia. Some of them can also lead to life-threatening conditions (arrhythmias, myocardial infarction, pulmonary edema, ...) if the execution of anesthesia monitoring and support are not adapted to the nature and severity valvular abnormalities, concomitant diseases and the size of the surgical procedure.

Aortic stenosis

Anesthesiologists will often be in a position to conduct anesthesia in patients with varying degrees of these valvular disease. Basically, it's important to understand that the left ventricle needs more power to push the blood into the aorta. This is the result pumping of blood through a narrow hole. For this reason, left ventricular hypertrophy is occurring and, consequently, increased oxygen demand. These requirements can not be met, because increased pressure in the ventricle leads to compression of subendocardial blood vessels. Angina pectoris is one of the symptoms of this disease, and

the patient does not have to have changes in coronary blood vessels. Increased fatigue, weakness and syncope may be a symptom of this valvular defect. These disorders are the result of an inadequate chamber baroreceptor response, leading to peripheral vasodilatation and hypotension. In addition, because of the inability to increase cardiac output, it is not possible to respond to increased needs in pressure and volume during effort.[4]

The normal surface of the aortic valve is 2 -3.5 cm^2. In relation of this surface and the mean transvalvular pressure gradient, there is an echocardiographic classification of the severity of aortic stenosis. Severe aortic stenosis is characterized by the surface of the aortic valve (valve area) of less than 1 cm^2, with a gradient of pressure greater than 50 mmHg, moderate is characterized by aortic valve surface area of 1 - 1.5 cm^2 with a pressure gradient of 30-49 mmHg, and a middle, with a surface of the aortic valve greater than 1.5 cm^2 and a pressure gradient of less than 30 mmHg.[5,6] Patients with greater pressure gradient of 50 mm Hg have more perioperative complications than patients with a moderate degree of aortic stenoze.[7]

The presence of any symptoms (fatigue, angina pectoris, hypotension, syncope, ...), in the presence of severe aortic stenosis, is an indication for emergency surgical intervention of the valve replacement. Endocarditis prevention is performed in high-risk patients.

The objectives that should be maintained during anesthesia are as follows: the flow into the left ventricle to be increased, while maintaining sinus rhythm without tachycardia (provides better filling of the left ventricle), held on the contractile force of the myocardium by increased systemic vascular resistance. Do not allow the fall of arterial blood pressure. For these reasons, use inhalation anesthetics and regional anesthesia with caution, which can lead to hemodynamic instability, or hypotension. These patients require post-operative monitoring and emergency management of arrhythmia and hypotension.

Aortic regurgitation

Aortic regurgitation (AR) can be acute or chronic. In acute aortic regurgitation, a sudden return of large blood volume to the left ventricle results in increased pulmonary venous pressure and altered coronary flow dynamics. It can be presented with cardiogenic shock, pulmonary edema, myocardial infarction, ...) In the chronic AR, the return of blood to the left ventricle increases for years, so various compensatory mechanisms (left ventricular hypertrophy) will develop. At one moment , compensatory mechanisms are consume, the volume at the end of systole becomes elevated while reducing coronary perfusion gradijenta.[8]

Cardiac complications are more common in these patients than in patients who do not have this valvular disorder (16.2% versus 5.4%) in non-cardiac elective surgery. The most common complications were prolonged intubation, arrhythmia, myocardial infarction.[9]

According to the volume of return volume (expressed as the percentage of left ventricular outflow tract), the rate of AR is expressed as mild (4-24%), moderate (25-59%) or severe (more than 59%). [6] Patients with mild AR and without symptoms are at low risk for developing serious postoperative complications.[9]

Hemodynamic goals during the management of anesthesia in patients with AR are reflected in the optimization of the flow to circulation, reduction of regurgitation and optimization of cardiac output. Hypotension should be treated with drugs that affect pulse acceleration and increased contractility. The application of regional anesthesia is possible and desirable.

The objectives to be maintained during anesthesia are as follows: increasing the flow into the left ventricle, while maintaining a higher frequency sinus rhythm (more than 90 / minute), maintain the contractile strength of the myocardium with reduced systemic vascular resistance.

Mitral stenosis

Patients with mitral stenosis (MS) for many years can be without symptoms. The normal surface of the mitral valve is 4-5 cm^2. MS usually has no symptoms in peace, when the surface of the mitral hole is greater than 1.5 cm^2. As MS becomes larger, the cardiac output becomes subnormal in peace and continues to fall during exercise. According to the guidelines of the European Association of Cardiologists, severe MS represents a surface of a valve of less than 1 cm^2, with a gradient of pressure greater than 10 mmHg, moderate represents a stenosis of 1 to 1.5 cm^2 with a gradient of 5 to 10 mmHg and mild where the surface of the stenosis is larger of 1.5 cm^2 and a pressure gradient of less than 5 cmHg. [6,10, 11]

With such patho-anatomical changes, it is clear that there is distension and increased pressure in the left atrium and reduction of left ventricular filling. The increase in pressure in the left atrium is also transmitted to the pulmonary circulation. With worsening stenosis, the filling of the left ventricle is decreased, especially if you have tachycardia and atrial fibrillation. Increased pressure in the pulmonary circulation is initially reversible but later, pulmonary hypertension with right ventricular hypertrophy is irreversible. The degree of severity of mitral stenosis is also graded according to the pressure value in the pulmonary artery. In mild mitral stenosis, this pressure is less than 30 mmHg, moderate to 30-50 mmHg and more than 50 mmHg severe.[11,12] Preparation and the management of anesthesia are basically anxiolysis and pain control. Reduction in the sympathetic tone is useful in these patients.

It is necessary to maintain normal sinus rhythm and avoiding pre-ventricular fibrillation. Anticoagulant therapy is necessary in these patients. Diuretics are needed in the treatment of pulmonary edema. If moderate or severe levels MS with the symptoms are present, percutaneous valvulotomy or mitral valve surgery are necessary before elective surgery.

The objectives to be maintained during anesthesia are as follows: the inflow into the left ventricle to be maintained, with the maintenance of a sine rhythm of a less frequent, avoiding atrial fibrillation and excessive fluid replacement in order not to develop pulmonary edema.

Much afterload helps to maintain cardiac output. Avoid drugs that lead to tachycardia.

Mitral regurgitation

Mitral regurgitation (MR) can be organic or functional, and by the time of its occurrence it is acute or chronic. Due to incomplete closure of the mitral valve, during systole leads to return of a certain quantity of blood from the left ventricle into the letf atrium. In this way, the pressure in the left atrium is increased, that is, the pressure gradient is growing. MR may be mild where the regurgitation fraction is 20-30%, moderate with fractional regurgitation 30-50% and severe where the regurgitation fraction is greater than 55% .[6]

The ejection fraction in these patients is normal or higher than normal because the left ventricle is more empty both, through the aortic and through the mitral valve. The value of the ejection fraction falls when mitral regurgitation takes a long time and ischemia of the enlarged heart muscle of the left ventricle. Similar as MS, left ventricular hypertrophy (atrial fibrillation develops) with the transfer of pressure to pulmonary circulation and subsequent enlargement of the right ventricle and its dysfunction. Pulmonary congestion is a constant hazard especially in the case of acute mitral regurgitation.

In correlation with the size of the effective regurgitant orifice, there are also the number of complications and survival of the patients. Higher regurgitation, greater likelihood of complications.[13] Hemodynamic goals during anesthesia of patients with this valvular defect are based on maintaining the maximum normal cardiac frequency. Reducing diastolic time is not allowed to complete regurgitation. In this way increases the effective output cardia. Hypotension and bradycardia should be avoided in anesthesia in these patients. A balance should be found between increased heart rate that requires more oxygen consumption and bradycardia in which myocardial perfusion is poorer. It is necessary to avoid cardiodepression caused by anesthesia.

Intraoperative and postoperative invasive monitoring of both arterial and central venous pressure should be applied. In order to reduce the likelihood of fluid overload, pulmonary edema, arrhythmia and myocardial ischemia.

Conclusion

The number of patients with valvular heart diseases, who will undergo elective surgery is increasing every year. In addition to heart valve diseases, they also have other comorbidities. Echocardiography remains the cheapest and most reliable way of diagnosing and evaluating the severity of valular heart defects. Then, if we estimate that it is necessary, refer patients to consultative examinations with an internist cardiologist

and a cardiac surgeon. Later, on the basis of all available data, we decide whether the first solution for valvular cardiac failure or elective intervention is needed. Then make a decision on antitrombotic and antibiotic prophylaxis.

A good understanding of the events during the heart cycle and the movement of blood in this way enables us to adequately conduct anesthesia in these patients for any surgical intervention. During the management of anesthesia, complete monitoring of vital parameters is required with possible application and invasive hemodynamic monitoring. In the postoperative course, monitoring is required in the intensive care unit. This is especially for patients with moderate and severe cardiac valvular disease.

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21 Obesity as an anesthesiologic challenge in perioperative period

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Obesity is a chronic disease that manifests itself due to excessive accumulation of fat in the body and increased body weight. Any weight gain of 10% and above ideal is marked as obesity. Pathophysiological changes in obese people range from respiratory disturbances and respiratory physiology disorders to the onset of many diseases such as diabetes, hypertension, and heart disease. [1]

Progressive BMI growth can affect myocardial contractility and lead to decreased stroke volume and ejection fraction. Polycythemia, deep vein pathways and increased intraabdominal pressure increase the risk of developing deep venous thrombosis in obese persons, which makes this person highly at risk of developing pulmonary thromboembolism, especially in women. [2]

Obesity decreases the compliance of the lungs and of the thoracic wall leading to a reduction in the functional residual capacity which can not overcome the closing capacity. As a result, obese patients tend to increase intrapulmonary shunts and ventilation - perfusion mismatch. Obstructive sleep apnea (OSA) is a disorder commonly associated with obesity (40-90% obese patients with OSA) and is the result of increased fat tissue in the pharyngeal walls with the tendency of the pharyngeal wall to collapse during a negative pressure in the inspiration.[3]

The aim of preoperative preparation is the treatment of the accompanying diseases in order to achieve the optimal condition in which the patient can undergo anesthesia and surgery. The multidisciplinary approach (anesthesiologist, surgeon, endocrinologist, nutritionist, psychologist) in preoperative preparation is important for achieving better treatment results and reducing the number of complications. The preoperative preparation of the patient for the bariatric and other surgical interventions should be directed to the analysis of obesity events and treatment to reduce the risk of intra and postoperative complications. Drugs that are used in the preoperative period may be

those that patients already use to treat existing comorbidities, but the use of certain drugs is also indicated to reduce the risk of perioperative complications. It is recommended that patients continue with the usual therapy to surgery, except for insulin and oral hypoglycemics. [4]

Operative interventions in obese patients can be performed in general anesthesia, regional anesthesia, which is most commonly in neuroaxial (spinal or epidural), or combination of both, and peripheral nerve blocks. Bariatric surgery is commonly used in general anesthesia. But in cases where general anesthesia is high risk for the patient, a good alternative is epidural anesthesia with regard to all the more perfect surgical methods that include laparoscopic surgical techniques with lower pneumoperitoneum.[5]

Because of the difficulty of intubation, prior to induction to anesthesia, the patient should be placed in an adequate position to improve the visualization of the larynx and facilitate intubation, which is achieved by removing the head and shoulder above the chest height by placing pads and bent pads (HELP position - Head Elevated Laryngoscopy Position). Ventilating the patient on the mask may be difficult because of anatomy of the face as well as obstruction of the upper respiratory tract and reduced pulmonary complications.[6]

Most intravenous anesthetics used for the introduction into anesthesia are highly lipophilic with a large volume of distribution (Vd) which should be kept in mind when dosing these drugs and calculating the dose according to one of the recommended formulas.[7]

Respiratory function maintenance is recommended with a tidal volume of 6-10 ml / kg and a respiratory frequency of 12-14 / min to provide normal capnia, especially during laparoscopic bariatric surgery with FiO2 between 0.4 and 0.8. During the operative procedure it is recommended to conduct a recruitment maneuver to open the collapsed lung portions followed by PEEP (8-15 cmH2O) and pressure plate 40-45 cmH_2O during 7-8 with preventing collapse and improving oxygenation.[8]

During postoperative period, patients are positioned in a 45 ° head elevated with continuous pulse oximetry and arterial pressure monitoring. Continuous monitoring of electrocardiograms is indicated in patients with significant cardiorespiratory comorbidity. In the early postoperative period, oxigen support, analgesia, thromboprophylaxis, the use of proton pump inhibitors and antibiotics according to the local protocol, and maintenance of the hydroelectric balance are also indicated.[9]

Conclusion

The role of anesthesiologist in the perioperative period of obese persons is of great importance since knowledge of pathophysiological events in obese persons as well as prediction of possible occurrences is the basis in planning a perioperative treatment for each patient, thereby reducing the incidence of complications and improving the treatment outcome.

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Session VII:
ANESTHESIA UPDATE

Best Papers in Anesthesiology 2017/2018

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It is essential for the Anaesthesiologist to be up to date with the latest scientific publications affecting daily clinical practice. However, the Anaesthesiologist's spectrum of clinical activity is broad, covering all aspects of perioperative medicine, including emergency medicine. Therefore the number of publications is enormous and the task of staying updated is almost impossible for a clinically working individual. To solve this dilemma we screen the most recent publications for relevant content in regular intervals. Journals covered are: New England Journal of Medicine, JAMA, The Lancet, Anesthesiology, Anesthesia and Analgesia, British Journal of Anaesthesia, European Journal of Anaesthesiology, and Acta Anaesthesiologica Scandinavica. Sometimes articles from surgical journals are retrieved if considered relevant. Articles are then associated with clinically relevant topics and are grouped into smaller areas according to the context. Best Papers of 2017/2018 include the topics like

- out-of-hospital and emergency medicine (CPR, Trauma)
- preoperative evaluation (ESA guidelines)
- intraoperative management (fluids, blood pressure, transfusion, muscle relaxants)
- postoperative therapy and pain (catheter infection, myocardial injury)
- curiosa and oddities

With this strategy, we hope to cover all important aspects of anaesthetic practice and keep the anaesthesiologist informed with the latest scientific developments, even if the choice of publications might be personally biased.

23 How you monitor depth of anesthesia? An objective evaluation on consciousness during sedation and general anesthesia

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Depth-of-anaesthesia monitors have been developed in the recent decades providing indexes for an adequate administration of sedation and general anaesthesia. DOA monitors are based on the analysis of electroencephalogram waves mainly detected in the frontal cortex. The spectral analysis of these waveforms allows to detect specific spectrograms for different anaesthetic drugs and it should be used to avoid too deep anaesthesia/sedation states. The actual DOA indexes unfortunately are not able to provide a full picture of the neurobiological changes at the brain level caused by the administration of anaesthetic drugs. The future DOA monitors should be able to analyse this multilevel state to guide the anaesthetist during general anaesthesia especially in elderly and fragile patients.

Keywords: depth-of-anaesthesia, electroencephalogram, spectrogram, burst suppression

EEG as an objective evaluation of consciousness during sedation and general anaesthesia

Introduction

Evidence and objectiveness in medicine is becoming more important than in the past when the diagnosis was based on clinical signs and differential hypothesis. Nowadays, no patient with an acute onset of myocardial infarction would receive rTPA just relying on the clinical symptoms and on a computerized ECG test. While this is quite obvious, in many operating theatres anaesthetists are still relying on processed EEG and derived numbers when they have to decide if they have to increase or decrease the level of anaesthetic drugs.

One of the main targets of procedural sedation and general anaesthesia is the suppression of the experience related to the surgery. For this reason, electroencephalogram (EEG) represents the goal standard to monitor the effect of the sedative drugs as the brain is the target organ (1).

Aim of this review is to describe how we should monitor depth of anaesthesia, why it is important to avoid too deep level of sedation and anaesthesia and what is really depth of anaesthesia.

How EEG changes during anaesthesia

The effect of sedative drugs on the EEG waveforms has been clearly studied in the past (2-4) for different anaesthetic agents. A growing body of literature suggests that anaesthetics induce oscillations that alter or disrupt the oscillations produced by the brain during its normal activity of transferring informations. These anaesthesia-induced oscillations can be readily visible in the electroencephalogram. Visualisation and analysis of the unprocessed EEG is a kind of time domain analysis. Indeed, the frequencies and amplitudes from the unprocessed real time EEG waves in the operating room remains challenging. The more practical and informative solution is to conduct a spectral analysis by computing the spectrum of the EEG waves and the related spectrogram. For a given segment of EEG data, the spectrum provides a decomposition of the segment into its frequency components usually computed by Fourier methods. The advantage of the spectrum is that it shows the frequency decomposition of the EEG segment for all of the frequencies in a given range by plotting frequency on the x-axis and power on the y-axis. The spectrogram makes it possible to display how the oscillations change in time, with changes in the dosing of the anaesthetics and/or the intensity of arousal-provoking stimuli during surgery.

Different anaesthetics drugs have different EEG spectrograms. Propofol generates waves in the beta and alpha ranges (8-22Hz) and slow-delta oscillations (0.1-4Hz) (5). Ketamine, when administered alone, creates fast oscillations in the high beta (25-32 Hz) and low gamma range (4Hz) (6). Dexmedetomidine has a specific spectrum with spindles appearing as streaks in the high alpha and low beta bands (9-15Hz) and slow-delta waves (0.1-4 Hz) (7). When the rate of the dexmedetomidine infusion is increased, spindles disappear and the amplitude of the slow- delta oscillations increases.

In case of administration of volatile anaesthetics, at sub-MAC concentrations: sevoflurane shows strong alpha and slow-delta oscillations that closely resemble those of propofol while at higher concentration of sevoflurane to MAC levels and above: a strong theta oscillation appears creating a distinctive pattern of evenly distributed power from the slow oscillation range up through the alpha range. Nitrous oxide is associated with prominent beta and gamma oscillations and, possibly, with a relative decrease in power in the slow and delta oscillation band (8,9).

Too deep anaesthesia

It is important to keep the patient under general anaesthesia in a state of unconsciousness and unresponsiveness but this level should not be too deep to determine states of "burst suppression" when the EEG is characterized by electrical silence. Monk et al. (10) were the first showing an association between death and deep anaesthesia. In their study, they observed 1,064 patients having a wide range of non-cardiac operations for every hour of deep anaesthesia (defined by a BIS lower than 45). They found a 24% increase in all-cause postoperative mortality after one year.

More recently, another metanalysis (11) based on the eight observational studies involving 40,317 patients showed a higher risk of death with deeper anaesthesia at one year after surgery. Unfortunately, these metanalysis and trials revealed only a potential risk for deeper level of general anaesthesia to be associated with worse perioperative outcome. For this reason, the Australian and New Zealand College of Anaesthetists Clinical Trials Network has launched the BALANCED Anaesthesia Study. This is a large international prospective randomized-controlled trial to determine if light anaesthesia (Bispectral index (BIS) target = 50) compared with deep anaesthesia (BIS target = 35) will reduce one-year mortality in 6,500 high-risk patients aged 60 years or older (12).

If these results are still debating during general anaesthesia, there is better evidence during sedation in critically ill patients mechanically ventilated and sedated. A study from Watson et al (13) showed that burst suppression is quite frequent (39%) in sedated patient admitted to the intensive care unit and mechanically ventilated. The presence of burst suppression in these patients was an independent predictor of increased risk of death at 6 months.

Is there an ideal monitor for depth of anaesthesia?

Depth of anaesthesia (DOA) may be conceptualized as a continuum spanning from an anesthetized patient approaching consciousness ("light anaesthesia") to one with dramatically reduced brain activity ("deep anaesthesia"). Most brain monitors use data from the spontaneous electroencephalogram to assess DOA and provide usually a number that is representing the level of anaesthesia.

The ideal DOA index should (14):

1. have a high correlation with the concentration of the anaesthetic drug in the brain,
2 be sufficiently sensitive (the slope of the concentration response curve would be sufficiently steep) in individual patients to allow reasonably accurate estimation of relative anaesthetic concentration based on the index,
3 display a predictable value at which emergence from anaesthesia occurs across a population of patients.

Unfortunately, the presently available monitors do not meet these standards. In trials where general anaesthesia is titrated to a target range of BIS values, the targets are typically achieved only about half the time. In about 10% of patients the BIS value will actually increase as the anaesthetic drug concentration increases (15). One possible explanation of this problem is that the existing processed-EEG algorithms were designed specifically to maximally separate the awake and unresponsive states, with little regard to the higher end of the anaesthetic dose-response curves.

A new definition for depth of anaesthesia

Shafer and Stanski (16) more recently defined "depth-of anaesthesia": a multi-dimensional probability of various responses to various stimuli. The concept of probability function in the definition changed what was considered intrinsically before a binary on-off measure into a pseudo-continuous measure, analogous to "depth" under water. However, anaesthetic dose-response curves are often very steep. Being simple, we should consider DOA as a household switch-board rather than a submarine. Instead of asking ourselves the somewhat blurred question of "Is the DOA optimal?" we should be asking ourselves a more specific questions that target neurobiological systems that probably should be suppressed during successful general anaesthesia.

It is very unlikely that the EEG could directly monitor all these neurobiological responses which are intuitive for an anaesthetist. However, we should go beyond trying to find a single one-dimensional monitor that combines all those questions together, instead developing separate monitors that can optimally answer each question individually.

Conclusion

To detect consciousness reliably, the processed-EEG indexes should directly correspond with the actual neurobiological process required for consciousness (cortico-thalamic integration of information). Actual DOA monitors do not provide enough information about unconsciousness, consecutiveness and responsiveness. Spectral EEG represents actually the best DOA monitor for cortical electrical activity. New DOA monitors should focus on specific biomarkers of both consciousness and connectedness.

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Neurotoxicity of anesthetics in pediatric patients

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Introduction

General anesthesia should be, by definition, safe and completely reversible loss of consciousness with absence of pain sensation, to enable surgical procedure to be done in patients of all age. But is it always like that? One of the most controversial problems occupying pediatric anesthesiologist's attention is potential neurotoxicity of anesthetics for developing brain in children. There are unambiguous evidences that almost all anesthetics used today are toxic for developing brain of experimental animals.

Importance for clinical practice

Results of studies on experimental animals can't directly prove neurotoxicity of anesthetics in humans. Great number of studies which compared children who had general anesthesia in early childhood with children who didn't, give different results: from memory disorders, learning disabilities, disorders in abstract thinking to no consequences at all. These studies had significant lack: they were retrospective, didn't include different parameters that can affect anesthesia outcome (surgical stress, inflammation, hypo and hyperoxia, hypo and hypercapnia, hypo and hyperglycemia, use of different fluids during the surgery etc). The effect of particular anesthetic can be studied only on experimental animals.

Different societies together with Food and Drug Administration (FDA) initiated and supported three big prospective studies (General Anesthesia compared to Spinal anesthesia – GAS, The Mayo Anesthesia Safety in Kids (MASK) Study and Pediatric Anesthesia NeuroDevelopment Assessment – PANDA). Their preliminary results indicate that single general anesthesia during early childhood has no significant consequences, but in case of multiple general anesthesias, results are not that uniform. We have to wait for final results of these studies, in next few years to see if there is need

for us to change out practice although anesthesiologists in some European countries already changed their practice.

Until that day, the question is what to tell to the parents who are already scared by articles in the media. This article gives answers to many questions in this area.

Keywords: anesthetics, neurotoxicity, child, newborn, safety.

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Fascia iliaca compartment block - stara tehnika u novom ruhu

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Uvod:
Blok fascije ilijake predstavlja blok za donji ekstremitet. Indikacije: su hirurgija kolena i prednje butine, analgezija nakon procedura na kuku i kolenu.

Može da se izvede na dva načina: koristeći tzv.“pop“ tehniku ili pomoću ultrazvuka. Zamisli se linija koja spaja spinu ilijaku superior anterior i pubični tuberkulum i podeli se na tri trećine. Mesto punkcije je 2 cm kaudalno od spoja lateralne i srednje trećine. Osete se 2 karakteristična “popa” prilikom prolaska kroz fasciju latu i fasciju ilijaku. Kada se prođe kroz fasciju ilijaku nakon aspiracije se pažljivo ubrizga anestetik. Ultrazvučnom tehnikom se vizuelizuju neurovaskularne strukture i omogućava preciznije izvođenje bloka.

Kod odraslih se koristi 20-40ml lokalnog anestetika, kod dece 0,7ml/kg telesne težine.

Efekat ovog bloka može da se poredi sa blokom tri u jedan ali se lakše izvodi jer ne zavisi od distribucije lokalnog anestetika duž nerava. Umesto toga on se oslanja na distribuciju anestetika duž fascijalne ravni. Ovim blokom se ne postiže blokada anteriorne grane obturatornog nerva. Blok fascije ilijake je u Kliničkom centru Vojvodine, sastavni deo multimodalnog tretmana bola i fast track koncepta, kod operacija na donjem ekstremitetu, a cilj je da se bolesniku omogući rana mobilizacija i aktivacija. Naš rezultat je 6,56 sati postoperativno.

Zaključak:
Blok fascije ilijake je jednostavan, efikasan i jeftin blok, koji daje dobru analgeziju ali ne i anesteziju, za operacije na donjem ekstremitetu.

Session VIII

ALL ABOUT PAIN

26 Invazivni zahvati u liječenju kronične boli

Ivan Radoš

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Kod vrlo jake boli ne treba se slijepo držati modela trostupanjske ljestvice u liječenju boli već treba primijeniti model lifta, tj. invazivne procedure mogu biti prva opcija u liječenju boli, te se na taj način sprečava nepotrebna patnja i trpljenje boli koja bi bila tijekom titracije farmakoterapije. Od minimalno-invazivnih procedura u liječenju boli najčešće se primjenjuje epiduralna primjena steroida, radiofrekventna denervacija fasetnih zglobova, blokada zglobova, perkutana laserska dekompresija diska, epiduroliza, te stimulacija kralježnične moždine. Navedene procedure se izvode u operacijskoj sali, u sterilnim uvjetima uz monitoriranje vitalnih funkcija. Najčešće se izvode pod kontrolom fluoroskopa, a u nekim slučajevima i pod kontrolom ultrazvuka. Za djelotvornost navedenih procedura važan je dobar odabir bolesnika za navedene procedure.

Ključne riječi: kronična bol, invazivne procedure, križobolja

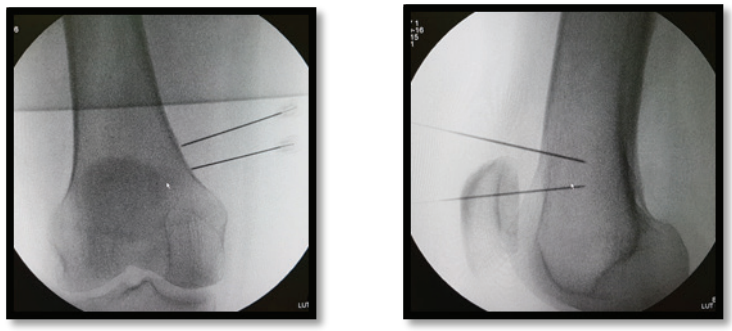
UVOD

Interventne minimalno invazivne procedure u liječenju kronične boli često se koriste kao jedna od zadnjih opcija u liječenju boli kada su se analgetici i fizikalna terapija pokazali nedostatni u zadovoljavajućem smanjenju boli. Takav stav prevaziđen je „modelom lifta“ u liječenju boli koji se preporuča za liječenje karcinomske boli, ali i za jaku i vrlo jaku kroničnu bol. Upravo model lifta stavio je u algoritam liječenja jake i vrlo jake boli intervencijske procedure kao moguću prvu stepenicu u liječenju boli. Intervencijske procedure mogu biti dijagnostičke, prognostički ili terapijski.

RF BLOKADA KOLJENA

Osim klasične blokade koljena, moguća je radiofrekventna neurotomija koljena nakon provedenog dijagnostičkog bloka. Navedena blokada je indicirana kod osteoartritisa koljena. Zglob koljena je inerviran granama raznih živaca uključujući femoral-

nog, zajedničkog peronealnog, safenusa, tibijalnog i obturatornog živca. Ove grane koje inerviraju koljenski zglob poznate su kao geniukularni živci. Nekoliko genikularnih živaca se lako perkutano može pristupiti pod kontrolom fluoroskopa. Blokada se izvodi u području femura medijalno i lateralno te u području tibije medijalno.



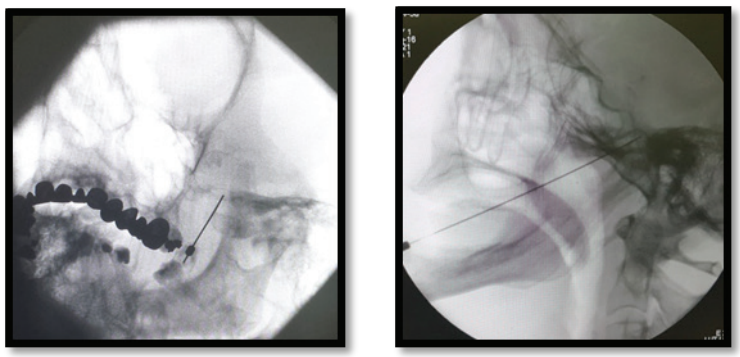
A **B**

Slika 1. Anteroposterirna (A) i lateralna (B) RTG snimka položaja RF igala u području femura medijalno.

BLOK GANGLIJA GASSERI

Blok ganglija Gasseri s lokalnim anestetikom, neurolitičkim otopinama, radiofrekventna lezija ili balon kompresivna tehnika su zahvati za zaustavljanje patnje od nekontrolirane boli od trigeminalne neuralgije i karcinomske boli kada farmakološko i onkološko liječenje boli ne daju rezultata. Kod ovog bloka se javlja više nuspojava i komplikacija nego kod drugih nervnih blokova i zbog toga ovaj zahvat treba koristiti samo ako se bol ne može uspješno liječiti na neki drugi način.

Kao posljedica blokade parasimpatičkih vlakana trigeminalnog živca može se javiti Hornerov sindrom, o čemu također treba informirati bolesnika prije izvođenja samog bloka ganglija Gasseri.

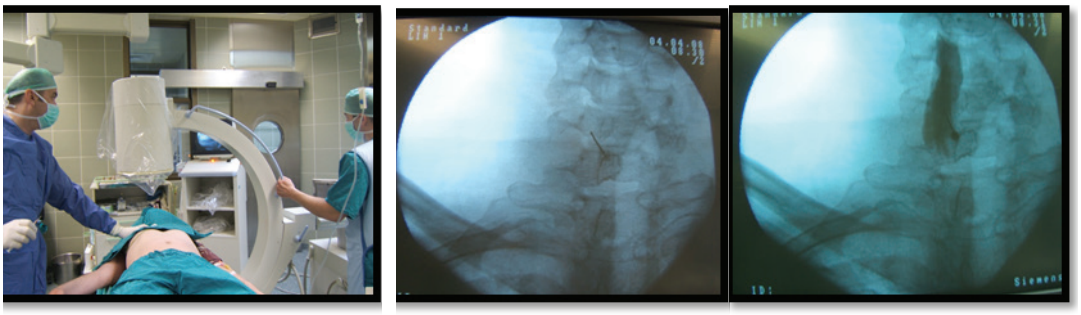


A **B**

Slika 2. Napredovanje igle kroz foramen ovale (A) te krajnji položaj igle kod dijagnostičkog bloka ganglija Gasseri (B)

BLOK GANGLIJA STELATUMA PREDNJI PRISTUP

Blok ganglija stelatuma je indiciran za liječenje akutnog herpesa zostera u području distribucije trigeminalnog živca i cervikalnih i gornjih torakalnih dermatoma kao i kod ozeblina i akutne vaskularne insuficijencije u području lica i gornjih ekstremiteta. Blok ganglija stelatuma je također indiciran za liječenje refleksne simpatičke distrofije lica, vrata, gornjih ekstremiteta, Raynaudovog sindroma gornjih ekstremiteta i simpatički povezane boli malignog uzroka u navedenim područjima.

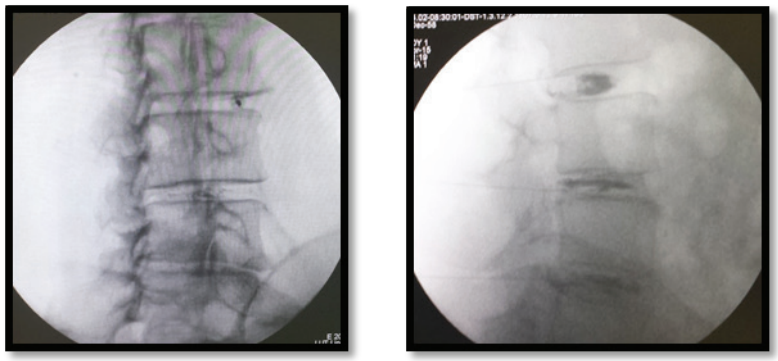


A **B** **C**

Slika 3. Položaj bolesnika za blok ganglija stelatuma u polažaju na leđima kod prednjeg pristupa (A). Položaj vrha igle na C6 (B), te provjera položaja igle ubrizgavanjem kontrasta (C)

DISKOGRAFIJA

Diskografija se koristi za dijagnosticiranje strukturalnih oštećenja diska. Tijekom diskografije radiografski kontrast se injicira u disk te se promatra bolesnikova reakcija na injekciju. Provokacija boli koja je istog karaktera kao bol koju je bolesnik osjećao prije zahvata sugerira da je navedeni disk uzrok boli. U novijim studijama dokazano je da se bol ne može izazvati u asimptomatskoj kontrolnoj skupini, što ukazuje da je diskografija korisna u identifikaciji pacijenata s diskogenom boli. Diskogram treba učiniti ako bolesnik nema adekvatan odgovor tj. zadovoljavajuće smanjenje boli na farmakoterapiju te ako ostali neivazivni testovi (npr. MR, CT) nisu uspjeli otkriti uzrok boli u leđima.

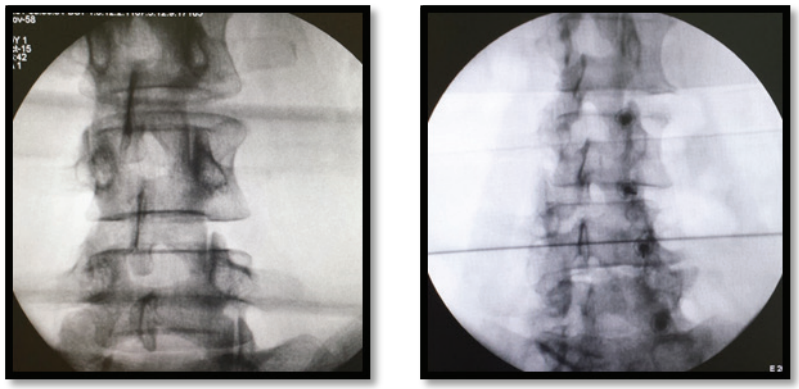


A **B**

Slika 4. Kosa snimka od 25 stupnjeva s iglom koja napreduje prema disku (A). Diskografija na tri nivoa sa širenjem kontrasta unutar diska (B)

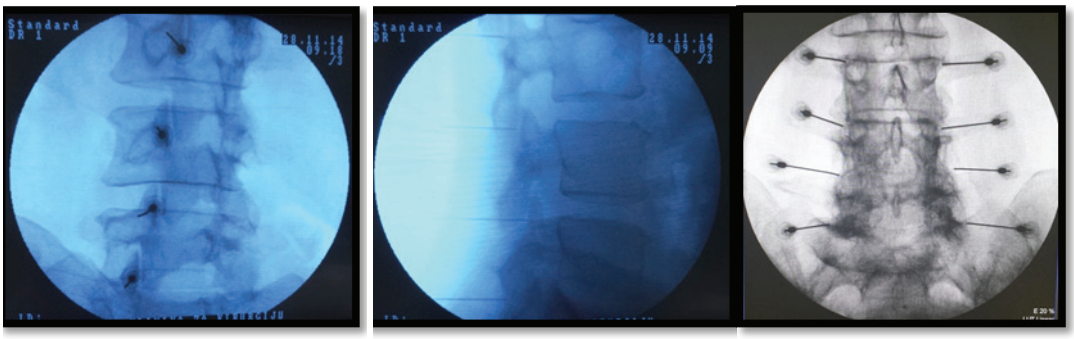
BLOKADA FASETNIH GLOBOVA

Poremećaj u fasetnom zglobu može biti odgovoran od 10% do 50% svih slučajeva kronične lumbalne boli. U čistom fasetnom sindromu ne postoje znakovi i simptomi iritacije živčanog korijena, nema parestezija, nema radikularne boli u nogama, nema senzornog deficit, nema slabosti u mišićima nogu, nema boli prilikom fleksije u leđima ili javljanja boli prilikom Laseugovog testa. U nedostatku prediktivnih kliničkih ili radioloških nalaza, blokade živca se smatraju najbolji način dijagnosticiranja fasetne boli. Ako lumbalni ili vratni fasetni zglobovi budu potvrđeni kao izvor boli, obično s dijagnostičkim blokom medijalne grane, onda je vjerojatno da će radiofrekventna denervacija biti djelotvorna za liječenje boli u vratu ili križima



A B

Slika 5. Snimka lumbosakralne kralježnice mobilnim RTG aparatom nakošenim za 15 stupnjeva (A), te blokada fasetnih zglobova na nivou LII/LIII, LIII/LIV, LIV/LV, LV/SI (B)



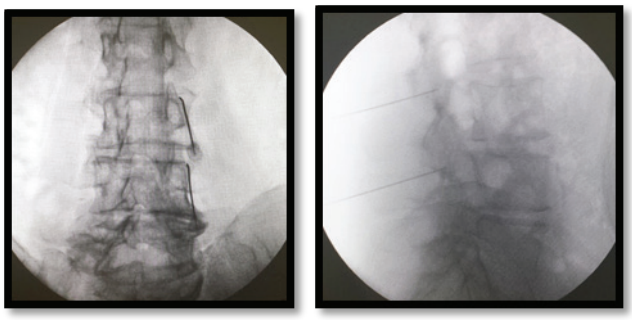
A **B** **C**

Slika 6. Dijagnostički blok fasetnih zglobova na nivou LII/LIII, LIII/LIV, LIV/LV, LV/SI (A), lateralna snimka dijagnostičkog bloka LII/LIII, LIII/LIV, LIV/LV, LV/SI (B), te anteroposteriorna snimka obostranog dijagnostičkog bloka fasetnih zglobova LII/LIII, LIII/LIV, LIV/LV, LV/SI (C)

RADIOFREKVENTNA DENERVACIJA FASETNIH ZGLOBOVA

Neuroliza medijalne grane može se smatrati izbor za pacijente koji pate od uporne aksijalne, a ne radikularne boli, te bol ne reagira na manje invazivne konzervativne mjere. Radiofrekvencija ablacija izaziva termalnu nekrozu fasetnih živčanih vlakana (medijalne grane) što dovodi do značajnog smanjenja boli u bolesnika od 6 do 12 mjeseci.

Slika 7. Izvođenje RF denervacije fasetnih zglobova lumbosakralne kralježnice pod kontrolom fluoroskopa, uz monitoriranje vitalnih funkcija, te nadzor medicinskog tehničara i rendgen tehničara.



A **B**

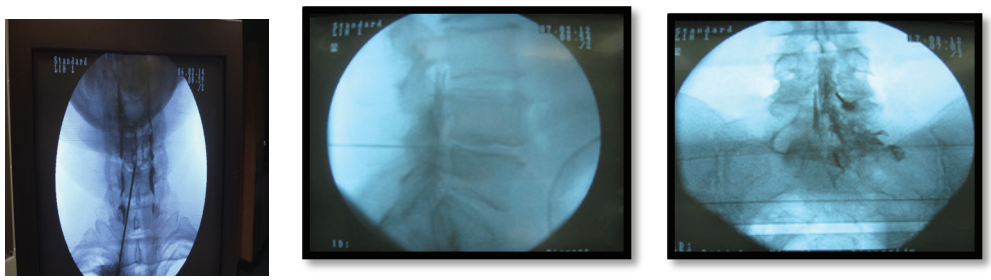
Slika 8, Položaj RF igli sa 15 stupnjeva nakošenim RTG aparatom (A), i položaj RF igli u lateralnoj RTG snimci (B)

EPIDURALNA PRIMJENA STEROIDA

Najučestalija indikacija za epiduralnu primjenu steroida je akutna radikularna bol. Lumbalna radikularna bol (LRB) je bol uzrokovana iritacijom, upalom, pritiskom ili ozljedom lumbalnoih spinalnih živaca. Lumbalna radikularna bol je karakterizirana kao oštra, pekuća, pritiskajuća i probijajuća bol duž zahvaćenog živčanog puta. Hernijacijom inducirana bol pogoršava se pregibanjem, sjedenjem, kašljanjem i povećanjem tlaka intervertebralnog diska, dok se stanje poboljšava u ležećem položaju i kod nekih bolesnika prilikom hodanja. U suprotnosti, bol uzrokovana centralnom stenozom spinalnog kanala pogoršava se hodanjem i smanjuje s pregibanjem.

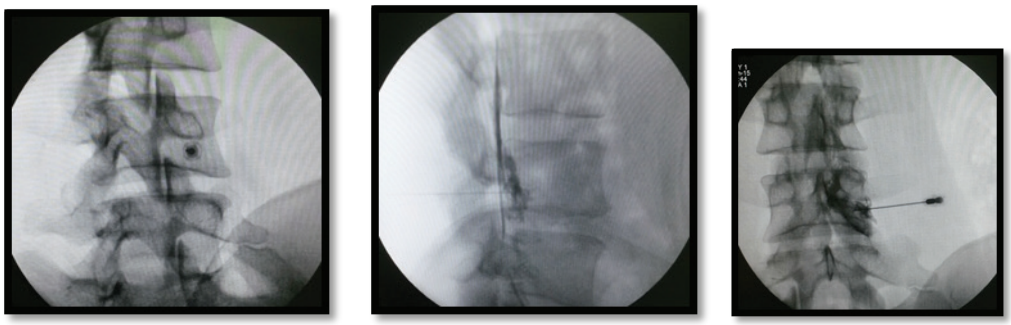
Ubrizgavanje i akumuliranje steroida u neposrednoj blizini živčanoga korijena ima za posljedicu djelotvornu kontrolu lokalne upale. Epiduralno primjenjeni steroidi inhibiraju sintezu prostaglandina, inhibiraju sintezu i opuštanje proinflamatornih faktora, stabiliziraju lizosaomalne i druge membrane, suprimiraju imuni odgovor, povećavaju krvni protok te na taj način dovode do ispiranja upalnih medijatora.

Epiduralno se steroidi mogu primijeniti na tri načina tj, interlaminarno, transforaminalno i kaudalno.



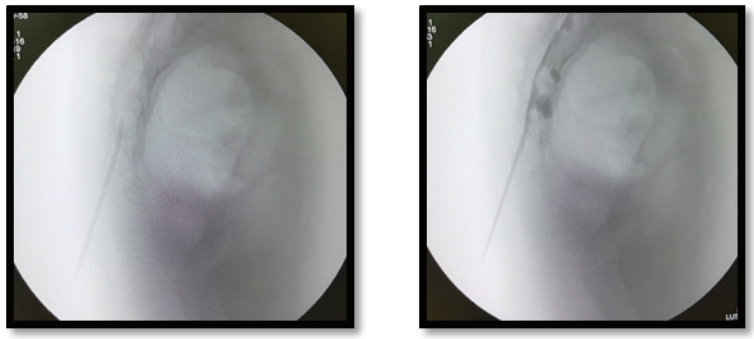
A **B** **C**

Slika 9. Epiduralna primjena steroida interlaminarnim pristupom u području vratne kralježnice (A). Potvrda položaja vrha igle kontrastom u lumbalnom dijelu kralježnice (B), te širenje kontrasta prikazano anteroposteriornom snimkom (C)



A B C

Slika 10. RTG snimka nakošena 20 stunjeva, te položaj igle u odnosu na pedikule (A). Provjera položaja vrha igle i širenje kontrasta u prednjem epiduralnom prostoru (B). Širenje kontrasta u epiduralnom prostoru te uzduž živca. Anteroposteriorna snimka (C)

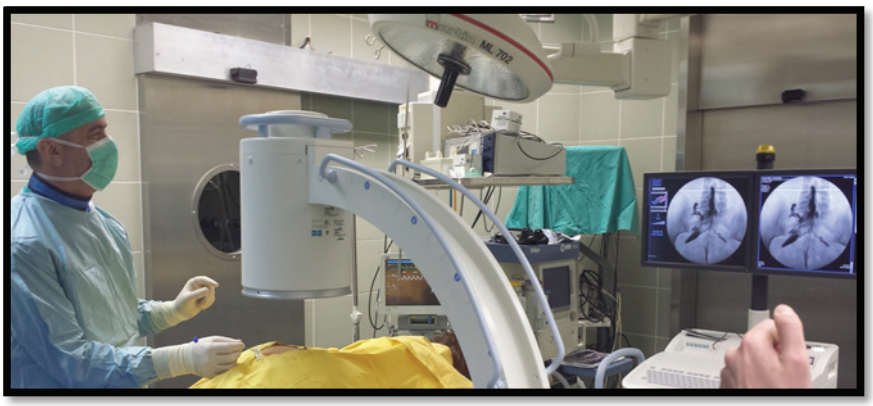


A B

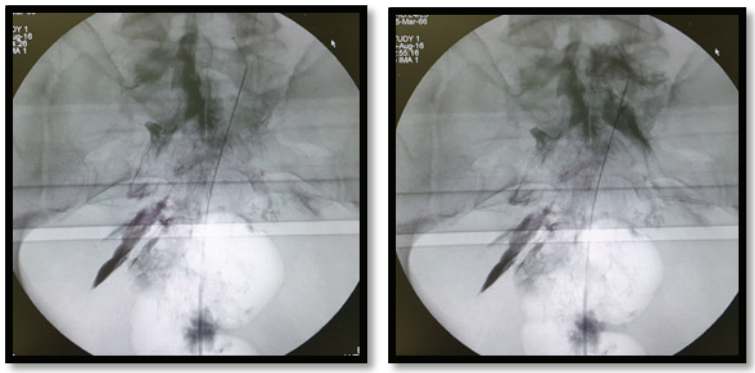
Slika 11. Kaudalno plasiranje epiduralne igle (A). Provjera položaja epiduralne igle kontrastom (B)

EPIDUROLIZA -RACZ PROCEDURE

Epiduroliza je postupak koji se primjenjuje za oslobađanje od priraslica tj. ožilnog tkiva koje se javlja nakon operativnog zahvata na kralježnici tj . u epiduralnom prostoru, a sami postupak se izvodi pomoću Raczovog katetera koji se uvodi kaudalno, transforaminalno ili interlaminarno, te se dovodi do priraslica i putem njega se injiciraju lijekovi koji otapaju priraslice. Kada se radiografskom snimkom potvrdi položaj katetera na mjestu priraslica kroz kateter se aplicira hijaluronska kiselina ukupno 1500 i.j., te 5 ml 0,25 % levobupivacaina i 40 mg DepoMedrolaPostupak se izvodi u dnevnoj bolnici.



Slika 12. Širenje kontrasta u obliku božićnog drvca nakon ubrizgavanja kontrasta kroz epiduralnu iglu kaudalno, prije postavljanja Raczovog katetera.



A **B**

Slika 13. Plasiranje Raczovog katetera u područje priraslica tj. područje bez kontrasta (A). Širenje kontrasta u području priraslica nakon otapanja priraslica (B)

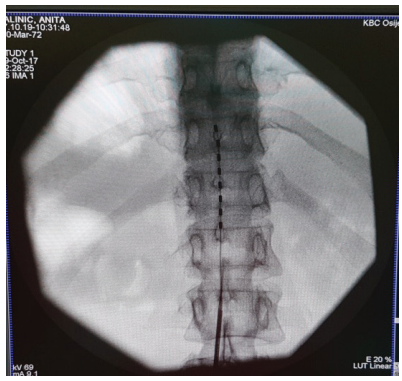
STIMULACIJA KRALJEŽNIČNE MOŽDINE

Stimulacija kralježnične moždine (Spinal Cord Stimulation, SCS) namjenjena je za liječenje vrlo jake do neizdržive neuropatske boli kada su iscrpljeni drugi, konvencionalni oblici liječenja boli. Dva najčešća uzroka NeuP su višestruke neuspjele operacije kralježnice (Failed Back Surgery Syndrome-FBSS) i kompleksni regionalni bolni sindromi (**Complex Regional Pain Syndrome**-CRPS), ranije poznat kao sudeckov sindrom.

Najčešće se radi o stanjima nakon višestrukih operacija kralježnice (neuspješnih operacija hernije interertebralnog diska, postoperativne epiduralne fibroze kao uzroka radikularne boli duž donjih ekstremiteta, postlaminektomijske boli), te kompleksnih regionalnih bolnih sidroma.

SCS je minimalno invazivna procedura koja uključuje kirurški ili perkutane im-

plantacija male elektrode, spojene na izvor napajanja, pod kožu. Niskonaponski električna stimulacija se prenosi iz izvora napajanja i kroz elektrodu dovodi do kralježnične moždine, s ciljem smanjenja bolnih senzacija, zamijenivši osjet boli s blagim trnjenjem tj. parestezijama. Za neurostimulaciju je zadužen mali uređaj, neurostimulator, vrlo sličan elektrostimulatoru srca (pacemaker), koji se kirurški ugrađuje ispod kože bolesnika, najčešće u području trbuha. Neurostimulator isporučuje blage električne impulse u leđnu moždinu čime izaziva blage trnce.



Slika 13. Položaj elektrode u epiduralnom prostoru kod stimulacije kralježnične moždine

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27 Spinal injections for chronic pain

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Introduction

In this presentation we shall refer to the injections to the cervical, lumbar spine and sacroiliac joints. We shall talk about translaminar and transforaminal epidural injections and also injections into facet joints. We won't be referring to the classical epidural injection in lumbar and thoracic spine because these are rather well-known and frequently applied in daily practice.

Imaging and Radiation safety

In the past, spine injections were "blindly made" without any direction. With the advancement of technology, the use of C-arm or ultrasound are "a cine qua non" for each injection. Each time we use the C-arm it's absolutely necessary to use a protective apron, special glasses and gloves; most importantly to shorten the time of radiation is to avoid continuous imaging. The operator should be familiar with the C-arm. The views that are usually used are anterior-posterior (AP), the "profile" or "lateral" and oblique. In addition to being familiar with the C-arm, it is also necessary, as we shall see further down, to know about spine anatomy. Two questions are important: where should I place the needle and the second more important where shouldn't I place the needle in order not to cause any damage or any injuries to the spinal cord or to a vessel.

Cervical epidural injections

The word "epidural" is a complex word consisting of "epi" which means upon and the word "dura" which mean matter. The pain felt in the neck which may or may not be reflected to the upper limb, is due to some pressure of the spinal cord or due to a nerve root from a disc or spinal stenosis. In both cases the injection of local anesthetic

in combination with a steroid can offer pain relief to the patient. The cervical epidural injection can be done in two ways: Interlaminar or transforaminal. In the first case the drug is injected into the epidural space while in the second case the drug is injected into the foramen.

Indications

Here are some various conditions where the cervical epidural injection can offer pain relief to the patient: Whiplash injury, cervical radiculopathy, cervical spondylosis, tension type headache, phantom limb pain, post-herpetic neuralgia, reflex sympathetic dystrophy (CRPS) and etc.

Anatomy

As we have said before, knowing the anatomy is very important. Some of the basic anatomic elements are recognizing the C1 and C7 vertebra, the spinolaminar line which is the border of epidural space and the posterior vertebral line which is the border of the spinal cord. We should not forget the vessel components: the vertebral and internal carotid arteries. We also must remember that cervical ligamentum flavum may not be fully shaped in the entity of it's root from C7 to C1, as there may be gaps. At the level of C7/T1 and C6/C7 the epidural space is wider and for this reason this is the point where the injection is made. If the space is smaller than 1mm, it is not a good idea to perform the injection.

Equipment-Drugs

In order to make the injection into the epidural space we use our well known Tuohy needle, preferably 20G or 18G and if it is for a transforaminal injection, a black 22G spinal needle. 4-5 mL of Lidocaine 1% along with a steroid, is a sufficient dose and volume for a cervical epidural injection. Half of this is used for a transforaminal epidural injection.

All injections in the spine should be done in the operating theater, under aseptic conditions, with continuous monitoring of the vital signs (HR, BP and SpO2), placing of a drip and of course using a C-arm or an Ultrasound. The patient can be placed in a prone, lateral, supine or sitting position. The advantage of a sitting position is that it's more comfortable for the doctor and the patient as well as the fact that the epidural space is wider this way. The disadvantage is the danger of vagotony as it is not possible to give adequate sedation.

A few words about the steroids: methyl-prednizolone and Dexamethazone don't make particles of a large size in contradiction to Triamcinole and Betamethazone. For this reason they are considered suitable for injections in the cervical area. Some rare adverse effects of steroids are: insomnia, nightmares, nervousness and hyperglycaemia.

Cervical epidural injection – Technique (Translaminar approach)

Under aseptic conditions, we use the loss of "resistance to saline" technique to

reach the epidural space under continuous AP and lateral views with the C-arm. After we reached the epidural space, we inject a contrast to confirm that it is the epidural space and after this we made the injection with a total of 5mL of Lidocaine 1% plus steroid. While the injection is being performed, it is important the patient does not complain of pain or any paresthesia on the neck or upper limb. Since such a complaint would mean pressure of the spinal cord or pressure of a nerve root, something that we certainly would not want. For this reason the patient should not be deeply sedated.

Safety considerations

A few words now about the safety in all kinds of injections. The help of the operator of the C-arm is very important in order to obtain good views during the process of finding the right place to give the injection. As we reach the spinolaminar line we connect the needle to the syringe and we apply the "loss of resistance to saline" technique very carefully. Spinolaminar line is the line (border) where we expect to find the epidural space. In no circumstances should we pass the posterior vertebral line because that is where the spinal cord is.

Contraindications

Contraindications for both interlaminar and transforaminal injections are local infection, sepsis, anticoagulant agents and a very narrow space <1mm. Hypovolemia is a relative contraindication as well.

Complications

Nobody but nobody would like to have one of these complications[1]: hematoma formation, dural puncture, spinal cord trauma, embolization of particulate matter into the arterial supply of the cord, infection, abscess formation, subdural injection, nerve damage, headache, intravascular injection, vascular injury, death and etc

Effects of steroids

The percentages are between 0-16% while many incidents remain unrecorded. Let me remind you that cervical epidural injections have not obtained approval of the FDA even though they are described as techniques in all American books related to this kind of injection. According to a recent work[i] an important factor in the occurrence of such complications is the lack of training of the doctor who is performing the injection.

Cervical transforaminal epidural injection (also known as cervical nerve root injection).

As the title of says, the steroid is injected into the cervical foramen of the nerve root. Let me remind you that in this foramen (as in any spinal foramen) there is not only the nerve but also some vessels and the dura matter that we must avoid. It is better in

this case to place the needle in the upper one-third of the foramen. The indication for this kind of injection is the radicular pain in the upper limb as a result of a disc proptosis or lateral cervical spine stenosis.

In addition to the standard basic monitoring of vital signs we also need a spinal needle, local anesthetic, contrast dye and a steroid.

Technique

With the patient in the prone position and by turning his head to the opposite side, than the side it suffers, we turn the C-arm in such a way so it clearly sees the spaces between the vertebras. Following that, we turn coronary the C-arm up to 45^0 to the side that is suffering and then a little bit cephalad or caudal such a way to see the foramens clearly. The point where we place the needle is the upper and posterior part of the foramen, which we mark on the skin of the patient. With the needle parallel to the beam we push the needle while we continuously check the position with AP and lateral views of the C-arm. The right position is a few mm into the foramen. After we have applied the contrast dye and confirmed that we are in, we inject 1,5-2mL of local anesthetic with the steroid.

Complications

These are similar to translaminar epidural access and for this reason we need to pay extra attention and follow the safety regulations.

Cervical facet joints injections

Facet joints, are more properly termed the zygapophyseal joints, a term derived from the Greek roots zygos, meaning bridge, and physis, meaning outgrowth. Patients with cervical facet joint syndrome often complain about neck pain, headaches, and limited range of motion. Symptoms include tenderness to palpation over the facet joints or paraspinal muscles, pain with cervical extension or rotation, and absent neurologic abnormalities. We should remember that pain does not have nerve root distribution.

Equipment and drugs

We will need a spinal needle (22G), local anesthetic and a steroid.

Technique

In the profile x-Ray of the neck one can evaluate the facet joints and match the points of pain with them (they are misshaped). With "en face" and oblique views and with the tunnel view technique, we set the needle onto the facet joints. We must be careful during the advance of the needle, in the profile view, when pushing the needle; there is a danger to traumatize the cerebral artery. For long term results, radiofrequency technique can be applied through a special electrode.

Complications

Complications that can occur are various: Intravascular injection – embolism (intra-arterial injection), spinal anesthesia, nerve root block and vasovagal reaction.

Lumbar transforaminal epidural injection (lumbar nerve root block)

Indications

Indications for transforaminal epidural injection in lumbar spine is every radicular pain of the lower limb, of whatever aetiology such as lateral disc prolapse or lateral stenosis or even to treat post herpetic pain of lower limb.

Safety considerations

Knowing the anatomy is very important. Let us be reminded that the needle should be placed in the lower part of the foramen in order to avoid trauma to the nerve or to the vessel. This safety area is also known as the "Kambin triangle".

Technique

After confirming the level with an AP view, we adjust the beam in such a way to see the endplates clearly. We oblique the beam to see the Kabin's triangle, and set the needle. We check the needle's advancement with AP and lateral views and once we get, only a few mm into the foramina, we stop there: we inject the dye for confirmation and then we inject the local anesthetic plus the steroid.

Complications

Complications are few if someone, of course, pays extra attention to the technique. Rarely have there been complications recorded.

Lumbar facet joints injection

The facet joints, as was mentioned above, are a pair of joints in the posterior aspect of the spine. When the joints are inflamed or damaged they cause low back pain without nerve distribution. A rather large percentage of patients who are suffering from pain due to facets joint syndrome still remain undiagnosed. It's relatively easy for one to see the facet joints in a normal spine but this is not so easy when the spine has osteoarthritic changes or more difficult when there is a scoliosis. Local tenderness over the facet joints, low back pain with or without pathologic findings in the MRI , are some of the indications that pain is due to facet joints syndrome.

Equipment and drugs

We will need a spinal needle (22G), local anesthetic and a steroid.

Technique

For a facet joint injection are a spinal needle (22G), local anesthetic and a steroid.

After we have localized the joints that are suffering using the AP view, we oblique the C-arm ipsilaterally (5^0-15^0). The target point is the lower, middle or upper part of the joint. We put the needle parallel to the beam ("tunnel view" technique) and then we push it until it touches the joint.

As long as analgesia lasts for some time, longer than one month, then one could apply the radiofrequency ablation technique in order to extend the period of analgesia for a longer time. The tip of this special electrode is guided through the needle to the middle nerve of the joint. This small point of the facet joint is described as the «eye of the scotty dog».

Complications

Complications are generally rare and include bruising, backache, neuritis and sometimes numbness of the leg.

Sacroiliac Joint Injections

Usually, the pain from the sacroiliac joints is misdiagnosed and the patient is subjected to various injections in the spine without any pain relief. Pain is localized to the gluteal, inguinal and hip areas. The spread of pain as you press the sacroiliac joints and the morning pain as you get out of bed, are characteristic of sacroiliac joint arthritis.

Equipment

We will need a spinal needle (22G), local anesthetic and a steroid.

Technique

The injection is administered with the patient in a prone position and with C-arm in such an inclination to see the joints as «hyperlucent region». Usually the C-arm has a tilt 15^0-30^0 to the suffering joint. We perform three injections, in the upper, middle and lower third of the joint. Equipment for this injection is similar to the previous injection. For long term results one can apply the radiofrequency technology.

Conclusion

Spinal injections are most effective as part of multimodal approach. The correct diagnosis is absolutely crucial along with the ability of the operator to perform the injection in the correct way. Last but not least, continuous training and daily practice are the important keys for succeeding.

28 Preoperative intravenous ketamine for analgesia

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Introduction

Ketamine is a phencyclidine derivative that was introduced into clinical use in 1965. It is a noncompetitive N-methyl-D-aspartate (NMDA) receptor antagonist, and has analgesic and antihyperalgesic properties. Ketamine may improve the management of perioperative pain, because the mechanism of action differs from that of opioids. Since the 1980s, investigations have revealed a critical role of the NMDA receptor in pain processing and ketamine has received considerable interest as an analgesic. At sub-anesthetic doses (≤0.3 mg/kg IV), ketamine possesses centrally mediated analgesic properties with minimal effects on consciousness and cognition. The current model of pain processing consists of 3 primary sites of molecular and neural modulation including the peripheral nociceptor, nerve and dorsal root ganglion, the dorsal horn of the spinal cord, and the brain and brainstem. The NMDA receptor probably exerts much of its pain processing effect in the dorsal horn of the spinal cord. In response to tissue injury or trauma, the primary nociceptive neuron triggers a release of glutamate in the dorsal horn of the spinal cord, which binds to NMDA receptors on second-order neurons. Once activated, the NMDA receptor triggers a cascade of intracellular processes that culminate in the altered behavior and expression of NMDA receptors as well as neuronal synaptic plasticity that lies behind the development of central sensitization.

Ketamine neuropharmacology

Ketamine essentially acts on glutamate binding sites, NMDA (N-Methyl-D-Aspartate), and non-NMDA receptors. The antagonism of NMDA receptor is responsible for the specific ketamine properties (amnesic and psychosensory effects, analgesia, and neuroprotection). There are also other glutamate-independent mechanisms. By block-

ing the NMDA receptor, ketamine holds obvious promise for attenuating these centrally mediated pain processes, thereby reducing acute pain and potentially preventing chronic pain. It should be noted that the NMDA receptor is present throughout the central nervous system and that ketamine, in addition to its actions in the spinal cord, probably has multiple effects on pain processing.

Pharmacokinetics

Ketamine clearance is described by a two-compartment model with a rapid distribution phase (distribution half-life of 11-16 min). Elimination half-life is 2-3 h and the clearance is 12-17 mL/kg/min. Ketamine is highly lipid soluble and has a large volume of distribution (3 L/kg). Ketamine will accumulate during prolonged infusions, and the context sensitive half-time is similar to that of propofol. Most of the pharmacokinetic modeling of ketamine infusions has been done using anesthetic or sedation doses, and there are little data about the pharmacokinetic implications of prolonged sub-anesthetic ketamine infusions. Some of authors applied a low-dose ketamine protocol consisting of an initial bolus of 0.5 mg/kg followed by a 72-h continuous infusion (first 24 h at 2 mcg/kg/min followed by 48 h at 1 mcg/kg/min) and measured serum concentrations of ketamine and norketamine at 1, 24, and 72 h. Their results suggest that after 72 h, the serum concentrations of ketamine are still below that 1 h following a 0.5 mg/kg bolus. Norketamine levels do rise, however not significantly. [13] Renal dysfunction could cause prolonged clearance of ketamine metabolites, though this is probably not clinically significant as the vast majority is metabolized into inactive metabolites. There are no data to suggest that sub-anesthetic ketamine is unsafe in patients with renal dysfunction.

Contraindications to sub-anesthetic ketamine

Sub-anesthetic ketamine for perioperative analgesia is an elective treatment, and a risk-benefit assessment should be done in all cases where the patient may have a relative contraindication.

Contraindications to sub-anesthetic ketamine: High risk coronary or vascular disease, Uncontrolled hypertension, Elevated intracranial pressure, Elevated intraocular pressure, Globe injuries, History of psychosis, Sympathomimetic syndrome, Hepatic dysfunction, Recent liver transplantation, Porphyria.

Effective intraoperative bolus doses

In most of the published studies, effective intraoperative bolus doses range from 0.15 mg/kg to 0.5 mg/kg and infusions are most commonly in the range of 0.1-0.2 mg/kg/h (2 mcg/kg/min is a common infusion dose as well). Psychosensory effects increase at doses above 0.3 mg/kg, so this can be considered a soft upper limit for bolus doses in awake patients. The effects of a bolus dissipate after 30-45 min, so obviously an anesthetized patient can tolerate higher doses so long as they will not be emerging from anesthe-

sia in the immediate future. Furthermore, during long operations, serial boluses of ketamine every 30-45 min should be considered. There is no consensus on the upper limit of ketamine infusion, but 0.3 mg/kg/h is a reasonable upper limit to be considered in awake patients in a non-Intensive Care Unit setting. In obese patients, ideal body weight should be used for dose calculation. The ideal duration of postoperative infusion is also not clear from the literature, but 24-72-h infusions are both efficacious and safe. With prolonged infusions of any drug, there is always some concern about drug and metabolite accumulation. There are no studies of postoperative ketamine infusions that suggest prolonged infusions are associated with increased incidence of side effects. Ketamine, an NMDA antagonist, blunts central pain sensitization at sub-anesthetic doses (0.3 mg/kg or less) and has been studied extensively as an adjunctive analgesic in the perioperative setting. At sub-anesthetic doses, ketamine has a minimal physiologic impact though it is associated with a low incidence of mild psychomimetic symptoms as well as nystagmus and double vision. Relative contraindications to its use do exist and due to ketamine's metabolism, caution should be exercised in patients with renal or hepatic dysfunction. Sub-anesthetic ketamine improves pain scores and reduces perioperative opioid consumption in a broad range of surgical procedures with a minimal risk of side effects.

Conclusion

Sub-anesthetic ketamine has efficacy when given as an intraoperative bolus alone or as an intraoperative dose followed by a postoperative infusion of 24-72 h. The ideal dose of sub-anesthetic ketamine is 0.1-0.3 mg/kg as a bolus and 0.1-0.3 mg/kg/h as an infusion. In Table 3 the authors present their recommended dosing strategy. Further research is needed to define the best indications for perioperative sub-anesthetic ketamine and to further explore the potential long-term implications of perioperative ketamine on the development of persistent postsurgical pain.

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29 Preoperative anxiety and postoperative pain

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Introduction

Decades ago preoperative anxiety, was recognized as a potential and preventable risk factor for postoperative complications, as in 1963 Egbart et al. noted that surgical patients exposed to the "unpleasant state of mind reported as uneasiness, anxiety and fear, during preoperative period" (1). The first and so far the only definition of preoperative anxiety was created by Ramsay and it states that preoperative anxiety is "an unpleasant state of uneasiness or tension that is secondary to a patient being concerned about a disease, hospitalization, anesthesia and surgery, or the unknown" (2).

With increasing number of surgeries being performed each year worldwide (3), it is obvious that an individual patient perception of surgery and outcomes needs to be better assessed (4). Particularly because of data showing that between 25% and 80% of patients admitted to hospital for surgery experience preoperative anxiety (5-7), and anxiety can negatively influence patient recovery (8-14).

Preoperative anxiety factors

As human beings, we have "personal psychological history", that could influence postoperative recovery (1). Based on knowledge that our fear originates from the unknown (1), surgery and anesthesia are potentially the most traumatic situation of a patient's life (1). The causes of preoperative anxiety are arranged in three dimensions: the fear of the unknown, the idea of being sick, and the possibility of life ending (15). And, it is found that the surgery waiting period is acknowledged by patients as the most worrisome (15).

The level of preoperative anxiety is highly individualized, and Berth systematized the factors as sociodemographic factors, psychosocial and type of surgery and anesthesia (16). Sociodemographic factors influencing postoperative pain include younger age (17), and female gender (5, 18-21). Psychosocial variables influence on preoperative anxiety is even more complicated issue as patient's typical emotional reactions should

be analyzed, not just pre-operative emotional status (22). Also, anxiety has an impact on personal coping behavior and indirectly influences postoperative recovery (23). Patients with family and and other social support, have lower preoperative anxiety (24, 25). Shortened sleeping period and feeling of helplessness and self-blaming were found to be predictors of anxiety (17, 18). Additionally, concern about family, fear of complications, results of operation, and postoperative pain, can precipitate preoperative anxiety (26).

Role of surgery and anesthesia

It is interesting that experience of prior surgery decreases the preoperative anxiety status (21, 27), while the first time anesthesia experience increases anxiety level (28). From our everyday practice it is obvious that patients waiting for the surgery express concerns about family, fear of complications, results of operation, and postoperative pain (4). Based on literature data, preoperative state anxiety scores of patients undergoing cardiovascular surgery were significantly lower in comparison to gynecologic and aesthetic surgery (17), and neurosurgery, general surgery, ear-nose-throat, and orthopedics cause less anxiety (17). Preoperative anxiety can be present in up to 85% of day surgery patients (29).

There is an obvious question, what is the primary determinat of preoperative anxiety? It was noted that fear of "mutilation", rather than extent of surgery (15, 30) and history of cancer are important determinant of preoperative anxiety (30). It seems logical that patients are more afraid of general anesthesia than local infiltrative anesthesia (29). But, patients who are offered regional anesthesia usually are anxious that they will be awake, in pain, feeling surgeon's touch or being in situation to see the "cutting of their body" (31). Patients are also concerned about anesthesiologist experience, presence in the operating room during anesthesia, of not waking up, being in pain and paralyzed postoperatively (32).

Preoperative anxiety and its consequences on perioperative pain management

One of the most important consequences of primary anxiety is pain. Postoperative pain is complex phenomenon, multifactorial and multidimensional (33). Although Henry Beacher observed that preoperative anxiety influences the severity of postoperative pain, this was showen by recently performed studies especially in patients undergoing gastrointestinal, obstetrical, and gynecological surgery (34, 35). Based on literature data, the higher the preoperative anxiety the greater requirements of postoperative analgesia (36, 37). Moreover, higher level of preoperative anxiety has been associated with higher dosage of intravenous anesthetics, at induction and during maintenance (38). It is recognized, at least for intravenous anesthetics that the dose may have to be adjusted based on preoperative anxiety level (36).

Preoperative anxiety is connected with less favorable outcomes after orthopedic, cardiac, and gynecologic surgery (9-12, 39), and therefore standardized preoperative

screening and subsequent treatment of high anxiety level as part of the preoperative work-up in orthopedic and gynecology practice was suggested by several authors (10, 40). This can be particularly important for patients undergoing cardiac surgery as it may help identify patients at an increased risk for cardiovascular mortality, even for long-term mortality (13, 14).

Instruments for assessing and measuring anxiety

The most commonly used instruments by clinicians and researchers for the assessment of preoperative anxiety were not initially developed specifically for the assessment of preoperative anxiety (4). The tool can be adapted into perioperative clinical practice. It is important to develop sensitive and specific simple-items questionnaires which could be easy, fast and therefore applicable in real life, busy clinical practice, while still providing reliable measurement of the intensity and severity of preoperative anxiety (4).

Stamenkovic et al. (4) summarized and presented in their paper the available tests for measuring anxiety State-Trait Anxiety Inventory – STAI (41), Amsterdam Preoperative Anxiety and Information Scale – APAIS (42), Anxiety Specific to Surgery Questionnaire – ASSQ (18), Visual Analog Scale for anxiety – VAS-A (43), Anxiety Likert Scale (44).

Action is needed

An appropriate evaluation of preoperative anxiety is critical for postoperative quality of care, and even reduced postoperative costs (45). Simple VAS-A scale was found to be reliable and useful (15). Education prior surgery and anesthesia is integrated into the preoperative visit, but no data exists as to how frequently in practice this is done on regular basis (46), as studies showed that patients like to be informed about surgery, postoperative pain, pharmacological treatment and staff competence (47). But, this can be, culturally and ethnically dependent, as in some patients preoperative information failed to show benefits (17). "Intensive" role to preoperative counseling about anesthesia and surgical procedures is suggested by Enhanced Recovery after Surgery (ERAS) Society programme for different surgical fields apostrophizing the multidisciplinary approach (48). These includes surgeons, anesthesiologists, nurses on the ward, operating room, recovery, physiotherapists and nutritionist involvement as very important step in patient preparation for surgery (48, 49). It is suggested that anxiety assessment should be incorporated in battery of tests performed in the preoperative clinic, like airway assessment (4). This can redirect patient to a psychologist if higher level of anxiety is recorded, for preoperative psychological therapy (4).

Non-pharmacological methods, like music interventions and acupuncture are suggested for preoperative anxiety management (50-52). Pharmacological Interventions have failed to decrease preoperative anxiety and postoperative pain (53-55). Nevertheless, the particular recommendation given by ERAS is "not routine" use short- or long-acting sedatives (49).

Conclusions

A preoperative assessment performed several weeks before surgery in an outpatient clinic, which will include information about surgery, anesthesia and postoperative pain seems reasonable, and anxiety assessment could be integrated in the preoperative visit with available questionnaires, such as the VAS-A or Anxiety Likert Scale, as the simplest and quickest way. The anesthesiologist preoperative visit must include information about the particular type of surgery and anesthesia, using explanations delivered in a patient's understandable language to ease preoperative anxiety. A firm experts' consensus, including anesthesia professional societies, is not available for the perioperative assessment of anxiety and its management.

However, the question arises: how we can change our management of preoperative anxiety? So far, no anesthesia guidelines exist for how to overcome preoperative anxiety and prevent progression to postoperative anxiety. Moreover, guidance is needed for appropriate situation in which to refer patients to a psychologist or psychiatrist.

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Session IX

WHEN 2 IN 1: OBSTETRICS

30 Postoperative analgesia for cesarean delivery

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Abstract

Cesarean delivery is the most common operating room procedure in women. Poscesaren delivery pain affects both mother and child, and also contributes to chronic postoperative pain. Multimodal analgesia, a key component of Enhanced Recovery After Surgery (ERAS), includes the use of systemic medications (opioid and non-opioid), neuraxial opioids and regional techniques.

Key words: cesarean delivery, analgesics, neuraxial opioids

Introduction

Multimodal analgesia, a key component of Enhanced Recovery After Surgery (ERAS), is the use of a variety of analgesic medications and techniques combined with nonpharmacological interventions to achieve effective pain control.1 The rate of cesarean delivery was 31.9% in the United States in 2016.2 and 25.26% in the Clinical Center Niš in 2017. With the total number of 1.22 million hospital stays in 2011., it was the most common operating room procedure in US.3 Effective postcesarean delivery analgesia impacts both mother and child: it improves mother satisfaction,4 reduces the risk of postpartum depression,5 improves mobility and reduces risk of DVT, and by all of that facilitates care of the newborn and increases breastfeeding.6

Chronic postoperative pain, defined as pain still present for three months after surgery has overall incidence of 10 – 50%, with 6 % of patients experiencing severe and disabling pain7. After cesarean delivery estimated incidence of chronic pain is lower – 10% with 4% of disabling chronic pain.8 Woman who had cesarean delivery are more likely to have persistent postpartum pelvic pain then woman who had vaginal delivery.9 There are several risk factors for chronic postsurgical pain e.g.: depression, anxiety, repeated surgery, psychological vulnerability, surgical approach,10 but severe acute postoperative

pain is a major predictor for chronic postsurgical pain.11 Several strategies have been recommended to reduce the incidence of chronic pain: use of regional (neuraxial) anesthesia,12 systematic use of NMDA receptor antagonist – ketamin,13 or gabapentin and pregabalin,14 15 or neuraxial clonidine.16 The aim of all these strategies is to reduce central sensitization, and by that decrease incidence and severity of chronic pain.

Neuraxial analgesia

American Society of Anesthesiologists (ASA) recommended selecting neuraxial techniques in preference to general anesthesia for most cesarean deliveries17. Most of cesarean deliveries are performed with neuraxial anesthesia (spinal, epidural and combined spinal epidural) in the United States,18 Europe19 20 and developed countries.21 Use of neuraxial anesthesia for cesarean delivery recently increased in some Serbian hospitals.22 ASA and American Pain Society recommend neuraxial opioids for postoperative analgesia for cesarean delivery.17 23

Opioids administered in subarachnoid spinal space appear to act principally on mu receptors in substantia gelatinosa of the dorsal horn.24 Lipophilic opioids, such as fentanyl enjoy greater direct diffusion as well as greater delivery to the dorsal horn by spinal segment arteries. By that they have swift onset of action and large uptake of lipophilic opioids in spinal cord results in small cerebrospinal fluid concentrations and a decreased potential for the drug to diffuse to higher spinal levels. As a result of that, fentanyl as a lipophilic opioid has a shorter duration of action (median effect of neuraxial fentanyl is 4 h) than a hydrophilic opioid – morphine, with intrathecal duration of action of 11-29 h (median time to first analgesic 27h).25 Although, sufentanil is lipophilic opioid like fentanyl, data suggest, that duration of analgesia was significantly longer with intrathecal sufentanil (2.5 /5μg) compared to intrathecal fentanyl 25 μg (214/236 min. vs 187 min.), with no difference regarding adverse events.26 The most appropriate dose of intrathecal morphine is uncertain. While higher doses (100-250 μg) of intrathecal morphine prolong analgesia after cesarean delivery compared with lower doses (50-100 μg) for 4.5h, the risk of opioid-related side effects (nausea, vomiting and pruritus) may increase with higher doses. A systematic review of ten studies (n=431) showed that a single bolus of epidural morphine provides better analgesia than parenteral opioids but with an effect limited to the first postoperative day after caesarean section and with an increase in morphine side effects (nausea and pruritus).27

Systemic analgesic

Systemic administration of different analgesic and adjuvat drugs is widely used in treatment of postcesarean delivery pain. Systemic opioids prescribed as needed or as patient-controlled intravenous analgesia are the basics of postoperative analgesia in general. But, for postcesarean delivery analgesia most reviewers recommend use of neuraxial morphine with "round the clock" nonsteroidal antiinflamatory drugs (NSAIDs)

and paracetamol; systemic opioids should only be prescribed as needed for the treatment of breakthrough pain.28 29

Nonsteroidal antiinflamatory drugs are important part of multimodal analgesia. NSAIDs such as ibuprofen, ketorolac, naproxen, ketoprofen are classified by American Academy of Pediatrics as "maternal medication usually compatible with breastfeeding".30 NSAIDs have up to 50% sparing effect on opioids. 31 32 Reduction of incidence of opioid-related adverse effects is also expected, which some meta-analysis confirmed31 and some didn't.32 Studies examining cyclooxygenase-2 (COX-2) inhibitors in postcesarean delivery analgesia are infrequent, and they did not prove COX-2 inhibitors analgesic efficacy,33 34 therefore their use should be limited to patients with contraindications for nonselective NSAIDs.

Paracetamol is widely used safe analgesic with minimal excretion in human milk. When used as a part of multimodal postoperative analgesia, it has an opioid sparing effect up to 20%, with the reduction in opioid adverse events.35 It has better analgesic efficiency when used in "around the clock" regime,36 and in combination with NSAIDs.37 Moreover, the addition of intravenous paracetamol to opioids in postoperative analgesia in obstetrics and gynecology surgery is associated with decreased hospitalization costs. 38

Gabapentinoids (e.g. gabapentin and pregabalin) are antiepilepsy drugs that are well established medications for neuropatic pain. When used as preemtive analgesia they are effective in reducing the incidence of chronic postsurgical pain.39 Moore et al.40 suggested that gabapentin in the setting of multimodal analgesia reduces postcesarean delivery pain, but later studies did not confirm that,41 42 while its sedation effect is verified. Pregabalin improves the postoperative analgesia compared with placebo,43 but in the cesarean delivery setting so far there is just one single-center confirming study.44 The safety of gabapentinoids in pregnancy and breastfeeding has still not been well determined.45

Local and regional techniques

Transversus abdominis plane block (TAP) block is regional anesthetic field block technique which blocks T6-L1 (according to some data T10-L146) nerve branches and by that has a role in postoperative analgesia for lower abdominal surgery, primarily for somatic pain and not for visceral pain. The block duration is approximately 10 hours with large variation (512-716 minutes)47. TAP block significantly improved postoperative analgesia after caesarean delivery in analgesic regimen that excludes spinal morphine.48 Intrathecal morphine was associated with improved analgesia compared with TAP block alone at the expense of an increased incidence of side effects.49 Staker et al. suggested that the addition of the new ilioinguinal-transversus abdominis plane block provides superior analgesia to our usual multimodal analgesic regimen (with intrathecal morphine and p.o. NSAIDs).50 Complications of the TAP block are rare, although local anesthetic toxicity could occur due to the large volumes required to perform this block51.

Quadratus lumborum block (QLB) was introduced as a variant of TAP block. It is performed exclusively under ultrasound. It can have advantages over TAP block due to easier ultrasound visualisation (superficial location) and potential analgesic effect on visceral pain (mechanism still needs to be confirmed)52. Random control trials showed that the QLB after caesarean section was effective and provided satisfactory analgesia,53 54 and even it was superior then TAP block. The main dissadvantage of these trials was that spinal anesthesia regimes did not have intrathecal morphine55.

Wound infiltration. A Cochrane Database Rewiev showed that local anesthestic wound infiltration as adjunct to regional analgesia and general anesthesia is of benefit in caesarean section by reducing opioid consumption56. TAP block and wound infiltration are equaly effective regarding postoperative opioid consumption, pain scores, and patient satisfaction in parturients undergoing cesarean delivery under spinal anesthesia57. Continuous wound instillation of local anesthetics provided significant analgesia at rest or on movement for gynecological and obstetric surgery at 48 h, but not for other type of surgery58, wereas another meta-analysis did not suggest a difference in pain scores and opioid consumption between infusions and single infiltration.59 Recent doble blind RCT (192 full-term parturients) even found that 100 μg intrathecal morphine and ropivacaine wound infusion both provided similary effective analgesia after elective cesarean delivery.60 The limiting factor for this kind of analgesia could be that high infusion rates lead to wound leakage, and low patient and practitioner acceptability.

Conclusion

Gold standard for postcesarean delivery analgesia is multimodal analgesia with neuraxial morphine with sheduled paracetamol and/or NSAIDs, and opioids for breakthrough pain. Local and regional techniques (TAP block, quadratus lumborum block, wound infitration) may be useful when the gold standarad cannot be deleivered (general anesthesia, NSAIDs contraindication) and for breakthrough pain. Gabapentinoids may be useful for patients with a history of chronic pain, or when higher risk for the chronic pain is anticipated.

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31 ERAS protocol for Caesarean delivery in Serbia – where are we now?

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Enhanced Recovery After Surgery (ERAS) is a new concept in surgery and anesthesia today. It started in the late 1990-ies in Denmark, predominantly for colorectal surgery, then spread to orthopedics, urology and oncology surgery. In recent years, this concept found its place in obstetrics, too. ERAS protocol was established in some hospitals in UK and in the USA and the results were very good. The whole medical team is involved in creating these protocols and implementing it in the hospital practice, which includes: an obstetrician, an anesthesiologist, a nurse and of course, a manager. The whole process starts in the obstetrics office and anesthesia pre-assessment clinic with oral and written information for patients. This process always starts preoperatively, continuous during surgery and finishes on patient's discharge home.Using ERAS protocol for Cesarean Delivery (CD) showed that there was no increase in number of complications after discharge patient home, infections and readmissions to the hospital. On the other side, patients recovery can occur without decreasing the quality of care or patient satisfaction. In Serbian hospitals some of ERAS elements are in use, which is documented in the survey, where all Serbian hospitals (which provided obstetric service) were included. We don't have any protocol in Serbia, but it is not impossible to implement it at some hospitals. Despite significant changes that have been recently made in CD care, enhanced recovery after CD could be significantly improved in Serbian hospitals.

ERAS protocol is a new concept in surgery which has been adopted in Scandinavian countries at the end of XX century and was described by Wilmore and Kehlet (1). The task was to improve patient's recovery after exhausting preoperative preparations for colorectal surgery and long staying at the hospital, slow recovery and long time to return to work. Soon after ERAS protocol successes in speeding patient's recovery, decreasing times to discharge from the hospital, and improving patient's outcomes was described in colorectal surgery patients, and successful application was reported in urological, breast, pancreatectomy, liver resection, and gynecologic surgery. (2,3)

ERAS includes patient information about ERAS and its acceptance of the protocol, then patient condition optimization, short fasting period (6h for solid food, 2h for clear liquids and energetic drinks), surgical techniques associated with fastest recovery (laparoscopy), early intravenous (IV) lines and urinary catheter removal, as much as possible avoid drainage, early feeding, early ambulation and discharge home. For the successful function of ERAS it is necessary to create multidisciplinary team, which includes surgeons (obstetricians), anesthesiologists, pain medicine specialists, occupational health-cares, nurses and administration staff. (4). Gynecology and obstetrics were the last who joined ERAS group and now program has been implemented in some developed countries (UK and USA predominantly), but not in all hospitals, of course. First results were published and are encouraging for ERAS in CD. (5)

ERAS is consisting of three parts: preoperative, intraoperative and postoperative part. The whole process starts in the moment when decision of surgery is made, where surgeon introduces ERAS to the patient, gives the patient written information and signs in the medical record that the patient will be in ERAS group. An anesthesiologist has to optimize patient's condition, give the information about preoperative fasting, what to expect following the surgery and about pain relief, IV lines, catheters, oral feeding, starting ambulation and about planning discharge home. In the written information paper patient must know what to do or who to call in case of some complications, which are in connection with mother or baby.

In Serbian hospitals we still don't have any similar protocol for CD, even at some hospitals some of ERAS elements are in use. Pujić et al. (6) performed an electronic survey in 2017, where all hospitals with obstetrics service were involved. A survey tool of 22 questions with multiple choice answers was sent by email to all hospitals in Serbia (4 university teaching hospitals and 45 general hospitals). This survey was approved by Ethical Committee at the Clinical Center of Vojvodina. The questionnaire was completed by either the Chief of Obstetrics or Chief of Anesthesiology who had knowledge of all aspects of perioperative care within the institution, and only 1 questionnaire per institution was returned. The questionnaire asked about time of admission to hospital, hospital stay, mechanical bowel preparation, fasting time, antibiotics and DVT prophylaxis, anesthesia for CD, analgesia post CD, catheter removal, IV line removal, first ambulation, first oral intake, skin-to-skin contact between mother and baby in the operating theatre. Pearson' chi square test was used where appropriate for comparisons between groups in this prospective observational study (R version 3.3.3, R Core Team, R Foundation for Statistical Computing). Differences of $P \leq 0.05$ were considered significant.

Results showed no one has ERAS protocol for CD, but in 24% of the hospitals some ERAS elements are implemented in everyday practice. More than 80% of patients for scheduled CD are admitted to the hospital the day before the CD, and 87% of patients

have mechanical bowel preparation and DVT prophylaxis. In hospitals with ERAS elements about 73% use antibiotics prophylaxis 30 min before CD. IV lines and urinary catheter are removed first postoperative day at ERAS hospitals, and patient discharge is on day 3 or 4. In non- ERAS hospitals hospital stay is till day 6. In ERAS hospitals regional anesthesia (RA) is more often performed for both scheduled and urgent CD's.

Aluri (7) and Wrench (8) reported ERAS implementation at UK hospital and its influence on length of stay and maternal satisfaction, similar like Coates.(9) Pilkington et al. (10) reported a possible reduction of 200,000 euros in hospitals expenses after implementation ERAS protocol for CD in their hospital.Successful ERAS protocol implementation for CD in Serbian hospitals will require the great efforts of a multidisciplinary medical staff team and the outside community.

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32 Phenylephrine infusion- recipe for spinal obstetric hypotension

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Hypotension is one of the commonest complications of spinal anesthesia in obstetrics, with a reported incidence of up to 74%. Usage of vasopressors, such as phenylephrine boluses in combination with intravenous fluid prehydration, and physical methods such as leg bindings and compression stockings are not always effective. The optimum regimen for administration of phenylephrine has not yet been defined. Prophylactic phenylephrine infusions have been advocated in the range of 25-100 μg/min. Rate of 50 μg/min minimizes the risk of hypotension in comparison to lower doses and hypertension, bradycardia and decreased cardiac output seen with higher rate. Recent studies suggest a variable rate regimen adjusted according to the changes in arterial blood pressure.

Introduction

Spinal anesthesia is currently the anesthetic technique of choice for elective cesarean delivery (CD). It is safe and effective. However, one of the commonest complications of this technique is hypotension with a reported incidence of up to 74%.1Despite more than thirty years of research, hypotension following spinal anesthesia for cesarean delivery remains a frequent clinical problem, associated with morbidity for both mother (nausea and vomiting) and fetus (fetal acidosis).2 Techniques currently in use for preventing hypotension include intravenous fluid prehydration, sympathomimetic drugs and physical methods such as leg bindings and compression stockings. However, none of these techniques alone was effective in eliminating hypotension and future research should be directed toward investigation of combinations of interventions. 3

Definition of hypotension

There is not one accepted definition of hypotension in the scientific literature. The incidence of hypotension varies depending on the chosen definition. Therefore,

even minor change of the definition causes major differences in the frequency of hypotension. This makes it difficult to compare studies on interventions to treat or prevent hypotension. Most frequently used definitions are: decrease in arterial pressure below 80% baseline or a blood pressure below 100 mmHg and a decrease below 80% baseline alone. When applying these definitions, the incidences of hypotension vary between 7.4% and 74.1%.1

Phenylephrine

Phenylephrine is a selective α1 receptor agonist, frequently used in obstetric anesthesia.4 Mechanism of its activity is arterial vasoconstriction caused by α1 agonist action. Phenylephrine has negative chronotropic effect caused by reflex bradycardia and decreased cardiac output, but it does not influence the fetus in elective cases. During emergency Cesarean sections with a presence of fetal acidosis, fall in cardiac output may further compromise the fetus. Therefore, definitive understanding of the effects of phenylephrine in emergency cesarean sections needs further research.

An intravenous dose of phenylephrine has immediate onset and duration of action of 5-10 minutes. The optimum regimen for administration of phenylephrine has not yet been defined5. Prophylactic administration could be associated with a higher incidence of hypertension and bradycardia. On the other hand, if treatment starts after onset of hypotension, higher incidence and severity of maternal hypotension can be expected. According to some studies, an intravenous intermittent bolus dose (ED95) of phenylephrine should be at least 122-147 μg.6 Despite that, 40-100 μg bolus dose remains the commonest in clinical practice, because it is not often associated with the most commonest adverse effect- maternal bradycardia.5

Prophylactic phenylephrine infusions have been advocated in the range of 25-100 μg/min in various studies, but most studies suggest fixed dose of 50 μg/min. Rate of 50 μg/min minimizes the risk of predelivery hypotension in comparison to lower doses and reactive hypertension, bradycardia and decreased cardiac output seen with higher rate.6

However, prophylactic fixed dose concept has been changed recently. A recent study by Siddik-Sayyid et al.7 showed no difference in neonatal outcome with a variable rate regimen adjusted according to the changes in arterial blood pressure, in comparison to prophylactic fixed rate infusion regimen. Despite these studies, obstetric anesthesiologists' statement on phenylephrine dosage has not been established yet. Some studies have demonstrated that with intermittent boluses, the total dose requirement is smaller and good blood pressure control can be achieved making infusion pumps unnecessary.

Combination of crystalloid cohydration and phenylephrine infusion

Maternal hypotension is one of the leading causes of intraoperative nausea and/or vomiting. This symptom is caused by cerebral and gut hypoperfusion that stimulate the vomiting center in the brainstem, enabling serotonin release. A common approach

to prophylaxis includes a fluid bolus with prophylactic phenylephrine infusion. Crystalloid preload alone has a poor efficacy in preventing hypotension, due to rapid redistribution into the extracellular space. Usage of colloid can be more effective,8 but synthetic colloids are more expensive than crystalloid and could be associated with side effects such as pruritis, anaphylactoid reactions, kidney injury and coagulopathy. A combination of crystalloid cohydration and phenylephrine infusion decreases the incidence of hypotension to 1.9%. 9 Hypotension could be virtually eliminated by the combination of a high-dose phenylephrine infusion and rapid intravenous crystalloid cohydration. According to the studies published by Ngan Kee et al, 10 patients who received cohydration with the phenylephrine infusion had greater hemodynamic stability. Furthermore, patients who received cohydration required less phenylephrine to maintain their blood pressure. This technique had no adverse effect on neonatal outcome and a low incidence of maternal nausea and vomiting. Even with very large doses of phenylephrine, there is no adverse effect on neonatal outcome as measured by Apgar scores and umbilical cord blood gases. However, despite using liberal phenylephrine infusion regimens, approximately 25% of parturients still experienced one or more episodes of hypotension. 10 This can be virtually eliminated by the addition of a simultaneous rapid cohydration. Technique of rapid intravenous crystalloid infusion after spinal injection (cohydration) is more physiologically appropriate than the practice of giving large volumes before spinal injection (prehydration) for decreasing hypotension during spinal anesthesia for cesarean delivery. Crystalloid given as cohydration also undergoes rapid redistribution, but the maximum augmentation of intravascular volume coincides with the time that the block and consequent vasodilatation are evolving, thus maximizing effect.11

Do we need phenylephrine infusion in low- resource environment?

Phenylephrine infusions are considered as standard management for obstetric spinal hypotension, but still there is significant problem to implement them in resource-limited environments. Bishop and al. 12 compared a phenylephrine bolus strategy to fixed-rate, low-dose prophylactic phenylephrine infusion with supplemental boluses. Fewer patients receiving prophylactic phenylephrine infusions had incidence of severe hypotension (47.4% Vs. 62.1% p = .001). Authors concluded that guidelines for resource-constrained settings should include a fixed, low-dose phenylephrine infusion in combination with phenylephrine bolus therapy.

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ABSTRACTS

Finalists of the abstract contest for anesthesiologists

OW.23.2018 ADDUCTOR CANAL BLOCK OR FEMORAL NERVE BLOCK FOR ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION. WHICH IS BETTER?

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Abstract

Backround: Pain control following ligamentoplasty, plays an important role in early mobilization. The aim of this study is to determine whether with the adductor canal block we can achieve postoperative analgesia as good as with the femoral nerve block, while preserving quadriceps muscle strength.

Methods: In this controlled, randomized, clinical trial, 80 ASA1 or 2 patients for ligamentoplasty took part and were divided in two groups. Group1 received preoperatively an ultrasound guided adductor canal block for postoperative analgesia and Group2 received femoral nerve block. As a rescue analgesic we used Tramadol 100mg. The parameters we measured were: pain during rest at 6, 12 and 24 hours postoperatively, time of the first request of Tramadol, the amount of Tramadol requested for the first 12 hours and 12-24h postoperatively, the mean dynamometer reading during knee extension at 6, 12 and 24 hours postoperatively as a percentage of the baseline measurement preoperatively, side effects and satisfaction score.

Results: There was not a significant difference in the pain scores, the time of first request of Tramadol and the amount of Tramadol, between the two groups. A significant difference was found in the quadriceps muscle strength measurement at 6 and 12 hours postoperatively between the groups. There was not a significant difference in the satisfaction score.

Conclusions: With the adductor canal block we achieved good postoperative analgesia, noninferior to femoral nerve block, but at the same time preserved quadriceps muscle strength.

Keywords: postoperative analgesia, adductor canal block, femoral nerve block, ligamentoplasty

OW.6.2018 How to predict neurogenic pulmonary edema in aneurysmal subarachnoid hemorrhage?

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Background. Neurogenic pulmonary edema (NPE) is a clinical syndrome characterized by the acute onset of pulmonary edema after a significant central nervous system (CNS) insult. NPE occurs as a result of release of catecholamines into the blood immediately after aneurysm rupture. The aim of this study is to investigate the connection between the value of cardiac biomarkers on admission and incidence of NPE in patients with aneurysmal subarachnoid hemorrhage (SAH).

Methods. 262 SAH patients (162 females) are prospectively included in the study. Clinical characteristics, electrocardiographic (ECG) changes, serum cardiac and inflammatory biomarkers were measured on admission and on the day of development of NPE. These data were analyzed in order to predict the development NPE.

Results.19 patients (7.25%) developed NPE. Comparison revealed that patients who subsequently developed NPE sustained more severe SAH. Cardiac damage was more severe in these patients, as represented by significantly higher mean values of all examined cardiac biomarkers (P=0.000), except for troponin I value that was significantly lower (P<0.001). Multivariate regression analysis revealed that elevated troponin I (OR 4.980; 95% CI 1.27-19.49, P=0.021) and white blood cells count (OR 22.195; 95% CI 3.99-123.50, P<0.001) are predictors of NPE.

Conclusions. Significantly higher values of cardiac biomarkers were observed in SAH patients complicated with NPE. Elevated values of cardiac biomarkers appear to play an active role in prediction of NPE, although white blood cells count may be involved in the prediction of NPE. There is an influence of SAH therapy on predictors of NPE.

CR.1.2018 Seratus anterior block for multiple ribs fractures-case report

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Background. Chest trauma is commonest cause of multiple fractured ribs. Multiple rib fractures results in intensive, excruciating pain and can predispose to respiratory failure, pneumonia. Adequate pain control continues to be a challenging problem for physicians in Intensive care units. Thoracic epidural and thoracic paravertebral blocks are effective but invasive techniques to relieve the pain of multiple rib fractures. Ultrasound guided serratus anterior plane block is a relatively newer technique that is less invasive, easier to perform, with low risk of complications.

Methods and material. 34 -year-old patient with chest trauma and multiple rib fractures suffering with intensive pain was given bilateral serratus anterior plane block. Under ultrasound guidance, a bolus dose of 20 ml 0.25% levobupivacaine and 4 mg of dexamethasone was given between the serratus anterior and latissimus dorsi muscles. A catheters were inserted and an infusion of 0.0625% levobupivacaine was given 10 ml/2-4 hr. Patient also received intravenous opioids, paracetamol and methamizol. Pain scores were recorded with numeric rate scale (NRS) before and after the block.

Results. Patient had pain relief following the block of 50% with in an hour. Pain score on NRS before block was 10/10 while pain score on NRS after block was 5/10. After continuous infusion of local anesthetic pain score was 0-1/10. No additional doses of analgesics were required and opioids were left out.

Conclusion.Serratus anterior plane block can provide effective analgesia in patients with multiple rib fractures, and is an alternative to thoracic epidural and paravertebral blocks.

Key words: serratus anterior, regional anesthesia, multiple rib fractures, analgesia.

ABSTRACTS

OW.1.2018 Entropy and surgical pleth index (SPI) – guided depth of hypnosis on general anaesthesia in critically ill polytrauma patients

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Background. The aim of this study was to compare the Entropy and Surgical Pleth Index (SPI) – guided general anaesthesia with standard haemodynamic monitoring methods used in the critically ill polytrauma patients and to evaluate the incidence of hemodynamic events.

Methods. 72 patients were included in this prospective observational study, divided in two groups, the ESPI Group (N=37, patients that benefited from Entropy and SPI monitoring) and the STDR Group (N=35 patients that benefited from standard hemodynamic monitoring). In the STDR Group hypnosis and analgesia were maintained using the standard criteria based on hemodynamic changes. ClinicalTrials.gov identifier NCT03095430.

Results. The incidence of hypotension episodes was significantly lower in the ESPI Group (N=3), compared to the STDR Group (N=71) ($p<0.05$). Moreover, the Fentanyl demand was significantly lower in the ESPI Group ($p < 0.0001$, difference between means 5.000 ± 0.038, 95% confidence interval 4.9250 to 5.0750), as well as vasopressor medication demand ($p < 0.0001$, difference between means 0.960 ± 0.063, 95% confidence interval 0.8.334 to 1.0866).

Conclusions. The implementation of multimodal monitoring in the critically ill polytrauma patient brings substantial benefits both to the intraoperative clinical status and to the clinical outcome of these patients by reducing the incidence of anesthesia-related complications.

OW.2.2018 Monitoring energy demand in the multiple trauma critically ill patient with sepsis based on indirect calorimetry. A prospective observational monocentric study

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Background. The critically ill polytrauma patient with sepsis presents with variable energetic necessities characterized by a pro-inflammatory, pro-oxidative and hypermetabolic status. One of the challenges the ICU doctor faces is adapting the nutritional therapy based on the individual needs of each patient. Through this paper we wish to highlight the trend of energy needs in the case of critically ill polytrauma patients with sepsis by using noninvasive monitoring of respiratory gases based on indirect calorimetry (GE Healthcare, Helsinki, Finland).

Methods. This is a prospective observational study carried out in the Anesthesia and Intensive Care Unit "Casa Austria", Emergency County Hospital "Pius Brinzeu", Timisoara, Romania. We monitored VO2, VCO2, energy demand (ED), and specific clinical and paraclinical data. We measured energy demand values monitored by indirect calorimetry with values calculated based on standard formulas.

Results.21 values have been recorded in the study. The mean VO2 was 3.3 ± 0.4 ml/min/kg, the mean VCO2 was 2.3 ± 0.3 ml/min/kg. In regard with energy demand, the mean ED obtained through direct calorimetry was 2393.2 ± 912.9 kcal/day, and those obtained by using mathematic formulas were 1988.6 ±1100 kcal/day ($p < 0.05$). Moreover, statistically significant differences have been observed regarding the mean difference between energy demand determined using indirect calorimetry and that determined mathematically, respectively between the enteral and parenteral administered ED.

Conclusion. Continuous monitoring of the energy demand in critically ill patients with sepsis can bring important benefits in regard with the clinical prognosis of these patients through the individualization and adaption of intensive therapy for each patient.

OW.3.2018 Influence of antioxidant therapy with high dose of vitamin C on mortality rates in critically ill poly-trauma patients

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Background and methods: The objectives of this study are to analyze the oxidative stress expression in polytrauma cases as well as to evaluate the impact of antioxidant therapy on outcomes. This prospective study was carried out in the Clinic for Anaesthesia and Intensive Care "Casa Austria", form the "Pius Brînzeu" Emergency County Hospital, Timisoara, Romania, with the approval of the hospital's Ethics Committee. ClinicalTrials.gov identifier NCT03095430. The patients' selection criteria included an Injury Severity Score (ISS) of 16 or higher and age of 18 or higher. 67 patients were eligible for the study. They were divided into two groups, group A (antioxidant free, control, N=32), and group B (antioxidant therapy, study group, N=35). The antioxidant therapy consisted of continuous IV administration of 7500 mg/24 h of vitamin C until discharge from ICU.

Results: Among patients in group B statistically significant differences were identified regarding the incidence of sepsis ($p < 0.05$), multiple organ dysfunction syndrome ($p < 0.05$), mechanical ventilation time ($p < 0.05$), and mortality ($p < 0.05$). No statistically significant differences were shown regarding the time spent in the ICU ($p > 0.05$).

Conclusion: Following this study we can state that the administration of substances with a strong antioxidant character has positive influences on the outcome of critically ill patients, decreasing the incidence of secondary pathologies as well as mortality rates.

OW.4.2018 TIVA for short gynecological operations

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Background: In this study we present TIVA with remifentanyl and propofol for short gynecological operations, there affect on patients hemodinamics and postoperative analgesia .Some modifications of general anesthesia may be useful for the patients and more interesting for the anesthesiologist.

Materials and Methods: The study included 50 female patients during period of one year treated on our clinic for interventions shortly then an hour. All patients were ASAI-ASAII. All of them got 2mg Midazolam for premedication, then induction in anesthesia started with remifentanyl 0.8 mcg/kg/min and propofol 10mg/kg/h.After one minute of ventilation, intubation was possible without muscle relaxant. Remifentanyl 0.3mcg/kg/min and propofol 4mg/kg/h maintain deep anesthesia during operations with their slowly declination. During operations, patients were monitored for HR, BP, SaO2 .Postoperative monitoring included BP every 30 minutes, HR and postoperative analgesia.

Results: All patients during the induction in anesthesia had decreasing in blood pressure (20-25%) but it repaired shortly after decreasing the level of remifentanyl and propofol. During the whole operation, patients blood pressure and heart work were 10-15% smaller than their normal (mild hypotension and bradycardia). Recovery from anesthesia and extubation was fast. Postoperative analgesia was good with standard analgetics (tramadol 100mg/8h) in most patients, but still 10 of them had inadequate analgesia that needed much bigger doses of analgetics.

Conclusion: TIVA with remifentanyl and propofol provides stable induction and maintaince of anesthesia with excellent recovery and extubation ,but still inadequate analgesia in healthy patients. Remifentanyl does not seem to offer any adequate for major interventions ,but might be quite useful for patients deemed to be at risk for intra-operative awareness or for patients where early ambulations is desirable.

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OW.5.2018 Treating of Hypotension after spinal anesthesia for caesarean section with vasopressors

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Background: Hypotension associated with spinal anesthesia during caesarean section is a most common complication. Ephedrine and Phenylephrine are the vasoconstrictors agent which are being recommended and used for hypotension. The aim of this study was to examine whether ephedrine and phenylephrine were different in their efficacy for managing maternal hypotension and their effects of adverse maternal and neonatal outcome.

Materials and Methods: In this study were entered 60 pregnant women .All of them were ASA I-II, which underwent elective caesarean section under spinal anesthesia during period of April 2017-march 2018.All patients received spinal anesthesia by an anesthesiologist using 27-gauge pencil point needle. The patients were monitored for HR, BP, SaO_2. Hypotension was treated with 10 mg bolus ephedrine in group I and 200 g phenylephrine in group II. Maternal and neonatal outcomes were recorded.

Results: There were no differences between two groups regarding the incidence of hypotension after vasopressor therapy. The incidence of nausea and vomiting were also regarding. Ephedrine use compared with phenylephrine was associated with a higher incidence of maternal nausea and vomiting. There was no significant differences between two groups in the apgar score in first and fifth minute, but use of phenylephrine was associated with better fetal acid-base status.

Conclusions: In this study we showed no significant differences between ephedrine and phenylephrine for treating of spinal induced hypotension during caesarean section .Also there were no differences on maternal and neonatal outcomes.

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OW.7.2018 ALGORITHMIC HAEMOSTATIC APPROACH DURING LIVER TRANSPLANTATION

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Background: Our study estimates the effect of algorithms application, incorporating pre-defined triggers and targets, based on ROTEM monitoring, to guide FFP and BPs administration.

Methods: We compared three successive patient groups: Group 1: OLT without ROTEM: 15 patients empirically transfused with FFP/BPs based on standard lab tests and clinical bleeding signs. Group 2: OLT with ROTEM: 18 patients transfused with FFP/BPs based on ROTEM values. Group 3: OLT with ROTEM & A5 algorithm: 31 patients transfused with FFP/BPs based on A5 ROTEM algorithm, facilitating decision making for transfusion triggers in the first 5 minutes of the test. We recorded MELD score, Hgb (at start and end of LT) and BPs (PRBCs, FFPs, PCC (Beriplex®), cryos, fibrinogen concentrate-FC (Riastap®)) and tranexamic acid (TXA) administered. Kruskal-Wallis & Anderson-Darling tests were used for analysis, since our date showed important deviation from normal values.

Results: Primary: Concerning FFPs a significant difference was noted. Group 1 & 2: mean values of FFPs were 14,93 and 11,53 respectively, Group 3: 4,46 units. Secondary: (Spearman's rank correlation analysis): Group 2: positive correlation between PRBCs & FFPs (rho +0.47) and between MELD score & PCCs (rho +0.54). Group 3: negative correlation between Hgbstart & PCCs (rho -0.41) and Hgbend & PCCs (rho -0.39) and statistical correlations between PRBCs and FFPs, TXA, FC, cryos (rho +0,71, +0,57, +0,41, +0,39 respectively), were also noted.

Conclusions: Haemostatic management following A5 algorithm, reduced FFP transfusion leading to blood products administration according to the intraoperative needs, obviously reducing relative transfusion risk and cost.

OW.8.2018 OUR EXPIRIENCE WITH PEDIATRIC AIRTRAQ

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Backgrounds: The pediatric airway management is challenging due to different anatomy. It's usually required trained skills and technical support. Airtraq video laryngoscope (Airtraq®, Prodol Meditec S.A., Vizcaya, Spain) is an advanced optical video laryngoscope, presented for guiding difficult airways, in pediatric patients. Use of the Airtraq minimize hyperextension and reduce force for obtaining the glottis view compared with the conventional direct laryngoscopy. The aim was to evaluate Airtraq as primary intubation device for intubation of pediatric patients from all age.

Material and methods: At the tertiary teaching university hospital, retrospective analysis of thirty patient's data from different age in which Airtraq was randomly used was done. The primary goal measures were: time needed for successful intubation, the ratio of successful first attempt intubation, number of intubation attempts. Additionally we analyzed: usage of additional devices, oesophagel intubation, remarkable events, airway trauma complications and the hemodynamic stability.

Results: We evaluated 30 pediatric patients age (36±23 month). Average time needed for successful intubation was 46±27 seconds. 22 of the children were intubated at the first attempt, 7 at the second attempt and only one child was intubated at the third attempt. Technical help (boudie) was needed in only one case. As remarkable event, one child desaturated (<94%), and two of the children had stridor. Intubation was performed with a lower alteration in the heart rate and there wasn't failed intubation.

Conclusion: From this evolution we can conclude that Airtraq can be used as device for pediatric intubation but for obtaining better results learning curve should be achieved.

Key words: Videolaryngoscopy, Airtraq, Tracheal intubation, Pediatric patients.

OW.9.2018 POSTOPERATIVE ANALGESIA – ILLUSION AND REALITY

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Introduction: "Working with a healthcare providers to optimize management of perioperative pain" is subproject of the PAIN OUT network. The goal of the first phase was to provide data of the intensity and characteristics of the postoperative pain.

Material i methods: On the first postoperative day after colorectal, breast and thyroid surgery, 130 adult patients completed a high-standardized questionnaire. At the same time, 23 doctors and 31 nurses filled out a questionnaire about postoperative analgesia.

Results: The mean worst pain intensity score was 5,51/10. There were significant differences in the worst pain intensity and in time during which patients felt severe pain after colorectal (6.38/10,38.24%), breast (5/10,27.31%) and thyroid surgery (2.2/10,12%). There was no significant difference between groups according to patient satisfaction with analgesia, the mean satisfaction score was 8.94/10.

The mean pain score estimated by healthcare providers was 4.78/10. 87% of healthcare providers were satisfied with postoperative analgesia, the average satisfaction score was 7.5/10. There was no significant difference in data between doctors and nurses.

Conclusions: There is a discrepancy between the severity of postoperative pain at one side and a high satisfaction with analgesia among patients and healthcare providers on the other side. It is necessary to improve perioperative pain management in routine clinical practice.

OW.10.2018 Why is spinal analgesia for labor?

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Introduction Many women have severe pain while in labor and require labor analgesia. Spinal birth analgesia, safe for mother and newborn, requires protocol, minimum accessory and equipment.

Methodology The purpose of this paper is to present our experience after the introduction of this procedure. We retrospectively analyzed the history of 306 spinal analgesia patients, each receiving 2.5mg Levobupivacaine, 25μg Fentanyl and 1ml physiological solution, spinal, pencil point needle 25G, 6cm dilation, with regular contraction and tedious CTG record .

Results At the Clinic for Gynecology and Obstetrics at Tuzla in the period 24.4.2017.- 24.9.2018. there were 5538 births, of which 4044 were naturally occurring, in spinal analgesia were 306 (7.5%). The sensory block lasted from 90 to 120 minutes (90%) and 150 minutes (10%). Of the complications we noted hypotension (6), pruritus (5), bradycardia of the newborn (3). There was no PDPHA. Apgar score of newborn was 9/9 (90%), and the lowest apgar score 5/7 (1%). In two cases we ended up in i.v. analgesia with Remifentanil.

Conclusion Spinal analgesia for labor is a reasonable option for labor analgesia. The protocol includes availability of anesthesiologist, minimal amount of anesthetics and equipment, non-invasive TA and P monitoring during spinal setup and 15-20 minutes later. Spinal analgesia is suitable for multiples where labor is fast progressing or in case of parturient with maternal cervical dilatation. If the analgesia ceases and the labor is not completed, the procedure may be repeated or supplemented by i.v. by analgesia Remifentanil.

OW.11.2018 Quadratus Lumborum Block after Cesarean Delivery: Serbian Experience

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Background: Quadratus lumborum block (QLB) is a posterior abdominal wall block that is performed exclusively under ultrasound guidance. It is described as a variant of the transversus abdominis plane block (TAPB) by Rafael Blanco in 2007. Since 2015, many studies have shown the importance of using the QLB in pain management after Cesarean Delivery (CD). Neither TAPB nor QLB were included in multimodal pain management after CD in Serbia before April 2017.

Methods: All CD cases followed by bilateral QLB performance were obtained from anesthesia databases of Leskovac General Hospital (LGH), Sremska Mitrovica General Hospital (SMGH), and Clinic of Gynecology and Obstetrics, Clinical Center of Vojvodina (CGOCCV).

Results: In LGH, QLB was performed in 27 patients after CD done under general anesthesia (GA), and in 11 patients after CD done under spinal anesthesia (SA). In CGOCCV, QLB was performed in 15 patients after CD done under GA, and in 23 patients after CD done under SA. In SMGH, QLB was performed in 4 patients after CD done under GA. All patients felt significant pain relief after block performance, 0 to 2/10 on a numeric rating scale.

Conclusions: QLB was introduced in LGH everyday clinical practice thanks to the international teaching visit. The LGH physicians started training physicians from other hospitals in the region. QLB can be easily performed thanks to the clear sonographic landmarks. QLB has eliminated postoperative opioid use in our patients. QLB can be used in CD patients done under either GA or SA.

OW.12.2018 The effect of body weight on the postoperative outcome after coronary artery bypass surgery

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Background: Obesity is a significant risk factor in coronary disease. The aim of the study was to demonstrate the effect of the body weight on postoperative outcome after coronary artery bypass graft surgery (CABG).

Methods: In the retrospective study, we included 170 elective patients who underwent CABG procedure. According to body mass index (BMI) patients were divided into 6 groups: I (BMI <18.5) underweight, II (18.5 ≤ BMI <25) normal, III (25 ≤ BMI <30) overweight, IV (30 ≤ BMI <35) Class I obesity, V (35 ≤ BMI <40) Class II obesity, VI (BMI ≥ 40) morbidly obese. Perioperative data were taken from medical history, during surgery and in intensive care (infection, glycemic, transfusion, cardiovascular, pulmonary and renal complications, ICU days, mortality) and were correlated with the BMI value.

Results: In the study there were no underweight patients. 56.5% of the patients were overweight, 24.7% obese and 3 morbidly obese patients. Males were significantly more prevalent in the group of obese. In the group of insulin dependent diabetic patients, BMI was mainly as overweight and obese *(p 0,007)*. The significant difference was in the postoperative value of haemoglobin and hematocrit between the investigated groups *(p 0,015; p 0,025)*. The overweight patients showed a significant difference in glycemia *(p 0,001)*. The difference in intra-hospital mortality among groups was significant *(p 0,023)*.

Conclusion: The CABG surgery in overweight patients is connected with higher risk of intrahospital mortality. The predictive value of BMI in postoperative morbidity is not proven.

OW.13.2018 Predicting values of glycated haemoglobin - HbA1c on outcome after coronary artery bypass surgery

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Background: Uncontrolled diabetes is a significant factor in morbidity and mortality in coronary artery bypass graft surgery (CABG). Glycated haemoglobin (HbA1c) is a reliable marker of long-term glycemic control. The aim of the study is to examine the postoperative outcome in CABG surgery based on the HbA1c value.

Methods: The retrospective study includes 170 elective CABG patients. Patients were divided into 4 groups according to the HbA1c value ≥ 6% and HbA1c <6%, and the present of diabetes. Perioperative factors such as blood count, glycemia, infection, arrhythmias, inotropic score, mechanical ventilation, days of ICU stay and intrahospital mortality were correlated between groups according to the HbA1c value.

Results: In the study, 62 (36.5%) patients were diabetics; 15.9% insulin-dependent and 18.2% on oral antidiabetics. Among the diabetics, 29.4% had HbA1c ≥ 6%, but also 8.2% of non-diabetic patients. A significant difference in HbA1c was observed between the patients in oral and insulin therapy (p 0,0001). The age difference between the investigated groups (p 0,004) and the prevalence of males (p 0,049) was significant. EuroSCORE was significantly higher in diabetic patients (EuroSCORE 6.7; p 0,001). Arterial hypertension as well as renal dysfunction (p 0,012) are significantly more present in the diabetes group with HbA1c ≥ 6% (x^2 0,018). Postoperative glycemic showed significantly higher values in the diabetics with higher HbA1c. There was no significant difference in mortality.

Conclusion: Poor preoperative glycemic control among coronary patients is a significant risk factor in coronary surgery. The preoperative determining of HbA1c showed the predictive value of morbidity, but not mortality.

OW.14.2018 Extended hepatectomy in a patient with polycystic liver disease (PLD): a challenge for intraoperative haemostatic management

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Background: PLD is a collection of rare human disorders (1:50000 in some types) resulting in progressive development of large, numerous, multiple cysts leading to portal hypertension, progressive hepatic failure & coagulation disorders.

Methodology: Point-of-care (POC) rotational thromboelastometry (ROTEM®) is a commercially available, rapid, point-of-care whole blood clot formation assay, including plasmatic and cellular components function assessment.

Case presentation: A 45 year old woman with a history of PLD since 2006, chronic stable renal failure and hypothyroidism was admitted at the hospital for severe abdominal compartment syndrome (IAP 30 cmH_2O). Hepatic cysts enlargement started in 2016, growing ever since. On examination, she was in a very poor general state with overdistended abdomen and pronounced dyspnoea.

She underwent urgent explorative laparotomy with extended hepatectomy performed. Haemostatic management was performed according to ROTEM® values, revealing a supranormal to hypercoagulative state, with no hyperfibrinolysis.

ROTEM values	CT_{INTEM} sec	CT_{EXTEM} sec	MCF_{EXTEM} mm	MCF_{FIBTEM} mm
Baseline	217	69	70	30
Intraoperative	217	59	70	21

Hbg was maintained at 8 g/dl with only 2 PRBCs transfusion and no operative or diffuse bleeding was noted.

Discussion – Conclusion: Patients with PLD appear to be more hypercoagulable than with a bleeding tendency. This is probably a result of elevated factor VIII levels due to endothelial activation and/or injury and depressed protein C levels due to decreased hepatic biosynthesis and increased consumption. POC driven haemostatic management results in a more rational transfusion management with impact on better clinical outcome.

OW.15.2018 ANAESTHETIC MANAGEMENT FOR CAESARIAN SECTION IN A PARTURIENT WITH CONGENITAL PERICARDIAL ABSENCE

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Background: Congenital pericardial absence is a rare cardiac malformation (1/10000-14000). Commonly asymptomatic or as autopsy finding, may be associated with atypical thoracic pain, dyspnoea and palpitations, syncope and sudden death. Diagnosis is radiographic, ultrasound or with MRI.

Method-Case presentation: A 29-year old parturient with CPA was planned for caesarean section at 39 weeks of gestation. 20 years ago she had underwent surgery for atrial septal defect, open sinus venosus and mitral valvoplasty. The preanaesthetic evaluation revealed: EF=66%, mild mitral & tricuspid valve regurgitation and SVI=42 ml/m^2. ECG showed incomplete RBBB, poor progression of R in the precordial leads and BNP had a value of 18 pg/ml. Clinicaly, the woman was asymptomatic. Epidural anaesthesia in lateral decubitus position was delivered as accepted method of choice. 20 ml of ropivacaine 0,75% and fentanyl 100mcg were given gradually in doses of 4 ml over 45 min. Apart from standard monitoring direct arterial blood pressure and waveform analysis were performed (Vigileo,Edwards®).

Results: The level of anaesthesia reached T4 dermotome. Throughout surgery she was haemodynamically stable. Overall 1,5 L of crystalloids were administered and 5IU of oxytocin were given right after the neonate was delivered. Apgar score was 8 & 9 at 1^{st} & ^{5th} min respectively. The postoperative course was uneventful.

Conclusion: Epidural anaesthesia with gradual administration of the local anaesthetic and opioid provided haemodynamic stability. Invasive haemodynamic monitoring contributed in more rational management of intravenous fluids administration.

OW.16.2018 COMBINED SPINAL-EPIDURAL VERSUS INTRAVENOUS PCA REMIFENTANIL FOR LABOR ANALGESIA

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Background and Objectives: Combined spinal epidural analgesia (CSE) is very popular technique for providing labor analgesia, while remifentanil is becoming more and more popular as alternative method. In this study, we compared patient satisfaction, as well as maternal side effects.

Methods: We analyzed 80 patients, ASA I, primiparous, divided into two groups. The first group (40 patients) received intravenous patient-controlled analgesia (iPCA) with remifentanil (RG) titrated from 20 to 50 mcg bolus dose. The second group (40) received combined spinal-epidural (spinal injection of 20 μgr fentanyl with 2,5 mg bupivacain). Epidural was activated 1 hour after the spinal injection with intermittent bolus doses of 0,0625% bupivacain and fentanyl 2 μgr/ml. Our primary outcome was patient satisfaction; we analyzed patient satisfaction scores and pain scores through 2 VAS scales in different time points during labor analgesia. The secondary outcome was maternal safety; we evaluate pulse oximetry (SpO_2), heart rate and respiratory rate.

Results: Satisfaction scores were slightly bigger in the CSE group, mean VAS satisfaction scores in the RG were 9.2 ± 0.9 and in the CSE group 9.4 ± 0.8, without statistically significant difference ($p = 0.62$). On the other hand, mean values of the VAS pain scores after onset of analgesia were 4.1±1.2 in RG, 2.3±1.1 in the CSE group ($p<0.0001$). Mean SpO_2 and respiratory rate were significantly lower in the iPCA remifentanil group.

Conclusion: IPCA with remifentanil provides satisfactory level of labor analgesia, with lower SpO_2 and respiratory rate. It could be a viable alternative to neuroaxial analgesia.

OW.17.2018 MULTIMODAL APPROACH IN PREVENTION OF POSTOPERATIVE NAUSEA AND VOMITING AFTER LAPARASCOPIC GYNECOLOGY INTERVENTIONS

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Background and objectives: Postoperative nausea and vomiting remain a significant cause of morbidity among patients undergoing general anaesthesia with a remarkably high incidence after gynecological laparascopic surgery. The optimal strategy for prevention, however, remains controversial. This study evaluated the efficacy of three antiemetic drugs alone and in combination for the prevention of nausea and vomiting in patients undergoing elective laparascopic gynaecological surgery.

Methods: Ninety patients were randomized into three groups. The first group received metoclopramide (MC) 10mg alone; the second group received MC 10 mg and ondansetron (ON) 4mg and the third group received MC 10 mg, ON 4 mg and dexamethasone (DEX) 4 mg. All three groups received equal intravenous injection (10 ml) immediately before the induction of anaesthesia. Nausea and vomiting were assessed over a 24-hour postoperative period.

Results: During patients stay in the recovery room (4 hours postoperatively) nausea occurred in 65%, 40% and 10% of the MC, MC/ON and MC/ON/DEX groups respectively ($p<0.001$), while the incidence of vomiting was 40%, 15%, and 6% ($p<0.0001$) for all three groups respectively. During the postoperative observation period of 20 hours, 58%, 32% and 10% of the patients in different groups reported PONV, while 30%, 18%, 9% of them needed rescue antiemetics.

Conclusion: Combination of metoclopramide, ondansetron and dexamethasone was more effective than combination of metoclopramide and ondansetron and significantly more effective than metoclopramide alone in the prevention of postoperative nausea and vomiting. Multimodal approach in prevention of PONV is effective, but still not applicable for everyday use.

OW.18.2018 Comparison of cardiovascular effects caused by intubation in patients receiving fentanyl or remifentanil

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Background: laryngoscopy and intubation during induction of anesthesia can cause pronounced sympathetic response. In order to reduce these side effects, we compared the effects of fentanyl and remifentanil (ultiva) on the hyperdynamic response during induction of general anesthesia (GA).

Patients and methodology: 75 ASA I or II patients undergoing abdominal hysterectomy were randomly divided into three (3) groups: the first group (S) received saline (n = 25), second fentanyl (group F) 1.0 μg/kg (n = 25) and third received remifentanil (group R) 1.0 μg/kg administered with continuous infusion of 0.5 μg/kg/ min (n = 25), all these directly before the induction of GA consisted from propofol 1.5 -2 mg/kg and rocuronium 0.6 mg/kg. Systolic and diastolic blood pressure, MAP, heart rate (HR) and the appearance of arrhythmias were registered.

Results: immediately after intubation, the patients received remifentanil showed significantly lower hemodynamic disturbances compared with those received saline or fentanyl ($p<0,05$). The frequency of the parameters: 1. SBP> 200 mmHg 2. increase of 30% from baseline values of SBP 3. HF> 120 beats / min and 4. arrhythmogenic changes, all these were significantly lower in the group R (12%, 16%, 0%, 0%) compared to group S (88%, 88%, 48%, 16%) and group F (52%, 76%, 28%, 12%); bradycardia (HF < 50 beats/min) was most seen with group R patients (24%, $p<0,05$).

Conclusion: pre-induction continuous infusion of remifentanil (ultiva) suppresses the cardiovascular response caused by endotracheal intubation more efficient than fentanyl. However, more trials are required for definitive conclusion.

OW.19.2018 Spinal anesthesia in Severe Preeclampsia

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Background: To determine the influence of spinal anesthesia (SA) on arterial blood pressure (BP) in parturient with severe preeclampsia undergoing Cesarean section (CS).

Methodology and patients: we evaluated 40 severe preeclamptic parturient undergoing CS that had received general GA (n = 20) or low-dose spinal anesthesia SA (n = 20). SA was consisted from 8-10 mg isobaric bupivacaine + 20 μg fentanyl. The most frequent indications for CS among the groups did not differ.

Results: The hemodynamics during SA in preeclamptic parturient was generally stable and comparable to that of GA. The largest fall in BP (MAP) occurred in the 5th min (±0.8) of spinal puncture (87.3±8.5 mmHg vs. 100.0 mmHg±15.5, p <0.05), was short-lived (<1 min) and was easily corrected with 5-10 (±2,8) mg of boluses dose of i.v. ephedrine. During the further period (up to 60 min) there were no significant drops in BP (systolic, diastolic, MAP) and it did not differ significantly compared to that of GA (p> 0.05). Neonatal acid-base parameters between the groups did not differ significantly (p> 0.05) but the Apgar scores from newborns delivered with SA show better results than those from GA (p<0,05).

Conclusion: SA in preeclampsia is not associated with serious spinal-induced hypotension. The most likely reason for this phenomenon is both the altered response of small vessels to the sympathetic block as well as a presence of high level of powerful pressure factors in a preeclampsia. However, more studies we need to elucidate the definitive confirmation of this statement.

OW.20.2018 USE OF PHENYLEPHRINE TO OBTUND OXYTOCIN – INDUCED HYPOTENSION AND TACHYCARDIA DURING ELECTIVE CAESAREAN DELIVERY UNDER SPINAL ANAESTHESIA

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Background Oxytocin is the first – line uterotonic agent to prevent postpartum haemorrahage but results in hypotension and tachycardia. Phenylephrine is the vasopressor of choice during spinal – induced hypotension and is associated with reflex bradycardia.

Objective This randomized double-blind placebo - controlled study was conducted to investigate whether prior administration of phenylephrine 100μg could obtund the oxytocin – induced haemodynamic effects.

Methods Forty-six ASA I and II parturients with term singleton pregnancies scheduled for elective Caesarean delivery under spinal anesthesia received either phenylephrine 100μg (Group A or saline Group B) immediately before administration of oxytocin 10 IU. Baseline haemodynamic parameters, (SBP, DBP and MAP respectively) as well as heart rate (HR) were recorded and at 3-min intervals after spinal anaesthesia was performed. After delivery of baby, the test drug was administered over 15s. Thereafter, haemaodynamic parameters were recorded at 1 –min intervals for 5 min (T1-T5). Rescue vasopressor was administered to maintain SBP within 20% of baseline.

Results Demographic and baseline haemodynamic data were comparable expect for a significantly lower DBP in Group A. Following administration of test drug and oxytocin, no significant inter group differences were observed expect for a lower mean HR at T3 for Group A. Intra – group comparison in Group B showed significantly lower readings in almost all vasopressor after delivery was significantly higher in Group B.

Conclusion Phenylephrine 100μg did not significantly obtund oxytocin – induced haemodynamic effects. However, haemodynamic changes were less pronounced in parturient who had received a dose of phenylephrine prior to oxytocin administration.

OW.21.2018 GENERAL ANESTHESIA FOR CAESAREAN SECTION IN PARTURIENTS WITH DILATED CARDIOMYOPATHY

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Introduction: The patients with cardiac disorders are challenge for every anesthesiologist, especially parturients for caesarean section. This study examines the peripartum anesthetic management of parturients with dilated cardiomyopathy in our hospital.

Principal findings: 5 patients were included over period of 6 years. A cardiac examination was performed with echocardiography and a cardio advice was given for preoperative and postoperative therapy. All patients were assessed with ASA score ¾. After appropriate premedication, general anesthesia was initiated with slow i.v.application of 1mcg / kg Fentanyl, 60-80mg Propofol and 1-1.5mg / kg Leptosuccin, after which the intubation was completed in less than 50 seconds. The anesthesia was maintained with O_2 and NO_2 and Sevoflurane gas 0.8%. After extraction of the baby, an oxytocin infusion at a rate of 0.05-0.2 IU·min was administered to maintain uterine tone, along with 0.2mg of Fentanyl and 30mg of Rocuronium. 10mg of Furosemide was also administered and the patient was placed in the Fowler's position. Arterial pressure, pulse, saturation, EKG and $EtCO_2$ were continuously monitored and all remained stable without major concessions or signs of cardiac arrhythmia. All patients were extubated in the OR and transferred to ICU. In the postoperative period, we followed the guidelines, which imply therapy with diuretics, BB, ACEI / ARB, oxygenation and monitoring.

Conclusion: General anesthesia is a good choice because it provides cardiocirculatory stability. Spinal anesthesia was not our preferred choice because of the risk of hypotension. Communication with obstetrician and cardiologist is necessary.

OW.22.2018 Comparison of Epidural Analgesia and PCA Fentanyl IV Analgesia after Abdominal Hysterectomy

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Background: Postoperative analgesia is very important after gynecological surgery. Continuous epidural analgesia (CEA) remains "gold standard" of pain relief after open total abdominal hysterectomy. However, in patients which refuse regional anesthesia or have contraindication for it, (IV-PCA (patient controlled analgesia) with Fentanyl). Comparison of the efficacy of CEA and IV-PCA using fentanyl was measured for the postoperative pain control after total hysterectomy.

Materials and Methods: Eighty patients were operated for abdominal hysterectomy. They were divided in two groups, Group 1 (n=40) which was operated under epi-spinal anesthesia and received continuous epidural analgesia postoperatively using hyperbaric bupivacaine for spinal anesthesia and bupivacaine 0,06% with Fentanyl. Patients from Group 2 (n=40) were operated under general TIVA anesthesia with Remifentanil/Propofol and received intravenous PCA Fentanyl analgesia for 3 days after the surgery. The pain VAS score, analgesia satisfaction, side effects were measured on the first postoperative day.

Results: In Group 1 we had good postoperative analgesia with one or more side effects. Nausea and vomiting were more intense in group 2 well controlled with ondansetron and dexamethasone. The average pain scores using VAS in two groups were less than 4. There were no significant differences in side effects and degree of satisfaction between two groups.

Conclusion: Both types of analgesia give satisfactory pain relief after abdominal hysterectomy with specific side effects depending on the type we used.

OW.24.2018 Advantages of percutaneous dilatational tracheotomy guided with ultrasound in real-time

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Introduction: Percutaneous dilatational tracheotomy (PDT) is invasive method which belongs to non-surgical procedures, and it is performed by anaesthesiologist-intensivist at critically ill patients in intensive care units. Compared with orotracheal intubation, it enables better care of oral cavity of a patient, as well as smaller risk for appearance of complications at intubated patients.

Methodology: PDT is based on the opening of stoma at the frontal part of neck, between the second and the fourth tracheal ring. In our hospital PDT has been performed since 2009, with a Seldinger technique, using the method by Griggs, and since 2017, we started to perform method by Cook, guided with ultrasound in real time. We are orientating ourselves with ultrasound about the whole neck anatomy, and then guiding the needle and introducer, watching all the time their position. And finally put cannula onto her place on the front side of the neck, and connect with the mechanical ventilator.

Results: Advantages of this method guided with ultrasound is faster orientation, faster performing of a procedure, minor stress on patient's tissue, smaller possibility of hypoxia during the procedure, minor possibility of complications, as well as better control of performing the whole procedure.

Conclusion: This is a simple and safe method for solving a problem of ventilation. So far received and presented results are showing that the ultrasound will have an irreplaceable role in performing of PDT, as a full substitution for classic surgical tracheotomy.

Key words: percutaneous dilatational tracheotomy, Seldinger technique, real-time ultrasound

OW.25.2018 COMPARISON OF TWO COLLOIDS FOR THE TREATMENT OF POST-SPINAL HYPOTENSION IN PATIENTS UNDERGOING CAESAREAN DELIVERY

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Background: Common adverse event of spinal anesthesia is hypotension. Lately the focus is on determining the type and volume of fluids, needed to treat hypotension.

Method: 40 patients requiring caesarean delivery, in which a post-spinal hypotension occurred, were included in this study. They received succinylated gelatin or hydroxyethyl starch 130/0.42. If vasopressor was needed, phenylephrine was used. Hemodynamic parameters were monitored (arterial blood pressure, mean arterial pressure, heart rate). The time needed to normalize these parameters was determined. Apgar scores were noted.

Results: Among the patients pre-delivery blood pressure changes were similar. In the first group, succinylated gelatin was used in an average of 390ml per patient. The average duration of the hypotensive episode was 11.75minutes. In 85% of the patients, 82μg phenylephrine was used. Intraoperatively, crystalloid was given in an average volume of 868.42ml per patient. In the second group, HES was used in an average of 256ml per patient. The time needed to normalize the hemodynamics was 7.25minutes. 70% of the patients received phenylephrine, with an average dose of 66μg. 722,22ml of crystalloid per patient was used intraoperatively. There was no difference in 1- or 5-min Apgar scores.

Conclusion: HES is more efficient than gelatin in the treatment of post-spinal hypotension, in patients undergoing caesarean delivery.

Keywords: post-spinal hypotension, hydroxyethyl starch, succinylated gelatin.

OW.26.2018 S-T NON-SPECIFIC CHANGES DURING INDUCTION IN ANESTHESIA IN HYPERTENSIVE PATIENTS

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Background and objectives: Induction in anesthesia and intubation are most vulnerable periods for cardiovascular system where hemodynamics changes occur. Literature reveals that in hypertensive patients, any hemodynamics disturbances, followed by changes in oxygen delivery and demand to the myocard, might be recorded in the S-T segment. The aim of this study was to evaluate the S-T segment changes during intravenous induction to anesthesia in hypertensive patients.

Material and method: in prospective study, 60 female patients, ASAI/II, aged 40-65 undergoing radical mastectomy were divided in two groups. Group A(n=30) included hypertensive patients (n=30) and Group B(n=30)- normotensive patients. For both groups standardized intravenous anesthesia induction and monitoring was commenced, 12 channel ECG monitoring was applied (with preoperatively adopting the J-point) for every patient individually and NIBP, heart rate and non-specific ST changes (smaller than 0.1mm) were recorded (from bipolar lead II) and analyzed. Analyzes were reported for: T0 (base line); T1 – after induction anesthetics; T2 (at laryngoscopy), T3 (5 min after intubation).

Results: Base line ST segment was not statistically significant (-0.21mm$\pm$0.4 vs. -0.01mm$\pm$0.2) while mean blood pressure was statistically different between the groups. For both groups ST changes progressed to depression which were mostly expressed five minutes after intubation: -0.31±0.4 vs. -0.02±0.3 (p=0.004427*). At the T2 and T3 mean artery pressure was significantly lower in hypertensive patient when compared to normotensive patients.

Conclusion: during laryngoscopy and 5 minutes after intubation remarkable decrease of the blood pressure occur in hypertensive patients which lead to most evident non -specific ST changes.

Key words: ST segment, hypertensive, inductuion,

OW.27.2018 Epidural analgesia for normal labor with Bupiacain and Fentanyl, continuos infusion versus intermittent bolus

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Background: The most wanted goal of pain free delivery wiht epidural analgesia is haemodyinamic stability and low procent of operative outcome of the delivery.The study is done on two diferent ways of giving the epidural anesthesia:continuos infusion and intermittent bolus of anesthetics with opioids.

Methods and patients: We analyzed(40) parturinets,all of them nultigravidas,ASA physical status 1.They were devided into two groups of twenty(20)parturinets.The epidural catether was placed when cervical dilatation was 4 cm.We used Lidocain 2ml for test dose and they receved 4ml 0.25% Bupivacain and Fentanyl 10microg/ml.The parturients in the first group continue with 0.1%Bupivacain and 2microg/ml Fentanyl(10-15 microg/h)until full opening of the cervix.The parturients in the second group received 4ml 0.125%Bupivacain with Fentanyl 10microg/ml on every hour.A few parametars were monitored:motor blockade,apgar score at the newborns,sensor analgesia with VAS scale(0-10),blood pressure and heart rate and the delivery outcome.

Results: The two groups had exelent analgesia VAS (0-2)Hemodynamic destabilation had 4 patients of the second group and one of the first group with low blood pressure. Motor blockade had one patient of the first group, three patients of the first group and two of the second ended with cesarean section.

Conclusion: Epidural analgesia for normal labor can lead to moderate haemodynamic unstability with no effect on Apgar score.There is no significant difrence between the two groups on the delivery outcome.

OW.28.2018 Short-Term Heart Rate Variability parameters in normotensive and hypertensive subjects during perioperative period

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Introduction: Heart rate variability (HRV) as a noninvasive measure of autonomic nervous system modulation of heart rate could be an important parameter in anaesthesia clinical practice. Different stages of hypertension are associated with alterations of the parameters of HRV and decreased adaptability of cardiovascular system during perioperative period.

Methods: Sixty five patients of ASA II status scheduled for elective minor surgical procedures were allocated to two groups: group 1 with 32 two subjects with mild hypertension and group 2 with 33 normotensive subjects. Haemodynamic parameters were monitored and ECG was recorded by holter ECG recorder and analysis performed by corresponding softwares. Linear parameters : a) in the time domain: mean RR interval(NN), standard deviation of mean RR intervals(SDNN), the root mean square of successive RR interval differences (RMSSD) and b) in the frequency domain : power of the total spectrum of heart rate variability(TP),power of low frequency band (LF ;0.04-0.15Hz), power of high frequency range(HF; 0.15-0.4Hz) and LF/HF ratio were analysed.

Results: Analysis of the parameters of HRV showed varying values in the time and frequency domain during the perioperative period in both groups of subjects, with lower power of HF oscillations and higher ratios of LF/HF in hypertensive patients.

Conclusion: The results of this trial showed variable differences in haemodynamic parameters variations and great variations of parameters of HRV among the subjects in the groups with consistently lower power of HF oscillations and higher LF/HF ratios in the patients with mild hypertension.

Key words: heart rate variability, preoperative period, hypertension, autonomic nervous system

OW.29.2018 SISTOLIC HYPOTENSION OCCURRENCE AND COEFFICIENT OF VARIATION OF SYSTOLIC BLOOD PRESSURE IN HYPERTENSIVE PATIENTS

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Introduction: During induction in anesthesia, blood pressure is angiotensin dependent. Hypertensive patients treated with rennin – angiotensin system (RAS) antagonists show pronounced hypotension due to blocked RAS. Literature reports that these patients have higher coefficient of blood pressure variations and additional increased perioperative risk. The aim of this study was to evaluate the occurrence of systolic hypotension in surgical hypertensive patients.

Method and material: With standardized induction protocol, we analyzed changes in hemodynamic in two groups of patients. Group A (30) included hypertensive patients, chronically treated with RAS antagonist and Group B (30) normotensive patients. We report the occurrence of systolic hypotension (defined as systolic blood pressure decreased for > 30mmHg from base line) and coefficient of variations of systolic pressure at five measurement times: T1 (prior induction), T2 (after induction agent), T3 (laryngoscopy), T4 (5 min after intubation) and T5 (10min after intubation).

Results: Systolic hypotension in T2 occurred in group A (in 20% of patients). In both groups, systolic hypotension was registered for T3 (in 30% versus 10% of patients), for T4 (in 66.7% versus 20% of patients) and for T5 (in 86.7% versus 13.3% of patients). Statistically significant differences between the groups was found for T4 ($p = 0.006$) and T5 ($p = 0.0000$). Coefficient of systolic pressure variations was within the range of 11-22.9% and 11-15.7% in respect to groups.

Conclusion: Patients treated with RAS antagonists, develop significant systolic hypotension 5 and 10 minutes after intubation and show grader variations in systolic pressure during induction of anesthesia.

Key words: Systolic hypotension, hypertensive, renin angiotensin system

OW.30.2018 COMPARATIVE STUDY OF REGIONAL ANESTHESIA FOR CAESAREAN SECTION AND DROP OF ARTHETIAL BLOOD PRESSIRE DURING USAGE OF MARCAIN 0,5% AND HEAVY MARCAIN 0,5%

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Introduction: There are used two different type of local anesthetics during regional anesthesia for caesarean section and comperation of side effects:drop of artherial blood pressure at both grouos after applicatikn of anesthetics.

Method and Material: There examineded 120 patients sepaeted into two groups and led with two anesthetixs:Marcain 0,5% and Heavy Marcain 0,5% during six months period from 2015/2016.

Case Report: 120 patients with regional anesthesia separeted itno two groups,one group got applicated Marcain 0,5% and the second group Heavy Marcain 0,5%.At both groups are included measurment of artherial blood pressure before application and every five minutes after the application with duration until the end od anesthesia.There are also included: age,weight,height,heart rate and oxygen saturation.

Results: They are entered in columns and graphs.Graphically is shown artherial blood pressure of both groups.It is clear that there is drop of blood pressure at both groups,but there is a difference.The group with application of Marcain 0,5% has shown drop of blood pressure at 20% of all tested patients and the group with application of Heavy Marcain 0,5% has shown drop of only 5% of all tested patients.

Conclusion: This has given us a conclusion that usage of Heavy Marcain 0,5% is more safe during regional anesthesia at patiens with caeserian section because of higher percentage of cardio-respiratory safety.

CR.2.2018 Anesthesia for awake craniotomy: a case report.

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Background and objectives: Some intracranial procedures which demand "speech mapping" are achievable with patients awake. There are challenges ranging from patient compliance to homeostasis. The aim of this study is to present a case of intracranial surgery for removal of a tumor in the left temporal lobe with the patient awake during the procedure.

CASE REPORT: A 32-years old male patient was scheduled for extirpation of the left temporal lobe lesion. After patient selection and psychological preparation, the proposed intervention in the waking state was clarified and accepted. The patient was induced into anesthesia in usual way. The anesthesia was maintained with continuous infusion of propofol and remifentanil. The bilateral scalp blockade was performed with bupivacaine. The Mayfield head fixation device was installed and drapes adjusted to maintain the airway and eyes accessible for mapping with electrical stimulation and tumor excision. At the moment immediately before starting of stimulation and excision, the patient was wakened from anesthesia with interruption of propofol infusion and decreasing the dose of remifentanil. The respiratory monitoring of the patient was managed with "Capnostream" monitor. The patient stayed awake till the end of the procedure without complications.

Conclusion: Although the maintenance of analgesia and hemodynamic stability was a challenge with the patient awake, infusion of propofol with remifentanil titrated analgesia and the blockade with bupivacaine provided satisfactory analgesia. "Capnostream" monitor provided appropriate monitoring of respiratory function.

CR.3.2018 Acute Cardiac Insufficiency in Pregnancy and Periparthal Period – Case Report

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Background: Peripartum cardiomyopathy (PPCM) is a disorder in which initial left ventricular systolic dysfunction and symptoms of heart failure occur between the late stages of pregnancy and the early postpartum period. [1,2,3]Monitoring of the patient with the acute form of PPCM should be initiated as soon as possible. The syndrome carries a high morbidity and mortality and diagnosis is often delayed. [1,2,3,4,5]

Case presentation: Our patient is 32 year old women in 27th week of second pregancy. Patient had one prior pregnancy 4 years ago,terminated naturally without complications. Cardiac symptoms begun 2 years earlier,when she was diagnosed with left fascicular block and advised to do heart ultrasound wich she never did.

First symptoms were fatigue,cough and dyspnea,which were misread as respirathory infection,she was examined by pulmologist and cardiologist but sent home with antibiotics.A week later patient was admitted to hospital with signs of acute heart failiure.Heart ultrasound showed extremely decreased ejection fraction (15%),dilatation of left ventricle,decreased systolic function and mitral regurgitation.Patient was treated with diuretics,cardiotonics,beta blockers and heparine and it was conciliarly decided to terminate pregnancy by performing Caesarean section on vital indications. Post operative therapy included inotropes,vasopressors,diuretics,antibiotics,

heparine,bromokriptine,fluids.Inothropic support was excluded form therapy on sixth postoperative day and the rest of recovery went well.

Conclusion: The exact cause of PPCM is still unknown. Numerous risk factors have been summarized recently, but only a few have been confirmed in epidemiological studies.. [1,2,3,4,5]

More investigations analyzing pathophysiology, genetics, and treatment options are essential in order to establish standardized treatment recommendations. [1,2,3,4,5]

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CR.4.2018 Quadratus Lumborum Block in Pediatric Patients – Leskovac General Hospital Experience

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Background: Quadratus lumborum block (QLB) is a posterior abdominal wall block that is performed exclusively under ultrasound guidance. It was described by Rafael Blanco in 2007. Mihaela Visoiu was the first author who described QLB in pediatric patients in 2013. We performed QLB as a part of postoperative pain management in 2 children after open inguinal hernioplasty under general anesthesia in Leskovac General Hospital (LGH).

Case reports: Case 1 was 5.5-year-old boy with 18 kg body weight and Case 2 was 9-year-old girl with 22 kg body weight. Both of them had unremarkable previous medical history. At the end of surgery, before the emergence from general anesthesia, unilateral QLB was performed. We used 50 mm Stimuplex needle and 2 mg/kg 0.25% bupivacaine. Patients received 10 mg/kg of acetaminophen 20 minutes before the end of surgery. Both of them had no other pain medications postoperativly. Patients were sleeping and playing postoperativly. Parents were very satisfyied with analgesia provided for their childern. Patients left the hospital 24 hours after the surgery.

Conclusions: QLB was introduced in LGH everyday clinical practice thanks to the international teaching visit. The LGH staff started training physicians from other hospitals in the region within 4 months of international visit. QLB provides larger field of analgesia, more lasting analgesia, and has significantly less potential for local anesthetic systemic toxicity comparing with transversus abdominis plane block. Clear sonographic landmarks allow it to be easily performed. QLB has great potential to improve and facilitate postoperative pain management in pediatric patients.

CR.5.2018 CLOT IN CEREBRAL AQUEDUCT OF SYLVIUS AS RISK FOR OBSTRUCTIVE HYDROCEPHALUS: CASE REPORT

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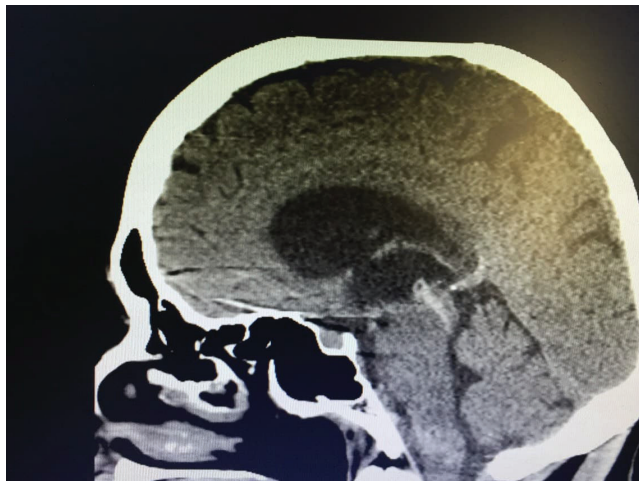
Introduction: Intraventricular haemorrhage is a great risk factor for developing hydrocephalus and interstitial (hydrocephalic) edema, leading to riced ICP and further worse prognosis. This severe complication develops in 67% of patients. Good framework is essential for early recognition and multimodal therapy.

Case report: A 68 years old female patient was admitted to neurosurgical ICU. At the admission she was soporous, responding to painful stimulus, confused and with motor dysphasia, estimated GCS 10. Her history revealed that she was having diabetes mellitus type2, hypertension and hypothyroidism. She was hypertensive 170/80mmHg, tachycardic, with spontaneous respiration and SaO_2 99%. Antiedematous therapy with Mannitol 20% 125ml, high dose of Furosemide and antihypertensive therapy with Nifedipine 20mg was administered. After few hours, her condition was improving fast.

Disscusion: Management of IVH begins with stabilization of the patient, closely monitoring the neurological status and hemodynamics, ensuring that further bleeding is minimized. Cerebrospinal fluid production is lowered by high doses of furosemide by impairing the Na^+ and Cl^- transport in the choroid plexus. Combination of diuretics, osmotic drugs and antihypertensive drugs is essential for effective treatment of intraventricular haemorrhage. If this medical approach doesn't improve the neurological condition or if there is further deterioration, than surgical management is the next option with external ventricular drainage.



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CR.6.2018 MANAGEMENT OF PAIN IN BUPRENORPHINE MAINTENANCE THERAPY PATIENT PRESENTED FOR HERNIOPLASTY

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Introduction: Buprenorphine is a medicine used in the substitution treatment of opiate dependence. It is a semi-synthetic, long-acting, highly soluble opioid, which belongs to the group of partial μ-opoid agonist and κ-receptor antagonists. Patients who use this medicine often have very severe postoperative pain due to Buprenorphine-induced hyperalgesia. The opioid medicines are with limited effectiveness in these patients.Will the same dose continue, increase the dose or stop the drug for several days before surgery and replace yourself with a pure agonist, depends on several factors, as like extent of surgery and expected strength of postoperative pain.

Case Report: A 35-year-old patient was received for operative treatment of hernia inguinalis. As BMT patient, he is taking: ling. Buprenorphin 2 mg s.1x1, caps.Venlafaxine XR s.1x1. It is directed to the patient not to stop the therapy. The patient was premedicated with Midazolam, Ranitidin, and Dexamethason. Spinal anesthesia was performed with 0.5% Bupivacain 3.4 ml and Fentanyl 20 μg. Preoperatively he had got iv 30 mg Ketamin, postoperatively Ketoprofen 2 x100mg, Paracetamol 1g. Postoperatively, pain was measured with numeric scale, and from first to the end of third day the pain score was 1-2/10.

Conclusion: The provision of analgesia in the perioperative period in patients receiving Buprenorphine is a major challenge. Our experience has shown that a multimodal, non-opioid approach to analgesia is essential.

Key words: buprenorphine,opiate dependence, postoperative analgesia

CR.7.2018 Difficult airway management in a patient with goiter: case report

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Introduction Difficult intubation is associated with a number of complications and can be life threating.Goiter has been considered an additional risk factor for difficult intubation.

Case report We present the case of 27-years old female patient with huge hyperthyroid goiter,which she has been treated for the past 13 years, scheduled for a near-total thyroidectomy.

During the examination,the patient was uncooperative due to oligophrenia and language barrier.The airway assessment showed the presence of inadequate mouth opening,Mallampati Grade-IV,inter-incisor distance 3cm,restricted jaw protrusion,long neck with sternomental distance of 20cm and circumference of 44cm.

The CT-scan showed multinodular goiter,with both lobes measuring 90x50x45mm in size,compressing the surrounding structures.The X-ray showed right-sided deviation of the trachea.

Considering the general condition of the patient,as well as the assessment of the airway,the plan was to try intubation using a video laryngoscope,whereas the alternate plan was to use a flexible fiberoptic bronchoscope.

The patient was placed in a sniffing head position.Preoxygenation was carried out with 100% oxygen for 10 minutes.For anesthesia induction,Propofol was used in a dose of 2mg/kg,with Fentanyl as a co-induction,while Succinylcholine was used for muscle relaxation in a dose of 1.5mg/kg.

Video laryngoscopy was successfully performed on the second attempt,after replacing the spatula of the laryngoscope.Cormack-Lehane was grade-3a.After external laryngeal manipulation,a reinforced endotracheal tube of size 7.5mm was inserted using an intubating stylet.

Conclusion Preoperative examination of the airway allows the recognition of predictors of difficult intubation,which enables adequate preparation.For goiter patients,in addition to the standard predictors,there are goiter-related factors that may predict difficult intubation.

CR.8.2018 Awareness, prevention and treatment of secondary brain injury in ICU: A case report

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Background: Brain injury is a major cause of long term disability and economic loss to society. Much of the neurological damage does not occur immediately, but in minutes, hours and days that follow. The secondary brain injury results from raised intracranial pressure, hypotension, hypoxia, anemia, seizures, hypoglycemia and hyperthermia.

Case report: A 44-year old woman was injured in a car accident. She acquired multifocal fractures on the facial bones. The patient was contactable, hemodynamically stable, did not lose consciousness, Glasgow Coma Scale Score 14.

The initial treatment was in another hospital, where after worsening the condition, she was intubated and taken to our ICU after 48h. The patient was hypotensive, anemic with prolonged bleeding and clotting time.

Control head computed tomography was performed. She was sedated, mechanically ventilated, treated with fluids, vasopressors, Tranexamic acid, Erytrocytes, FFP, diuretics, anti-oedematous therapy and ventriculo-peritoneal shunt was placed.

After 18 days the patient was extubated without neurological sequelae.

Discussion: The present case suggests that anesthesiologists should be aware that mild brain injury (GCS 13-15) may worsen over time and to outline the importance in early diagnosis and aggressive treatment of secondary brain injury so that further damage to brain can be prevented. Once the patient has a secure airway, is adequately oxygenated and has a stable cardiovascular system, consideration should be given to transfer to a neurosurgical unit. Managing brain injury is a challenging task and requires dedicated effort and good teamwork, betterment of the monitoring techniques and understanding the pathophysiological processes.

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CR.9.2018 Acute abdomen in a patient with Wolfram syndrome; case report

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Introduction: Wolfram syndrome is a progressive autosomal recessive neurodegenerative disorder, 1 in 770.000 cases, characterized by early onset diabetes mellitus and progressive optic atrophy in the first decade of life. Two types, type1 caused by a WSF1(Wolfram) gene mutation and type2 caused by a mutation in CISD2gene. This patients have an average life span of 35 years.

Case presentation: 36 year old female patients was admitted with acute abdomen and septic shock with and urgent need of surgery. The patient stated that she was diagnosed with WS, which resulted in blindness, deafness and diabetes mellitus. She also had hypothyroidism and was obese.

Management and Outcome: The first attempt of anesthesia failed due to patient's size BMI=29, that caused problems in intubation. The vital signs were BP140/80mmHg, HR108/min and $SpO_2$60%. Preoxygenation with 0_2 until SpO_2 of 90%, intubated with bougie with tube size6.5. Intraoperatively stabile BP and HR and anuria with 20ml diuresis. Postoperatively she was transferred in ICU and mechanically ventilated with IPPV. Vital parameters BP80/30mmHg, HR70/min and $SpO_2$96%. The patient`s state worsened, the BP dropped and she had oliguria to anuria. Inotropes were used. Postoperative RTG showed bilateral diffusely reduced lung transparency. The patient died on the second postoperative day due to respiratory insufficiency and metabolic acidosis.

Discussion: This condition is also known as DIDMOAD syndrome, an acronym composed of diabetes insipidus (DI), diabetes mellitus (DM), optic atrophy (OA) and deafness (D). This syndrome should be considered in young diabetic patients with unexplained visual loss or polyuria and polydipsia in the presence of high blood sugar.

CR.10.2018 Total knee arthroplasty in a patient with severe Von Willebrand disease

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Background. Total knee arthroplasty is the most extensive and the most commonly performed orthopedic procedure which is associated with numerous complications. Von Willebrand disease arises from a deficiency in the quality or quantity of Von Willebrand factor and affects blood-clothing system. Diagnostic category and disease severity is defined by values of fVIII, vWfAc, vWfAg. According to these laboratory levels, disease is treated with intravenous vWf/fVIII concentrates.

Case report. We presented a 46-year old patient with a severe (type 3) von Willebrand disease and HIV infection that was scheduled for the total knee replacement. After being admitted to "Banjica" Institute, our medical team established a treatment plan and strategy for controlling underling disease. Preoperative control of specific laboratory parameters: fVIII, vWfAc, vWfAg was performed and a detailed plan for preoperative, perioperative and postoperative vWf/fVIII concentrate administration was made. The total knee replacement was performed under general anesthesia conditions with a careful control of perioperative bleeding by antifibrinolytic administration and Tourniquet application. In the post-operative period cephalosporins were used for antibiotic prophylaxis whilst antiretroviral therapy and analgesic therapy including opioids and Paracetamol were performed according to the time-scheduled dosing. Intermittent pneumatic compression (IPC) device was used as anticoagulant therapy. On a 6^{th} postoperative day the patient was transferred to Clinic of Hematology, Clinical Center of Serbia where further monitoring of underlying disease was continued.

Discussion. Well organized team of experts, adequate treatment strategy and its thorough conduction is essential for prevention and early treatment of possible complication.

Key words: Total knee arthroplasty, Von Willebrand disease, anesthesia

CR.11.2018 Atypical eclampsia-a struggle for time and a problem for everyone

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Background:Atypical form of eclampsia constitutes about 8% of eclamptic patient.Problem with atypical eclampsia lie in its unpredictible onset so timely diagnosis and management are critical in avoiding complications.

Case Report:A 28 year-old primigravida at 31 weeks gestation was admitted to our Emergency Dep. due to seizures, and hypertension (210/130 mm Hg).She had no history of hypertensive disease and normal serum/urine laboratory results on admission.Diazepam 10 mg was administered (IV) due to ongoing seizure activity.Due to fetal distress,it was decided to proceed with an emergency cesarea section.The patient sustained an avulsion fracture of her right humerus and a swollen tongue because of the prior seizures at home.The patient was positioned in a 'ramped' position, was oxygenated and after induction of anesthesia with remifentanil 50mcg IV,propofol 200mg IV and suxamethonium 100mg IV she was successfully intubated on the first attempt (Cormack-Lehane class III).A healthy male infant was delivered after 7 minutes weighing 1600 g,with Apgar scores of 7/8. Postoperatively the patient was admitted to the intensive care unit (ICU) and she was successfully extubated after one hour.

Discussion:GA exposes the patient to a potential hypertensive response at laryngoscopy that can cause intracranial hemorrhage which is a leading cause of maternal mortality in patients with preeclampsia and eclampsia. In patients with eclampsia it is safe to perform a neuraxial anesthesia technique if the patient is stable and fully conscious and does not have any contraindications, otherwise GA is recommended.

CR.12.2018 OPIOID FREE ANESTHESIA IN LAPAROSCOPIC CHOLECYSTECTOMY: A CASE REPORT

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Background. Opioid free anesthesia is new anesthesiological technique, where opioids are not given in the intraoperative period. They can be replaced by non-opioid analgesics, such as paracetamol, dexamethasone, lidocaine, ketamine and magnesium sulfate. All these drugs given together has synergistic effect and can reduce opioid requirement in the postoperative period.

Case report. We present a case of 55-years-old woman (weight 78 kg) with well controlled hypertension and asthma, planed for laparoscopic cholecystectomy. Previously she underwent bilateral mastectomies (5 and 2 years ago) and in the postoperative period she has complained of nausea, vomiting, dizziness and shortness of breathing. We think that all these negative effects are from using opioids in the intra- and postoperative period, and we decided to give her opioid free anesthesia. Before the induction the patient received dexamethasone 8 mg and paracetamol 1 gr intravenously. The induction into opiod-free general anesthesia was consisted of giving midazolam 3 mg, lidocaine hydrochloride 78 mg, propofol 160 mg, ketamine hydrochloride 39 mg and rocuronium bromide 60 mg. After tracheal intubation, continuous intravenous infusion with lidocaine hydrochloride 2 mg/kg/hr and magnesium sulphate 1.5 gr/hr was started. Anesthesia was maintained by using sevoflurane MAC 1. At the end of the surgery 2,5 gr of metamizole was given intravenously. After the operation in the postoperative period she didn't complain of nausea, vomiting, dizziness and shorthess of breathing. She was discharged home one day after the surgery, didn't complain of pain or any negative effects during her stay in hospital.

Keywords: opioid free anesthesia, laparoscopic cholecystectomy, pain.

CR.13.2018 ICU management of water intoxication induced hyponatriemia in a patient with schizophrenia: a case report

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Introduction Serum sodium level <125 mmol/L is considered as severe hyponatremia and can leads to coma, death, rhabdomyolysis, and neurologic damage.

Case report We present a 34 years old male with history of Schizophrenia with multiple seizures followed with lost of consciousness after intake of 6 liters of water. Diagnostic CT scan has revealed cerebral edema. Laboratory tests has shown severe hyponatremia (109mmol/l), hypokalemia and hypocalcemia. We gave the patient 10% Hypertonic NaCl 120ml per day, 7.4% KCl and Calcium gluconat. He was sedated and mechanicaly ventilated. Antiedematous therapy with Manitol 20% was started. The following days laboratory results has shown gradual correction of the Sodium level: 112mmol/l, 119mmol/l and 127mmol/l respectively. The control brain CT scan showed cerebral edema regression. The 6th day of ICU stay sodium levels were 131mmol/l, the patient was awake, oriented and extubated.

Discussion Psychogenic polydipsia occurs in 20% of the psychiatric patients which could lead to severe hyponatiemia. Second generation antipsychotics intake could also lead to severe hyponatremia. Acording to Spasovski et all. The treatment consists of hypertonic NaCl 3% 150ml. The sodium level correction should be gradual and should not exceed more than 10mmol/l for the first 24 hours neither more than 8mmol/L for every next 24hours.

Conclusion Serum sodium level correction should be performed with hypertonic saline (NaCl >3%). Strict control of serum sodium levels is a must in order to avoid osmotic demielinisation and rhabdomyolisis.

Key words: Hyponatremia, Water intoxication, Hypertonic saline

CR.14.2018 Postsplenectomy severe sepsis due to mycoplasma pneumoniae: a case report

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Introduction The risk of severe infection after splenectomy is well recognised. Mycoplasma pneumoniae infection is usually self-limited, but sometimes fatal.

Case report A 36 old women was brought to the ICU because of respiratory insufficiency.The patient was diagnosed with chronic splenitis. For three months she was treated by hematologist due to trombocitopenia and one month ago a splenectomy was done.In the moment of admission in the ICU she already had pulmonary edema with SaO2- 70% and peripheral cyanosis, BP=100/60 mm Hg,HR=120 beats/min.Two hours later she became disoriented, anuric, tachypneic, hypotensive, tachycardic.Abnormal laboratory findings showed high infective parameters,metabolic acidosis and respiratory alkalosis .Chest radiography revealed diffuse bilateral infiltrates.She recived intravenous imipenem, vancomycin,linezolid, fluids,norepinephrine and dopamine.The result of the pneumoslide showed a significant Mycoplasma pneumoniae agglutination titer. Twenty hours after admission, despite intensive treatment, she developed progressive hemodynamic deterioration and DIC.Even though all the measures were taken the outcome was lethal.

Disscusion Asplenic patients are immunocompromised, with a high rate of morbidity and mortality from fulminant sepsis(1). Treatment is generally aggressive due to the serious nature of the condition and associated mortality, but sometimes it may fail to alter the course of this fulminant septic syndrome.

Conclusion M. pneumoniae may be a pathogen involved in overwhelming postsplenectomy infection, which is a rapidly progressive condition with a high mortality rate and should be treated aggressively.

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CR.15.2018 PECs blocks as basic anesthesiological technique for breast cancer in a patient with Myasthenia gravis

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Background Peck 1 and Peck 2 are superfitial interphascial blocks between the muscles of anterior thoracic wall. They block pectoral and intercostal nerves on the appropriate side. Ultrasound guided, the application site is precisely determined, followed by the hydrodysection between the muscles from the local anesthetic. They provide adequate analgesia for breast surgery.

Methods A 72 year old female patient with Myasthenia gravis, ischemic heart disease, arterial hypertension, AFF and varicose veins on the legs, classified as ASA 4 is scheduled for surgery due to breast cancer. Quadrantectomy of the right mammary gland (upper lateral quadrant) with axillary lymph dissection is planned. After setting monitoring, 1 mg of Dormicum, 50 mcg of Fentanyl and amp.Analgin 2.5g was applied. Under ultra-sound on a level of fourth rib first performed Peck 2 block applying 20 mL of 0.5% Bupivacaine between m.pectoralis minor and m.seratus anterior. Then Peck 1 block, applying 10 mL of 0.5% Bupivacaine between minor and major pectoral muscles. The patient is seated with 20 ml / h with Propofol continuously.

Results During the intervention, analgesia and comfort of the patient were provided. Vital parameters were stable. In the postoperative period, the patient didn't receive analgetics.

Conclusion These blocks can be adequate substitute for general anesthesia, especially in patients with comorbidities who need breast surgery. They are simple to perform and with the addition of adequate perioperative analgesia, you can provide significant post-operative analgesia and the use of opiates is reduced to minimum.

Udruženje anestezioloģa i intezivista Srbije

Serbian Association of Anesthesiologists and Intensivists

European Society of Anaesthesiology

ESA

WFSA

EAMS European Airway Management Society

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