

ambulation, and decres duration of hospital stay. Epidural anaesthesia without opioids is a safe and sufficient method to regulate postoperative pain in patients even with neuromuscular scoliosis and respiratory impairment. There are some limitations that we should consider. Catheters might be an additional source of infection by channelling the way for bacteria during their application. It may get stuck in surrounding tissues or even rupture. Catheter is installed after the surgery, and it does not reduce pain intraoperatively, therefore, amount of opioids during surgery remains to be substantial.

Intrathecal morphine injection A lot of studies carry out conclusion that intrathecal morphine reduces postoperative pain and opioid consumption in the 24 hours following spine surgery. There are some evidences that intrathecal opioids may decrease intraoperative blood loss, though the mechanism of the blood-sparing effect remains unclear. Some hypothesize that the diminished blood loss may be due to lower mean arterial pressures. Nevertheless, other studies have demonstrated no difference in blood pressures. In spite of all benefits, we should keep in mind several possible complications associated with intrathecal morphine.

Respiratory depression and sedation It can be sufficiently severe and require escalation of care and readmission to ICU.

Other complications – post dural puncture headache, cerebrospinal fluid leaks and surgical site infections. Morphine has the side effect – nausea, vomiting

We should be aware of the risk-to-benefit ratio when deciding whether to administer ITM for postoperative pain management.

Lidocaine and ketamine have no relation to regional methods of anaesthesia, nevertheless booth this method achieves the same goals – they reduce postoperative pain and opioid consumption.

Lidocaine iv improved pain scores and reduced 48-h opioid requirements in patients undergoing spine surgery. Patients given lidocaine had slightly fewer 30-day complications than patients given placebo. IV lidocaine improved the postoperative gastrointestinal function. Lidocaine reduces postoperative nausea, vomiting and the supply of antiemetics. Functional walking capacity distance increased significantly in lidocaine-treated children.

The analgesic effect of lidocaine is diversified. This drug has peripheral and central actions, which reduces neural responses to pain. Lidocaine suppresses spontaneous impulses generated from injured nerve fibres and the proximal dorsal root ganglion.

Lidocaine does not adversely affect the monitoring of motor evoke and somatosensory-evoked potentials in individual patients during surgery and can be used as an adjunctive medication with TIVA regimens to reduce the required dose of other MEP suppressing medications.

Ketamine at sub-anaesthetic doses, has been shown to modulate nociceptive hypersensitization through its antagonist effects on NMDA receptors by blocking pain signalling input. Several studies have demonstrated that the addition of intraoperative and postoperative intravenous ketamine infusion can reduce the amount of morphine equivalents consumed in the 48-h postoperative time period, founding the effects of ketamine on the pain control regimen. Additionally, significant reduction in the incidence of nausea and vomiting provides an additional benefit of ketamine. Yet, other studies conclude that ketamine reduces the amplitude and increases the latency of transcranial electrical MEP.

ESP block, due to the peculiarity of the innervation of the spinal column, shows the best results in reduction of pain after spine surgery. Resent MRI studies on cadavers and healthy volunteers confirm the spread of anaesthetic to the dorsal ramus of the spinal nerve, which innervates the muscles, soft tissues around spine column, and transverse processes of the spine.

Further studies demonstrate a significant reduction in the opiate use with lower rates of pain intensity after lumbar spine surgeries. Moreover, we have first clinical cases that describes successful performing ESP block in scoliosis surgery.

ESP is volume dependent block. To reach paravertebral and epidural spaces and effect ventral ramus of the spinal nerve at several levels high volume of anaesthetic is required. But, for spine surgery we need to effect only dorsal ramus, so we can reduce the volume of anaesthetic, and inject it bilaterally on two levels in order to block more spine levels as much as possible to place of screws implementation.

Apparently, we will not affect motor evoked potentials, considering that we block only the dorsal branch of the spinal nerve, but further researches are required.

Spine surgeries belongs to the most traumatic intervention and may conduct pronounce postoperative pain. If it treated not appropriately, it can lead to hyperalgesia and chronic pain. The incidence of moderate to severe chronic postsurgical pain at 12 months after spine surgeries can reach up to 39.1%

All methods of anaesthesia discussed today has impact on pain perceiving from various sides. Some of them, affects transduction, transmission, and modulation by interrupting the conduction of the pain impulse, another affects perception by reducing sensitization and tolerance to pain by reducing the quantity of narcotic analgesics. Due to this mechanism, the essential balance between nociception and antinociception is sustained.

#37207 IMPROVING OUTCOMES IN POSTPARTUM HAEMORRHAGE: RECOGNITION AND RESUSCITATION

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Introduction When this topic of PPH recognition is afforded, the first problem that arises is the correct definition of what a PPH is. Lack of consensus is the first concern, as many definitions have been used.

This is the classical definition of postpartum haemorrhage (PPH): genital tract blood loss of more than 500 ml within 24 h after giving birth.¹

PPH is nowadays the leading cause of maternal deaths worldwide.² Most of these deaths occur in low-income countries (LMIC).² It is estimated that 34% of 275000 maternal deaths in 2015 were caused by PPH.^{2 3}

Despite of these data, we must acknowledge that even in high income countries (HIC), women still die because of PPH.⁴⁻⁶

Data from Europe seem that 13% of obstetric patients have a PPH (> 500 mL) or severe PPH (>1000mL).⁷

Morbidity after PPH is also a matter of concern: Anemia, Acute kidney injury, psychological problems, posttraumatic stress, etc.⁸

There are several risk factors for PPH, but many women have a PPH despite they don't have any. Preventive measures are also important, such as active management of third part of labour.^{9 10}

There is a lack of consensus about definitions and because of it, about early recognition and treatment.¹¹

Clinical definition of PPH

Different guidelines and documents have been published by national and international societies regarding the definition on PPH

Definitions can be¹²

- Based on blood loss
- Based on clinical situation
- Based on the need of intervention

All definitions based on blood loss are not accurate on blood loss quantification.

WHO recommends visual estimation of blood loss as the standard for blood loss amount, but clinically this estimation is poor and often underestimated when bleeding is severe.

by up to 33e75%.¹³⁻¹⁵ A right estimation of blood loss is essential for all diagnostic and therapeutic steps, and errors on it can affect the patient's outcome. If the control of PPH is based on inaccuracy, the effectiveness of the measures will be limited.^{16 17}

The definitions based on clinical signs allow the capture of physio-pathological effects of PPH, and to detect some hidden sources of bleeding. Some guidelines focus on this.^{18 19} The disadvantage is that neither of the signs of bleeding correlate accurately with hypovolemia degree, and we can use neither of them as cut-off points nor triggers for transfusion.²⁰

Let's remind that pregnant women may lose up to 1000 mL of blood without any clinical sign of hypovolemia.

Some monitors and tools may help in this stage, as shock index, continuous non-invasive hemoglobin (SpHb) monitoring, or MEOWS.¹²

Given the limitations of existing definitions, probably a better way to do it is affording the problem as 'multidisciplinary approach' that could include maternal physical condition, clinical symptoms, coagulation, and other signs, that should be important for the official declaration of PPH.¹²

A consensus definition is needed, and clinical features related to severity of PPH may be unmasked because of physiological changes of pregnancy and because most of women are young and fit, and they look fine until the blood loss has been massive. Tachycardia, pallor, hypotension, shock index, oliguria, excessive volume requirement, acidosis or lactate, coagulopathy, are all signs related with the severity of PPH and will have to trigger emergency actions, and close surveillance and monitoring.¹¹

Quantification of peri-partum blood loss has become standard practice in Wales and has been clinically associated with a better detection of PPH.¹⁷ When blood loss measurement is standardized, the understanding of PPH, its causes, incidence and volume will improve, as it may affect maternal morbidity. The actions and interventions related to PPH, are different depending on the amount of bleeding, and it is also important to compare research studies. Despite of this, the improvement of outcomes needs to be investigated, to find out if these are clinically relevant.²¹

Fluid resuscitation in PPH

There is not an optimal hemostatic resuscitation in PPH. The Managing Obstetric Emergencies and Trauma course (MOET) and the Royal College of Obstetricians and Gynecologists (RCOG) instructions recommend a big amount of fluids (approximately twice the volume lost, up to 3500 mL) to restore blood volume and oxygen carrying capacity in this situation, if bleeding is > 1000 mL and/or signs of shock.^{22 23}

Resuscitation can be afforded with crystalloids and/or colloids. Each of them has advantages, disadvantages, risks, and benefits.

The administration of big amounts of crystalloids may lead to the lethal triad (hypothermia, dilution ad coagulopathy).²⁴

The administration of hydroxyethyl-starch has been related to the impairment of coagulation.²⁵

Permissive hypotension has been advocated as an alternative to liberal fluid resuscitation, but out of the obstetric context. Not many good quality studies have been published on this topic.

Out of PPH and obstetrics, restrictive fluid administration has decreased the amount of transfusion needed.²⁶ Despite of that, physiological changes of pregnancy (haemodynamic and haemostatic changes), show a big difference and these results may not be exchangeable to the obstetric field.

Large amounts of crystalloids in PPH have been associated with a quicker and more severe coagulation deterioration, ICU admission and other adverse maternal outcomes.^{27 28}

One randomized clinical trial has been published in mild PPH (500 mL blood loss), to find out if a restrictive policy of fluid administration was related or not with progression of PPH²⁹ after vaginal or CS delivery. The authors could not see any difference comparing restrictive or liberal regime, although the results are limited by the fact that only mild PPH was considered, and the results cannot be extrapolated to severe PPH.²⁹

The lack of consensus on perioperative, not only PPH, but fluid management is also reflected in the guidelines of the American Society of Anesthesiologists (ASA) and the European Society of Anaesthesiology and Intensive Care (ESAIC).³⁰⁻³²

Anyway, there is agreement that it is needed to replace the blood loss. ESAIC guidelines, advocates to avoid hypoperfusion and an aggressive policy towards optimization of cardiac preload (goal directed therapy).³² Meanwhile, ESAIC recommends restrictive policy of fluids in their trauma patient guideline, to achieve target blood pressure.³²

ESAIC and of Network for the Advancement of Patient Blood Management, Hemostasis and Thrombosis (NATA), also published a guideline focused on obstetrics, where it is recommended a restrictive fluid administration policy (1-2 mL of crystalloids for every 1 mL of blood loss).³³ Restrictive fluid resuscitation is focused on the replacement of lost fluids avoiding fluid overload.³⁴

Colloids may impair clot function (impairment of fibrin polymerization and faster clot disintegration). For those reasons, colloids may increase blood loss.^{35 36} The use of starches is related to an increase of blood transfusion needs, with the increase the likelihood of acute kidney injury, and other side effects as pruritis and rash, among others.³⁷⁻³⁹

There are not systematic reviews or randomized controlled trials that evaluate fluid management protocols in obstetric patients. Some retrospective studies may support the use of a restrictive policy on fluids administration, as coagulation impairment was associated with the use of more crystalloids and the use of more than 4 L of crystalloids was

independently associated to worse maternal outcomes (hysterectomy, ICU admission, embolization).^{27 28}

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#36453 REGIONAL ANESTHESIA ON THE BATTLEFIELD BY EXAMPLE FASCIA ILIACA PLANE BLOCK

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In a war or combat setting, the choice of the best nerve block would depend on the specific injury or surgical procedure, the available resources, and the expertise of the medical personnel on the ground.^{1 2} Given the challenging conditions and limited resources often encountered in such settings, certain nerve blocks may be more practical and effective.³ Here are a few nerve blocks that may be considered in a war zone: