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SP67 POCUS GASTRIC ULTRASOUND

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10.1136/rapm-2022-ESRA.73

Although gastric ultrasonography had been used for almost thirty years by gastroenterologists to evaluate gastric motility and emptying or to diagnose cancer of the gastric wall, it was only approximately ten years ago that the first publications appeared in the anesthesia literature about the perioperative use of bedside ultrasound to evaluate gastric content and volume. This new tool allowed and allows physicians to assess peri-operative patient aspiration risk and guide anaesthetic management. The exam mainly consists of two components. The qualitative component determines if a stomach is empty or contains clear or thick fluid or solid contents. If deemed necessary, the quantitative component of the exam determines how much clear fluid is present and uses for this purpose a validated mathematical tool to estimate total gastric fluid volumes.¹ It is however essential to keep in mind this model has been validated for clear fluids only.

A detailed framework (I-AIM model) was described that presents every conceptual step for the indications (I), acquisition (A), interpretation of gastric ultrasound (I) and the medical decisions (M) concerning anesthetic management to be taken from the obtained information, (<https://www.gastricultrasound.org/en/extra-material/faq/#downloads>).

For the extended technical aspects of the scanning and sonographic presentations of different stomach contents, we refer to two review articles or the abovementioned website.^{3,4} In breve, the epigastrium of the patient is scanned sagittally with a low-frequency abdominal transducer in the supine and right lateral decubitus position. The aorta and left lobe of the liver serve as anatomical references. This way a cross-sectional view of the antrum of the stomach -which is the most amenable part of the stomach to be scanned- is obtained.

The indications for using gastric PoCUS are the clinical scenarios in which prandial status is uncertain or gastric emptying is possibly delayed.⁴ This can be patients who for whatever reason have not followed the fasting guidelines or have an unclear history (language barrier, cognitive dysfunction, children...) or patients with chronic kidney disease, multiple sclerosis, diabetes....

The question that needs to be answered is -as for most point-of-care techniques- a dichotomous one. Does this patient have a pneumothorax, does that lady have a pericardial tamponade? In this case the question to be answered is: does our patient have an 'empty' or a 'full' stomach? A definition of 'full' is the presence of content that goes beyond what can be found in fasted and healthy patients. This is the presence of clear fluid in excess of baseline gastric secretions being > 1.5 mL/kg clear fluid or the presence of thick particulate or solid content. The volume of gastric contents is an important

determinant of regurgitation but the cut-off value of 1.5 mL/kg that confers a 'full' stomach and unacceptable aspiration risk is a topic of an ongoing debate and beyond the scope of this short update.⁵

Over the last decade, there has been an ever-rising number of publications on gastric point-of-care ultrasound. The initial focus was on the technique's development and characterising it in terms of validity, namely is it assessing what it intends to assess and in an accurate way. The reproducibility of the results (reliability) and application in clinical practice (inter-pretability) were to follow. Gastric PoCUS was investigated in different patient populations: adult, paediatric, morbidly obese, chronic renal failure, diabetes, elective, urgent and emergency surgery. More especially the obstetric population has attracted a huge interest as demonstrated by the large number of publications. Studies have focused on gastric emptying throughout the pregnancy but have focused on term patients and during labour.⁶

Other studies have focused on preoperative drinking policies with different timings and regimens (carbohydrate rich, protein enriched). Testing more liberal drinking policies may help us improve patient comfort, alleviate the effects of starvation, and retain safe gastric volumes. Especially in the paediatric population, the work by Frykholm and Andersson from Sweden has led to modified and more liberal fasting guidelines in children.⁷

Although many aspects that are essential to investigate this new tool have been studied, there are aspects that remain to be evaluated such as the education and implementation into curricula, cost-effectiveness, its role before tracheal extubation because the focus has been in most cases on its preoperative use and other interesting pathways such as its possible application in evaluating enteral feeding in the intensive care environment.

Gastric PoCUS is an exciting new tool that can be added to the armamentarium of the anesthesiologist, but it needs to be seen as an adjunct that increases the safety margin within anesthetic management, together with appropriate medical history and physical exam and it is not meant as a replacement for the fasting guidelines that have an excellent track record.

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SP68 DURAL PUNCTURE EPIDURAL: A 'HOLE' LOT BETTER? IS THIS THE HAPPY MEDIUM WE WERE HOPING FOR?

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10.1136/rapm-2022-ESRA.74

Labor is one of the most intense and painful conditions requiring analgesia.¹ Neuraxial anesthesia is the gold standard to provide effective, safe and reliable pain relief during labor and delivery.² Numerous neuraxial techniques exist such as spinal anesthesia, traditional epidural (EPL), combined spinal-epidural (CSE) and dural puncture epidural (DPE).³ Over time, various refinements have been made to optimize the efficacy of the traditional labor epidural. Modifications include the type of neuraxial technique chosen, local anesthetic (LA) concentration and volume, varying strategies for initiation and maintenance of analgesia with different pump delivery systems and addition of adjuncts to LA (most commonly lipophilic opioids).⁴

The simplest but likely least used technique is spinal anesthesia. This single shot technique is used when rapid onset of analgesia is required, and delivery is expected to occur within an hour (of administration).³ Although quick and effective, there is no means to supplement analgesia once the spinal effect wears off and in the event that anesthesia is required a repeat single shot spinal, epidural or general anesthesia may be necessary.³

Lumbar epidural is the gold standard against which other pain relief measures are evaluated for labor analgesia.² The epidural space is identified with the loss of resistance technique and a catheter is inserted into the epidural space. Local anesthetic (with or without adjuvants) is delivered to the epidural space via the catheter.³ Epidural medication can be administered in various ways: manual boluses by the physician, continuous infusion (CEI), patient controlled epidural anesthesia (PCEA), programmed intermittent epidural boluses (PIEB) or a combination of these.⁴ Although safe and reliable, time to onset of analgesia is relatively slow.⁵ There may be limited sacral spread of medication, resulting in inadequate analgesia in the second stage of labor. Repeated epidural top-ups may result in large volumes of local anesthetic being given which increases the risk of motor blockade.^{6,7}

In the CSE technique, the dura is intentionally punctured to allow administration of intrathecal medication. The epidural space is located with the loss of resistance technique. Thereafter, a small gauge spinal needle is used to puncture the dura in a needle-through-needle technique. Free flow of cerebrospinal fluid (CSF) confirms correct identification of both the spinal and epidural spaces and accurate midline placement. Intrathecal medication is administered before insertion of the epidural catheter. Maintenance analgesia is provided via the catheter. CSE has a much faster onset time and provides a reliable sacral block due to intrathecal medication when compared to EPL.⁸ The rate of unilateral and inadequate blocks is lower and fewer physician top-ups are required. This is possibly due to translocation of epidural medication to the intrathecal space via the dural puncture.³ Although CSE allows for rapid pain relief, the sudden decrease in maternal catecholamines may result in uterine hypertonus and fetal bradycardia.⁹ Other side effects such as maternal hypotension and pruritis may also occur.¹⁰ Due to the intrathecal medication, the epidural catheter cannot be immediately tested to exclude intrathecal, intravascular or malpositioned catheters.

The DPE was first described by Suzuki et al.¹¹ in a cohort of abdominal surgery patients. As with CSE, the epidural space is located with the loss of resistance technique. The dura is then punctured with a small gauge spinal needle, but no intrathecal medication is administered. It is hypothesised that medication administered in the epidural space will move via the dural puncture into the intrathecal space allowing for

faster onset of analgesia, better sacral spread, less unilateral block and lower rate of motor block compared to EPL.⁶ As no intrathecal medication is given the unwanted side effects such as uterine hypertonus, fetal bradycardia, maternal hypotension and pruritis are minimized.^{9,12} As the dura is punctured and CSF visualised, confirmation of midline placement is made and a test dose can be administered to rule out an intrathecal or intravascular catheter if desired.¹³

Thus, the DPE technique proposed to offer the 'best of both worlds' providing most of the benefits of the CSE technique without the unwanted side effects, but a faster and more reliable block when compared to EPL. However, the benefits have not consistently been confirmed in the literature when DPE is compared to EPL or CSE due to heterogenous results.

Three reviews conducted in 2018 and 2019 by Layera et al.¹⁴, Gunaydin et al.¹⁵ and Heesen et al.¹³ were unable to provide clear evidence of benefit when DPE was compared to EPL. However, some helpful conclusions could be drawn. DPE offered a more reliable benefit if a 25 gauge(G) spinal needle was used as opposed to the smaller 26G and 27G needles. This was shown by Cappiello et al.⁶ and Chau et al.¹⁶ with significantly decreased onset times, improved sacral block, decreased unilateral block and decreased top-ups in the DPE groups. A 27G needle for the dural puncture was used in two trials. Firstly, Thomas et al.¹² found no difference in quality of analgesia evidenced by no difference in catheter manipulation rates, sacral root sparing, unilateral block, peak block level, number of top-up doses and LA consumption. A higher incidence of dry taps also occurred. In contrast, Yadav et al.¹⁷ observed some benefits noting lower visual analogue scale (VAS) scores at 5 and 10 minutes ($p < 0.008$), faster onset time and improved analgesia quality ($p < 0.05$). However, there was no difference in the time to first top up request, LA consumption and duration of labor.¹⁷ Wilson et al.⁵ used a 26G needle for dural puncture. They found although time to VAS < 10 was shorter in the DPE group, the percentage of patients with adequate labor analgesia at 10 minutes did not differ between groups.⁵ No differences in complications or post dural puncture headaches (PDPH) were noted in any studies, however due to small sample sizes, complications occurring less frequently may not have been identified.¹⁴ All trials used varying types, concentrations and volumes of LA which made comparison of results challenging.¹⁴

Three additional randomized control trials have been conducted since these reviews, but again heterogenous results were found. Two of the trials have incorporated the use of PIEB delivery systems found to be more effective¹⁸ and possibly better suited for use with DPB. The proposed mechanism is that during the administration of a LA bolus, pressure within the epidural space will increase thus facilitating movement of medication into the intrathecal space.

Song et al.¹⁹ compared 3 groups: DPE combined with PIEB, EPL combined with CEI and EPL combined with PIEB including a total of 116 patients. A 25G needle was used for dural puncture. The primary outcome was time to adequate analgesia. As hypothesized, faster onset of analgesia and lower LA consumption was noted in the DPE + PIEB group. Reliable sacral block was also achieved. The incidence of side effects including pruritis, PDPH and maternal hypotension were comparable in all groups. Despite these findings, no difference in maternal satisfaction was found. Unfortunately, due to the lack of a fourth group (EPL and PIEB) in this study, the effect of the PIEB itself is unclear. The extent to which

the DPE alone contributed to the favourable outcomes cannot be isolated from the possible effect of the PIEB.²⁰

Bakhet²¹ conducted a study comparing EPL, DPE and CSE combined with a loading dose followed by PCEA in 120 parturients. A 25G needle was used for dural puncture. Primary outcome was mean hourly LA consumption. CSE outperformed both DPE and EPL with regards to LA consumption, time to onset of analgesia, numeric pain rating scale (NPRS) and time to achieve T10 block. There were no significant differences between the DPE and EPL for these observations. Occurrence of motor blockade, side effects and maternal satisfaction were comparable

amongst all three groups. Most recently, Tan et al.²² has reported results from a double-blinded randomized controlled trial comparing DPE to EPL in 132 obese parturients. They suggested that the DPE technique may be useful in this patient population as the dural puncture would confirm mid-line placement resulting in a lower failed epidural rate. Dural puncture was made with a 25G spinal needle and after an initial loading dose, PIEB with a PCEA function provided maintenance analgesia. The primary outcome was a composite of: (1) asymmetrical block, (2) epidural top-ups, (3) catheter adjustments, (4) catheter replacement and (5) failed conversion

Abstract SP68 Table 1 Summary of randomized controlled trials reviewed

Study	No. of participants	Study group	Control group	LA regime	Primary outcome	Results
Wilson et al. ⁵	80	DPE with 26G Whitacre needle	EPL with 17G Tuohy needle	Bolus: 12ml 0.125% bupivacaine + 50mcg fentanyl Maintenance: 0.1% bupivacaine with 2mcg/ml fentanyl 10ml/h, PCEA bolus 5ml lockout 10 min with 32ml/hr limit	Percentage of parturients with adequate analgesia (VAS ≤10) 10 minutes after block	No difference DPE vs EPL for primary outcome DPE shorter median time to VAS ≤10 vs EPL
Cappiello et al. ⁶	79	DPE with 25G Whitacre needle	EPL with 17G Weiss needle	Bolus: 12ml 0.25% bupivacaine Maintenance: 0.125% bupivacaine with 0.2mcg/ml fentanyl 6ml/hr, PCEA 6ml lockout 15 min with no hourly limit	Presence of S1 blockade with VAS <10 within 20 min after block	Higher number of patients in DPE group with primary outcome DPE had lower rate of unilateral block
Thomas et al. ¹²	230	DPE with 27G Whitacre needle	EPL with 17G Weiss needle	Bolus: 5ml 2% lidocaine as test dose, if negative a further 3ml 2% lidocaine Maintenance: 0.11% bupivacaine with 2mcg/ml fentanyl 10ml/hr, PCEA 5ml lock out 10 min with 30ml/hr limit	Instances of catheter manipulation	No differences in catheter manipulation between groups
Chau et al. ¹⁶	120	DPE with 25G Whitacre needle	EPL with 17G Weiss needle	Bolus: 20ml 0.125% bupivacaine with 2mcg/ml fentanyl Maintenance: 0.125% bupivacaine with 2.5mcg/ml fentanyl 6ml/hr, PCEA 6ml 15 min lockout with 20ml/hr limit	Time to NPRS ≤1	No difference in time to primary outcome DPE: higher incidence of bilateral S2 blockade at 10, 20 and 30 min; lower incidence of asymmetric block at 30 min, fewer physician top-up boluses
Yadav et al. ¹⁷	60	DPE with 27G Whitacre needle	EPL with 17G Weiss needle	Bolus: 10ml 0.2% ropivacaine with 2mcg/ml fentanyl Maintenance: 0.2% ropivacaine with 2mcg/ml fentanyl 10ml/hr, repeated in case of inadequate block	No primary outcome stated	Faster onset and better quality analgesia in DPE group
Song et al. ¹⁹	116	DPE with 25G Whitacre needle Group 1: DPE + PIEB Group 2: DPE + CEI	EPL with 17G Tuohy needle Group 3: EPL + CEI	Test dose: 3ml 1.5% lidocaine with epinephrine 15mcg Bolus: 0.1% ropivacaine with 0.3mcg/ml fentanyl Maintenance: 0.1% ropivacaine with 0.3mcg/ml fentanyl CEI groups: 8ml/hr PIEB group: 8ml/hr starting 1 hr after bolus. Both groups PCEA 5ml with 20 min lockout	Time to adequate analgesia VAS ≤30 during 2 consecutive contractions	Time to primary outcome significantly faster in DPE +PIEB group. DPE groups had S2 sensory block more frequently at 30 mins Fewer PCEA and physician top ups and lowest LA consumption in DPE + PIEB group

Bakhet ²¹	120	DPE with 25G Whitacre needle	EPL with 18G Tuohy needle CSE with 18G Tuohy needle and 25G Whitacre needle	Bolus: 10ml 0.1% bupivacaine with 2mcg/ml fentanyl Maintenance: 0.1% bupivacaine with 2mcg/ml fentanyl 8ml/hr, PCEA 5ml with 15 min lockout CSE received 2.5mg bupivacaine intrathecally	Hourly mean consumption of epidural bupivacaine and fentanyl combination	Primary outcome and time to complete analgesia (NPRS<1) significantly lower in CSE group, no difference between DPE and EPL groups
Tan et al. ²²	132	DPE with 25G Whitacre needle	EPL with 17G Tuohy needle	Bolus: 15ml 0.1% ropivacaine with 2mcg/ml fentanyl Maintenance: PIEB 6ml per 45 min initiated 30 min after bolus, PCEA 8ml lockout 10 min with 45ml/hr limit	Composite primary outcome: 1) asymmetrical block, 2) epidural top-ups, 3) catheter adjustments, 4) catheter replacement, 5) failed conversion to regional anesthesia	No difference between groups for primary outcome

to regional anesthesia for cesarean section. No significant difference was found for the primary composite outcome between the two groups. However, the authors acknowledge that the confidence intervals were wide and contained potentially clinically relevant differences. There were also no differences in the secondary outcomes including motor block, LA consumption, top-ups, side effects and maternal satisfaction.

One possible explanation for continued conflicting results may be that the mechanisms determining flux through the meninges rely on multiple factors. The size of the dural hole is an important determinant as shown by Bernards et al.²³, where more morphine and lidocaine crossed the dural orifice when the dura was pierced with an 18G versus 24G needle. This would explain why less favourable results were seen in some studies with 26G and 27G spinal needles.^{5 12} Other important factors include: total epidural drug mass and inherent rate of drug transfer through intact meninges.^{14 23 24 25} A greater effect is seen with medications with an inherently slow diffusion rate. Studies using lower volumes and concentrations of LA also had less favourable outcomes.^{12 22} Higher injectate pressures generated by PIEB may promote drug transfer across the dural puncture as suggested by the results by Song et al.¹⁹ However this was not seen when PIEB was used by Tan et al.²² in the obese parturient.

Thus, despite further randomized trials also incorporating new pump delivery systems, the suggested theoretical benefits of DPE have not consistently been documented. It is unclear why contrasting results have been found. In addition to this, in an editorial by Segal and Pan⁴, some concerns have been raised regarding the methodology of a number the trials showing favourable results. At this time, although benefits have been identified, they have not shown to be significant or consistent. However, studies have been limited by small sample sizes and use of varying needle sizes and LA regimes. It is suggested that a larger, multi-centre, double blinded and randomized study should be conducted. This should employ the use of a 25G needles, modern pump delivery systems and commonly used LA regimes. A larger sample size would also allow identification of side effects that do not occur commonly such as PDPH.

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SP69

ACUTE PAIN MANAGEMENT: NEW GUIDELINES ARE NEEDED

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10.1136/rapm-2022-ESRA.75

Acute pain represents an incredible and difficult challenge in medicine. Most of the physicians are especially concentrated on postoperative pain, forgetting hundreds of other causes responsible for acute pain conditions, both of surgical and medical clinical interest. For an organic and adequate evidence-based management, several guidelines have been published.

Exploring PubMed for ‘acute pain guidelines’, it is possible to find over 2,000 papers just for the last 10 years. The history of guidelines in acute pain starts much before than the last 10 years. It goes back especially to the ‘90s, with all the interest related to multimodal analgesia and organization of acute pain services. As said before, the huge majority was related to the postoperative pain management. In particular, there were 2 great groups, in Copenhagen (Denmark) and in Orebro (Sweden) that generated an increasing interest on the topic. The first group at the beginning of the ‘90s started to highlight the concepts on the importance to treat postoperative pain and the potentialities to obtain a good analgesia with the simultaneous use of different analgesics (‘balanced’ or ‘multimodal’ analgesia). The other one, in the same period of time, was more addressed to demonstrate how important (crucial) was the organization based on nurses, to obtain a rewarding management of postoperative pain.

After that, hundreds of evidence-based guidelines and recommendations have been published. We will analyze the most relevant. Also, we will focus the attention on the real influence of all those publications and guidelines on the on-bed assistance, and on the change of epidemiological data related to acute pain. At the end, we will propose some new vision that should be implemented, thank to technological developments, if we really want to have an impact on the incidence of acute pain and pain chronification.

SP70

ANESTHESIA FOR ELITE ATHLETES

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10.1136/rapm-2022-ESRA.76

Anesthesiologists are increasingly confronted with athletes in a perioperative setting. The right choice of type of anesthesia technique, pain management of injuries, specific physiologic adaptations of the athlete and knowledge of prohibited substances are eminent for a correct approach of this subpopulation.

An anesthesiologist should recognize the most common benign ECG findings in athletes like bradycardia, isolated left ventricle hypertrophy on voltage criteria and early repolarization as normal features in the athlete’s heart. Isotonic physiology typically produces four chamber dilation. In contrast, isometric stress creates high intravascular pressure leading to left ventricular hypertrophy. Preoperative evaluation should also identify possible consumers of performance-enhancing drugs. Intraoperative points of interest for the anesthesiologist are mainly avoiding drugs on the prohibited list of the world anti-doping agency (WADA). Post-operative and chronic pain management are still developing fields in this population. The International Olympic Committee (IOC) proposed treating acute pain with a combination of paracetamol, NSAIDs, topical analgesics, injectable NSAIDs and local anesthetics. It may be suggested that chronic pain management in elite athletes could benefit from treatment in specialized multidisciplinary pain clinics.

Although elite athletes are amongst the fittest people on earth, unique characteristics of this population requires careful preoperative evaluation and perioperative management. Chronic pain management in athletes is a developing field with a need for further expert.

Best free paper session I – RA

B1

NOVEL SELECTIVE BLOCK OF THE POSTERIOR BRANCH FROM THE MEDIAL FEMORAL CUTANEOUS NERVE FOR DIAGNOSIS AND TREATMENT OF CHRONIC NEUROPATHIC PAIN – A CASE REPORT

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10.1136/rapm-2022-ESRA.77

Background and Aims The medial femoral cutaneous nerve (MFCN) is known to innervate the anteromedial knee area.^{1,2} A selective block of the anterior branch from the MFCN (MFCN-A) but not the posterior branch (MFCN-P) has been described.^{3,4} We present an ultrasound-guided technique for blockade of the MFCN-P. Post-hoc analysis of data from a randomized, controlled trial showed that the MFCN-A or MFCN-P may innervate the distal part of the medial lower leg and even the medial malleolus (MM) which has never previously been described.⁴ We present a case of cutaneous neuropathy in the “classical saphenous nerve territory” on the medial side of the lower leg and MM, where a selective MFCN-P block was used for diagnosis and treatment of the neuropathic pain.⁵