information and should be the top pick of any regional specialist reading list.

Specific The most important general POCUS skill for anesthesiologists will arguably be the evaluation of gastric content and volume. Our top picks here would be 'Validation of a mathematical model for ultrasound assessment of gastric volume by gastroscopic examination' which is a brilliant Randomized Controlled Trial (RCT) refining the idea of calculating gastric fluid volume by Perlas et al. We consider it an invaluable article providing easy to use formulas with practical implications for clinical decision making. The systematic review by Van de Putte et al. published in the British Journal of Anaesthesia: 'Ultrasound assessment of gastric content and volume' is a must read for everybody who wants to excel at this key POCUS skill.[3,4] It presents a full understanding of the different formulas to calculate volume, while supplying all available evidence in a clear way.

POCUS of the airway is a fascinating aspect of the possibilities US offers us. Being able to quickly assess an esophageal intubation with the double track sign might be more helpful for the novice in airway management. However, the possibility to reliably identify the cricothyroid membrane even in morbid obese patients is immensely helpful for anesthesiologists. Kristensen et al. have published quite a few interesting papers regarding this topic.[5,6]

Although lung US scanning might not be the most practiced skill for regional focused anesthesiologists, the ability to quickly assess (with high accuracy) a pneumothorax is invaluable, especially when performing infra and supraclavicular blocks. No Lung POCUS overview would be complete without mentioning the plethora of papers published by Daniel A Lichtenstein. His most influential papers revolved around the implementation of the so-called 'BLUE protocol' and respiratory failure.[7] However it is 'A Bedside Ultrasound Sign Ruling Out Pneumothorax in the Critically III', as one of the first papers detailing lung sliding and analyzing the specificity and sensitivity of the US that really captures our heart.[8] Incredibly this RCT was already published back in 1995 and has more than 500 citations.

Finally, a recent study with a catchy title: 'Not so FAST - Chest ultrasound underdiagnoses traumatic pneumothorax' would be our only pick in the less well studies category.[9] It clearly shows the dangers of retrospective, monocenter studies presenting vastly conflicting results. Diagnostic accuracy studies should follow STARD guidelines, while in this publication only patients with confirmed pneumothorax were included in the study, instead of all patients with suspected pneumothorax. [10] Furthermore, the study was performed by radiologists, not familiar with the specifics of trauma pneumothorax identification. They also incorporated it in the Focused assessment with sonography (FAST) exam, using a phased array or curvilinear probe which is not suitable for proper pneumothorax detection.

Although there are still many topics in POCUS left, like FAST, eFAST, volume status ascertainment, or even venous access to name but a few, it is well beyond the framework of our small overview to elaborate further.

Conclusion POCUS is here to stay and has become the gold standard as a diagnostic tool in only a few years. Ultrasounds have become ubiquitous, making its routine use feasible. The dazzling number of possible applications can be daunting for the novice, however online training resources are readily available for everyone. Lack of teaching and training in standard curriculum remains a serious stumbling block.

REFERENCES

1. Haskins SC, Bronshteyn Y, Perlas A, El-Boghdadly K, Zimmerman J, Silva M et al. American Society of Regional Anesthesia and Pain Medicine expert panel recommendations on point-of-care ultrasound education and training for regional anesthesiologists and pain physicians—part I: clinical indications. Regional Anesthesia & Pain Medicine 2021; 46: 1031–1047.
2. Haskins SC, Bronshteyn Y, Perlas A, *et al.* American Society of Regional Anesthesia and Pain Medicine expert panel recommendations on point-of-care ultrasound education and training for regional anesthesiologists and pain physicians—part II: recommendations. *Regional Anesthesia & Pain Medicine* 2021; **46**: 1048–1060.
3. Van de Putte P, Perlas A. Ultrasound assessment of gastric content and volume. *British Journal of Anaesthesia* 2014; **113**: 12–22.
4. Perlas A, Mitsakakis N, Liu L, *et al.* Validation of a mathematical model for ultrasound assessment of gastric volume by gastroscopic examination. *Anesthesia & Analgesia* 2013; **116**: 357–363.
5. Kristensen MS, Teoh WHL, Baker PA. Percutaneous emergency airway access; prevention, preparation, technique and training. *British Journal of Anaesthesia* 2015; **114**: 357–361.
6. Kristensen MS, Teoh WH, Rudolph SS, *et al.* Structured approach to ultrasound-guided identification of the cricothyroid membrane: a randomized comparison with the palpation method in the morbidly obese. *British Journal of Anaesthesia* 2015; **114**: 1003–1004.
7. Lichtenstein DA, Mezière GA. Relevance of lung ultrasound in the diagnosis of acute respiratory failure*: the BLUE protocol. *Chest* 2008; **134**: 117–125.
8. Lichtenstein DA, Menu Y. A Bedside ultrasound sign ruling out pneumothorax in the critically III. *Chest* 1995; **108**: 1345–1348.
9. Santorelli JE, Chau H, Godat L, *et al*. Not so FAST—Chest ultrasound underdiagnoses traumatic pneumothorax. *Journal of Trauma and Acute Care Surgery* 2022; **92**: 44–48.
10. Bossuyt PM, Reitsma JB, Bruns DE, *et al.* STARD 2015: an updated list of essential items for reporting diagnostic accuracy studies. *BMJ* 2015; h5527.

SP19 RELEVANCE OF CUTANEOUS NERVE BLOCKS

TD Nielsen. *Aarhus University Hospital, Department of Anaesthesiology, Denmark*

10.1136/rapm-2022-ESRA.20

In the case of regional anaesthesia for surgery in the awake patient, it is evident that every sensory nerve in the surgical field, including cutaneous nerves, must be anesthetised to obtain a satisfactory procedure. However, for postoperative analgesia, after general anaesthesia, selective nerve blocks of cutaneous nerves are less commonly performed or added to conventional nerve blocks in order to provide a more complete analgesia when needed. The lack of exhaustive knowledge of the neural anatomy, that still exists for certain areas of the human body, can be one explanation. The inability, logistically, to perform more nerve blocks or more complex nerve blocks could be another. Nevertheless, the notion that pain from cutaneous nerves is neglectable, and that wound infiltration by the surgeon would satisfactorily provide equal analgesia is not uncommon.

Scientific studies, comparing wound infiltration by the surgeon to any selective cutaneous nerve block, are absent. There are multiple studies comparing standard nerve blocks of mixed nerves to wound infiltration finding superior analgesia after nerve blocks.[1–4] However, the relative importance of the cutaneous nerves cannot be extracted from these studies. Experiencing, not infrequently, the analgesic effect of providing cutaneous rescue blocks for failed surgical infiltration may also prove nothing more than improper infiltration technique. Nonetheless, if adequate anaesthesia of every cutaneous nerve ending in the surgical field by infiltration is regularly a challenging task, then this clinical reality should be the relevant comparator. Despite the lack of direct comparison between cutaneous nerve blocks and wound infiltration, the comparably much longer effect of nerve blocks compared to infiltration[3] could alone favour the former in many cases.

Pain from cutaneous nerves can be intense. This is more commonly experienced when the saphenous nerve is left unanaesthetised for ankle and foot surgery in spite of a functioning sciatic nerve block that innervates the vast tissue of the foot.[5] It is experienced likewise when the sural nerve is left unanaesthetised for lateral ankle surgery or just the removal of a fibular plate. Performing rescue blocks for breast lumpectomies, mastectomies and axillary lymph node dissections with nerve blocks of the lateral or anterior cutaneous branches of the intercostal nerves, despite wound infiltration by the surgeon, provides this experience also. Regional anaesthesia of the cutaneous nerves of the superficial cervical plexus for medial clavicular fracture repair, or for shoulder surgery where the incision includes the skin more medial than covered by the interscalene nerve block, will also show the intensity of pain from cutaneous nerves. Additional anaesthesia of the intercostobrachial nerve after elbow surgery, the superior cluneal nerves, the subcostal nerve or the iliohypogastric nerve after hip surgery,[6] and the medial femoral cutaneous nerve or saphenous nerve for anteromedial knee surgery or anterior tibial surgery respectively,[7] are all instances where the analgesic effect of cutaneous nerve blocks can be the defining cause of having comfortable patients postoperatively, with less hours spent in the postoperative care unit.

One possible explanation for the effect of cutaneous nerve blocks is that, what have been labelled cutaneous nerves, contrary to the immediate intuition, may innervate the periosteum where no muscles cover the skeleton e.g., the saphenous nerve for the anterior tibia and the superficial cervical plexus for the clavicle.[8] Additionally some cutaneous nerves may innervate joint capsules, e.g. the saphenous nerve at the medial ankle[9] and the medial femoral cutaneous nerve at the medial knee.[10] However, as mentioned above, even in cases where no deeper tissue is innervated, as with the lateral cutaneous branches of the intercostal nerves in breast surgery, the intensity of postoperative pain solely originating from cutaneous nerves can be easily observed. It is particularly recognizable when pain is resolved completely after the performance of a cutaneous rescue block postoperatively.

While cutaneous nerves have a part in mediating acute postoperative pain, they are the most frequent cause of postsurgical chronic neuropathic pain. The inescapable neurectomies of the surgical incisions, or the unintentional trauma by the surgical tools, consistently produce a procedure-dependent ratio of patients with chronic neuropathic symptoms such as disabling allodynia and hyperalgesia in the involved cutaneous areas[11] Historically, regional anaesthesia of the involved cutaneous nerves had only little relevance in the treatment of these chronic conditions. However, the increasing accessibility to non-neurodestructive technologies, such as percutaneous cryoneurolysis, in conjunction with improving point-of-care ultrasound equipment and the continuously ongoing scientific work into the anatomy of cutaneous nerves, changes this. Ultra-selective diagnostic nerve blocks of cutaneous nerve branches play an indispensable role in the treatment of these patients. Even in the absence of the ability to offer an interventional treatment, the diagnosis of cutaneous nerves as the cause of chronic pain has a significant potential to avoid improper secondary or tertiary surgical procedures when the pain is erroneously believed to have a different origin and a surgical solution.

The importance of cutaneous nerves in chronic postsurgical neuropathic pain should be of little dispute. Knowledge of the anatomy and ultrasonographic appearance of cutaneous nerves is essential to interventional treatments and help patients avoid unnecessary surgery. However, whether or not cutaneous nerve blocks should be of relevance to the regional anaesthetist in regard to acute postoperative pain, depends on the objective of the postoperative pain treatment. If future improvements towards opioid-free, painless, fast track procedures are an ambition, then cutaneous nerves and knowledge of cutaneous nerve blocks seem like an unavoidably part that equation.

REFERENCES

1. Wang Q, Zhang G, Wei S, et al. Comparison of the effects of ultrasound-guided erector spinae plane block and wound infiltration on perioperative opioid consumption and postoperative pain in thoracotomy. *J Coll Physicians Surg Pak*. 2019;29:1138–43.
2. Jeske HC, Kralinger F, Wambacher M, et al. A randomized study of the effectiveness of suprascapular nerve block in patient satisfaction and outcome after arthroscopic subacromial decompression. *Arthroscopy*. 2011;27:1323–8.
3. Hadzic A, Williams BA, Karaca PE, et al. For outpatient rotator cuff surgery, nerve block anesthesia provides superior same-day recovery over general anesthesia. *Anesthesiology*. 2005;102:1001–7.
4. Terkawi AS, Mavridis D, Sessler DI, et al. Pain management modalities after total knee arthroplasty: A network meta-analysis of 170 randomized controlled trials. *Anesthesiology*. 2017;126:923–37.
5. Bjorn S, Wong WY, Baas J, et al. The importance of the saphenous nerve block for analgesia following major ankle surgery: A randomized, controlled, double-blind study. *Reg Anesth Pain Med*. 2018;43:474–9.
6. Nielsen TD, Moriggl B, Barckman J, et al. Randomized trial of ultrasound-guided superior cluneal nerve block. *Reg Anesth Pain Med*. 2019.
7. Bjorn S, Nielsen TD, Moriggl B, Hoermann R, Bendtsen TF. Anesthesia of the anterior femoral cutaneous nerves for total knee arthroplasty incision: Randomized volunteer trial. *Reg Anesth Pain Med*. 2019.
8. Moriggl B. Clavicle innervation and implications for regional anaesthesia. *Regional Anesthesia & Pain Medicine*. 2019.
9. Chen J, Lesser J, Hadzic A, Resta-Flarer F. The importance of the proximal saphenous nerve block for foot and ankle surgery. *Reg Anesth Pain Med*. 2013;38:372.
10. Horner G, Dellon AL. Innervation of the human knee joint and implications for surgery. *Clin Orthop Relat Res*. 1994:221–6.
11. Management of neuropathic pain induced by surgery: Review of the literature by a group of experts specialized in pain management, anesthesia and surgery.

SP20 HUMAN SPINAL ARACHNOID SLEEVES AND ITS POSSIBLE RELATION WITH TRANSIENT NEUROLOGICAL SYNDROME AFTER SPINAL ANAESTHESIA

[1]I Riquelme, [2,3,4]MA Reina*, [3,5]AP Boezaart, [6,7,8,9,10]RS Tubbs, [11]A Carrera, [11]F Reina.

[1]Pain Clinic, Hospital Universitario Sanitas La Moraleja, Madrid, Spain; [2]CEU-San-Pablo University School of Medicine, and Department of Anesthesiology, Madrid-Montepríncipe University Hospital, Madrid, Spain; [3]Division of Acute and Perioperative Pain Medicine, Department of Anesthesiology, University of Florida College of Medicine, Gainesville, Florida, USA; [4]Facultad de CC de la Salud Universidad Francisco de Vitoria, Madrid, Spain; [5]Lumina Health Pain Medicine Collaborative, Surrey, UK; [6]Department of Neurosurgery, Tulane Center for Clinical Neurosciences, Tulane University School of Medicine, New Orleans, LA; [7]Department of Anatomical Sciences, St. George's University, St. George's, Grenada, West Indies; [8]Department of Structural and Cellular Biology, Tulane University School of Medicine, New Orleans, LA, USA; [9]Department of Neurosurgery and Ochsner Neuroscience Institute, Ochsner Health System, New Orleans, LA; [10]Department of Neurology, Tulane University School of Medicine, New Orleans, LA; [11]Neuroscience, Embryology, Molecular Oncology and Clinical Anatomy Group (NEOMA), School of Medicine, University of Girona, Girona, Spain

10.1136/rapm-2022-ESRA.21

Cauda equina syndrome (CES) is a well-recognized and potentially serious, though rare, neurological complication of spinal anesthesia. It presumably results from injury to the sacral roots in the spinal canal, which can also cause bilateral radiculopathy and progressive neurological deficits in the legs.