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## The subcostal nerve as the target for nerve stimulator-guided transversus abdominis plane blocks - Commentary

With the universal acceptance of enhanced recovery programmes following surgery, perioperative analgesia has seen many improvements.<sup>[1]</sup> There is a need for focus on the combined effect of regional anaesthetic techniques, minimally invasive surgery and suitable pharmacological modification of the inflammatory responses in the postoperative period.<sup>[1]</sup>

There has been growing evidence supporting the effectiveness of transversus abdominis plane (TAP) blocks for a variety of abdominal surgeries.<sup>[2,3]</sup> Single-shot TAP block plays a valuable role in multimodal post-operative pain management.<sup>[2]</sup> The techniques described for performing the TAP block include landmark technique and ultrasound-guided TAP blocks. The blunt landmark-guided technique is based on loss of tissue resistance as the needle is advanced through muscle and fascia.<sup>[2]</sup> Single- and double-pop techniques have been described for the TAP block.<sup>[4,5]</sup> These landmark-guided techniques are no longer recommended in view of ambiguity of the pops encountered and the risk of peritoneal perforation during the blind procedure.<sup>[2]</sup>

The success rate and safety of TAP blocks have improved following incorporation of ultrasound-guided techniques and is considered a basic skill level block.<sup>[6]</sup> Different approaches for ultrasound-guided TAP block have been described as subcostal, lateral and posterior on the basis of the involved spinal nerves.<sup>[2]</sup> A lateral or midaxillary TAP block is performed at or anterior to the midaxillary line between the costal margin and iliac crest. This approach provides lower abdominal wall analgesia.<sup>[2]</sup> In a posterior TAP block, which is performed at the lumbar triangle of Petit, local anaesthetic is deposited superficial to the transversus abdominis aponeurosis. This approach offers prolonged analgesia of segmental

nerves and also covers the lateral cutaneous nerves.<sup>[2]</sup> In the subcostal approach, the local anaesthetic is deposited between the posterior rectus sheath and the transversus abdominis muscle.<sup>[6]</sup> The subcostal approach provides analgesia for the upper abdomen. The hydrodissection technique used in the oblique subcostal technique covers both the upper and lower abdomen.<sup>[2]</sup>

Intraoperative ultrasound may not be easily available to anaesthesiologists in the developing and developed world.<sup>[7,8]</sup> Hence, it is essential to explore the effectiveness of safe alternative methods for regional analgesia techniques. Direct visualisation<sup>[9]</sup> and bimanual palpation<sup>[7]</sup> include alternative techniques that have been described for regional catheter placement.

Before the advent of ultrasound, peripheral nerve stimulator (PNS) had been the 'gold standard' for performing peripheral nerve blocks and was shown to be a highly effective technique for determining adequate needle placement.<sup>[10]</sup> Although PNS-guided ilioinguinal and iliohypogastric block is commonly practiced,<sup>[8]</sup> there exist limited literature describing the use of PNS for TAP blocks.

Vadhanan *et al.* have described in their study subcostal nerve stimulation-guided TAP block.<sup>[11]</sup> The relationship between the subcostal nerve and TAP was established by cadaveric dissections. Following sono-identification of the subcostal nerve in volunteers, the authors have conducted a feasibility study of subcostal nerve stimulation-guided TAP block in patients. After an initial scout scan, an anaesthesiologist blinded to scan findings attempted to locate the subcostal nerve at the midpoint between the costal margin and iliac crest in the midaxillary

line. The end motor response was twitches of the anterior abdominal wall which persisted with current intensity at 0.4 mA. Confirmation of needle placement in the right plane (TAP) was done by ultrasound. Any need for needle manipulation to reach the target site was noted. In 14% of the cases, the plane at which the twitches were elicited did not correlate with the TAP plane, and the overall success rate of the technique as reported in the study is 75%.

The study is not without limitations. The technique described may not be applicable for the different approaches of the TAP block. The needle insertion point suggests that the effect of the block will be similar to a lateral or a posterior TAP block. Hence, this PNS-guided technique cannot be used if analgesia is desired for the upper abdomen. Also, the end point in the study was the local anaesthetic spread in the TAP plane, which was confirmed using ultrasound. Documentation of the analgesic band using ice test or pin-prick method would have helped in confirming the extent of intercostal nerve blockade following the PNS-guided TAP block.<sup>[12]</sup> Presence or absence of analgesia of the lateral cutaneous branches by the proposed technique, unfortunately, remains unanswered and needs future studies.

The study by Vadhanan *et al.* includes 32 attempts at PNS-guided TAP block. It is a relatively small sample size and may not depict the actual success and failure rates of this new approach. Nevertheless, the success rate of 75% reported in the study is impressive and demands the reader's attention.

The study is an excellent example of attempting to find solutions to challenges based on available resources. This effort needs special mention as the investigators hail from a subcontinent where the anaesthesiologists' hands are deeply tied in demanding work schedules<sup>[13]</sup> with limited dedicated time for research. I sincerely hope that this article encourages more anaesthesiologists to explore beyond their usual place of practice – 'the operating room' – and revisit anatomy in the dissection halls to explore and expand our understanding of the human body.

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