

## Tips and Tricks of Performing Surgically Inserted TAP Catheters for Hepatectomy

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We read with interest the recent report by Dr. Thornblade et al. implementing the surgically inserted transversus abdominis plane (TAP) block in an enhanced recovery after surgery (ERAS) protocol for open hepatectomy.<sup>1</sup> We commend the authors for demonstrating both analgesia and cost-benefit advantages, by infusing local anesthetics or liposomal bupivacaine via TAP catheters. Although traditionally TAP catheter insertion is performed under ultrasound guidance (USG), there is strong interest in surgeon-initiated TAP blocks (SITB) due to the proposed advantages of improved accuracy in placing the nerve block catheter and reduction in complications, time, expertise, and need for anesthetic equipment.<sup>2</sup> One of the reasons for the resistance in adoption of the SITB is the lack of analgesic efficacy noted in some studies.<sup>2,3</sup> Possibly, technical aspects of catheter insertion might affect the analgesic efficacy. Hence, given the results of the study by Thornblade et al., readers may benefit from a detailed description of the technique and we describe the technique employed at our institution since 2008 for hepatobiliary surgeries requiring subcostal incisions.

To describe and record the TAP insertion technique, written consent was obtained from the patient. After identifying the transversus abdominis, internal oblique, and external oblique muscles of the abdominal wall, the transversus abdominis muscle is sutured closed. The internal oblique muscle is then partially closed to create a muscle pouch above the transversus

abdominis which restores the transversus abdominis plane. A 17-gauge Tuohy needle is inserted percutaneously, with the needle tip emerging within the pouch (Fig. 1). A multi-orifice nerve block catheter (Contiplex, B-Braun, Melsungen and Germany) is inserted through the tip of the Tuohy needle and the needle is removed. Using a Debakey forceps, the catheter is now directed such that the tip lies at the most postero-lateral aspect of the incision and is not occluded when the muscle layers are sutured (Fig. 2, see [supplemental video](#)). The catheter is thus positioned so that the tip lies within a pouch of the proximal part of the TAP plane. The internal oblique muscle, external oblique muscle, and skin are sutured closed with sterile dressing used to secure the catheter. At the end of the case, 20 mL 0.25% bupivacaine is provided through the catheter. In recovery, an electronic pump is programmed through which the TAP catheter may deliver 15 mL 0.2% ropivacaine every 4 h for 48 h post-operatively.

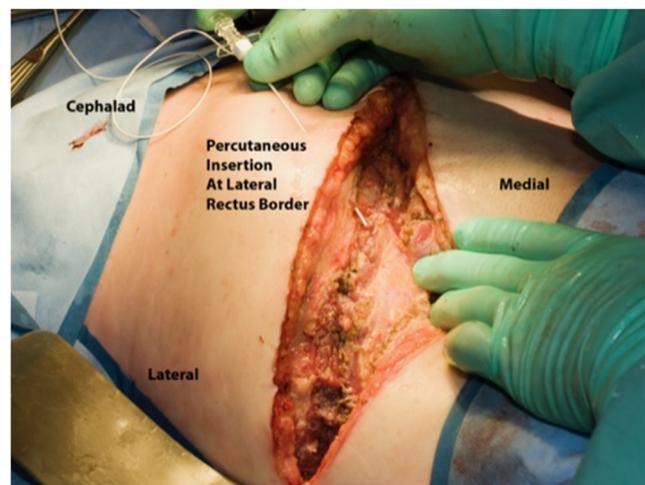
An important consideration to successfully inserting a TAP catheter for subcostal incisions is to close the abdominal muscle layers anatomically and not by mass-closure, as is standard

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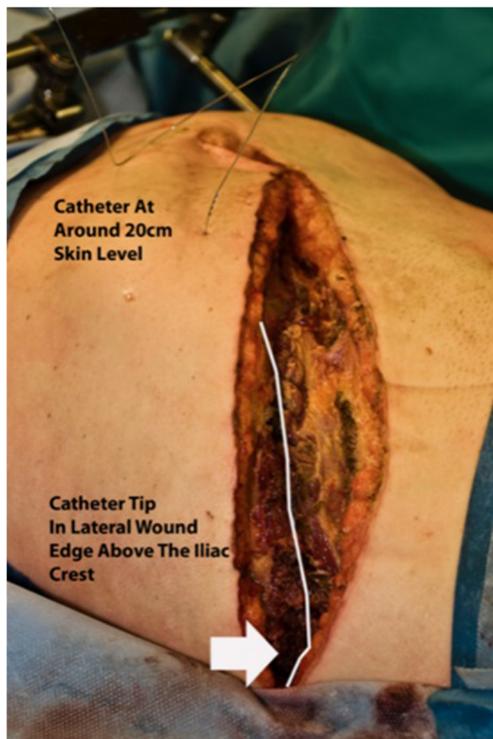
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**Fig. 1** Insertion of the 17-gauge Tuohy needle into the partially closed internal oblique muscle



**Fig. 2** Placement of the TAP catheter tip at the most postero-lateral aspect of the incision (arrow) to increase undisturbed spread of local anesthetic following wound closure

surgical practice in many institutions. It is also important to direct the tip of the catheter in the most postero-lateral part of the TAP plane, so that the surgical incision does not influence the spread of local anesthetic. The technique of TAP catheter insertion for subcostal incisions is somewhat similar to the technique described for flank incisions but differ in the fact that while the TAP catheter in subcostal incisions intend to deliver the local anesthetic into the TAP neurovascular plane, the catheter utilized for flank incisions mainly delivers the local anesthetic mainly in the wound itself. This is because the abdominal innervation (T7-T11) enters the TAP plane between the interdigitations of transversus abdominis muscle and diaphragm at the costal margin.<sup>4</sup> While a subcostal abdominal incision is ventral to the entry of the thoraco-abdominal nerve into the TAP plane, a flank incision, which is commonly used for open renal surgeries, usually overlies the point of entry for the thoraco-abdominal nerves and



**Fig. 3** Abdominal muscle and skin closure displaying final positioning of TAP catheter

requires a slightly different approach as described by us (manuscript under publication) (Fig. 3).

Some patients in the article by Thornblade et al. received liposomal bupivacaine. Liposomal bupivacaine may circumvent the need for block catheters; however, it is unavailable in several countries including Canada and most of Europe. The SITB technique as described above requires minimal time, skills, and equipment and allows for safe and accurate positioning of the nerve block catheter. By providing the description above, we hope that other institutions can consider our technique for the benefit of patients receiving subcostal incisions.

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