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The novel “Anterior-Passage” Sub-longissimus-thoracis plane (SLoP) block for lumbar spine surgery: a technical report.

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The novel “Anterior-Passage” Sub-longissimus-thoracis plane (SLoP) block for lumbar spine surgery: a technical report

- Letter to the Editor -

In this case series it is proposed the novel “Anterior Passage” Sub-longissimus-thoracis plane block (SLoP) block - whose goal is to target the sub-longissimus-thoracis plane from an anterior-lateral entry point - for lumbar spine surgery.

Herein, there are described three patient who had been submitted to a L5-S1, L5-S1 and L4-L5-S1 transforaminal lumbar interbody fusion surgery, respectively, under uneventful general anesthesia. The patients, aged 71, 75, 56 years old, respectively, had controlled hypertension without other significant past medical history. Despite the administration of significant intravenous (IV) analgesia (tramadol 150mg, paracetamol 1000 mg, ketorolac 30 mg, tramadol 150 mg and morphine 4 mg were given 30 minutes the end of the surgery) patients still had significant pain complaints, 30 minutes after the surgery (numeric pain rating scale (NPRS) of 8/10, 9/10 and 7/10 respectively).

The patients gave written consent for the publication of their case reports.

Fifteen ml of ropivacaine 0.375% (Kabi - Fresenius®, Santiago de Besteiros, Portugal) per side were injected by a 12 cms - 21G needle (Echoplex®, Vygon®, Ecouen, France) and a curved probe (Acuson P300®, Siemens®, Melsungen, Germany) was used in all patients. No complications were observed and the neurologic evaluation was not affected. The patients reported rapid pain relief (to 1/10 and 7/10 to 0/10 in the NPRS, respectively). It was also prescribed tramadol 100mg IV every 8h, paracetamol 1000mg IV every 8 hours, and ketorolac IV every 8h. The NPRS started increasing at 18, 16, 24 hours post-operatively, up to a maximum of 2/10, 3/10, 3/10, respectively, during
hospital stay but did not need further rescue analgesia. The first two patients received the type 1 block and the third patient received the type 2 block SLoP block.

Technique description (SLoP block):

Type 1 SLoP block (figure 1-A):

The curved probe (Acuson P300, Melsungen, Germany) is placed in the mid-axillary line transversally at the mid-point between the lower coastal margin and the iliac crest, to identify the transverse process (TP) of L3, using the identical roadmap for QLB type 5 (Fig. 1-D), and LALaT blocks. (Fig.1-C) [1]

In an anterior-to-posterior direction, the needle is advanced in-plane, through the latissimus dorsi muscle, puncturing the skin 3-3 cm posteriorly to the anterior axillary line at L3 level, towards the plane between the psoas major muscle (PMM) and quadratus lumborum muscle (injection site of the QLB type 5) (Fig. 1-D), [2] then it is advanced further through the PMM to reach the TP/intertransverse ligament (ITL) (injection site of the LALaT block) (Fig. 1) [1]; at this point, crossing the ITL, the sub-longissimus-thoracis plane (SLoP) is reached (if bony contact with lateral TP is noted the needle should be moved caudally or cranially, and afterwards advanced to the SLoP). During injection the LA is observing dissecting the SLoP.

Type 2 SLoP block (figure 1-B):

Alternatively to the SLoP 1 block technique the needle can pass laterally to the tip of the TP, targeting again, the SLoP. The LA lifts the longissimus-thoracis muscle and spreads posteriorly to the TP in the SLoP. (Fig 1-B).

In an effort to contribute for the understanding of the techniques performed in supine position through an anterior approach, the triad formed by 1) the Quadratus Lumborum block (QLB) type 5
[1]; 2) the Lumbar Anterior Lateral Transverse-process (LALaT) block [2] 3) the “anterior passage” SLoP block – that should be used for lumbar spine surgery might be named "Anterior-Passage Lumbar" Blocks (Fig 1-A,B): they target injection sites planes located in the close vicinity of each other, but lead to completely different dispersion patterns.

The “anterior passage” QLB type 5, share the same injection site with the transmuscular QLB (T-QLB) [1], but the latter demands a posterior entry point; the LALaT block has the advantage to avoid unnecessary abdominal analgesia, targeting indirectly the lumbar plexus in the psoas compartment / paravertebral region (possible vertebral analgesia may occur due to LA migration posteriorly toward the erector spinae plane (ESP)).

The “Anterior Passage” SLoP block, acting directly through the sub-ESP, should provide at least spinal analgesia comparable to other lumbar ESP techniques, and potentially would minimize the blockade of the anterior branches of the lumbar plexus.[1]

The ESP block will act mostly in the posterior rami of the spinal nerves (that innervate the posterior components of the vertebrae, nevertheless the post-operative neurologic check may be affected due to some thoracic “ventral” spread. [2-4] In a study, using magnetic resonance imaging, 30 ml of local anesthetic (LA) injected in the ESP at Th 10 level spread towards the ventral rami of spinal nerves, including epidurally in some patients, which could interfere with the post-operative neurologic check, carry risk of fall and sympathetic block. At the lumbar level the “ventral spread” of the ESP block should not be as common, due to the absence of the costotransverse foramina and to the lack of continuity of the paravertebral space, although the previously described lumbar ESP block (and also the paraspinal fascial blocks) will impinge with the surgical site [2,3].
On the other hand local anesthetic was not observed spreading caudally to L2 in most patients with the low thoracic ESP block. It can be concluded that despite the block does not interfere with surgical site low thoracic ESP block fail to block properly distal lumbar levels. [4]

The longissimus-thoracis muscle has a remarkable anatomy in this context. In the lumbar region some of its fibers are attached to the whole length of the posterior surfaces of the TP and the accessory processes of the vertebrae, and to the anterior layer of the lumbodorsal fascia, meaning that in opposition to the thoracic level it covers the lumbar vertebrae up to the articular pedicles (at thoracic level its medial insertions are located in the TP tips), which leads to an opportunity to dissect the plane between the posterior vertebral components and the longissimus-thoracis muscle from an anterior-lateral approach. [5] The SLoP block avoids the impingement with the surgical site, it is performed in supine position and allows limited LA epidural spread.
References


4- Schwartzmann, A; Peng, P; Maciel, MA; Gonzalez, X; Forero M. A magnetic resonance imaging study of local anesthetic spread in patients receiving an erector spinae plane block. Can J Anesth. 2020;67,942–48.

Fig. 1. Description of the “Anterior passage” Lumbar blocks: Sub-longissimus-thoracis Plane (SLoP) type 1 and type 2, Lumbar Anterior Lateral transverse-process (LALaT) block and Quadratus Lumborum block (QLB) type 5 blocks.
Fig. 1 A). Ultrasound image showing the novel “Anterior passage” Sub-longissimus-thoracis Plane (SLoP) block (type 1). During the performance of SLoP block type 1 the TP is not observed during the injection because the ultrasound view targets the intertransverse region. The full description is available in the main text.

Fig. 1 B). Ultrasound image showing an alternative approach to the novel “Anterior passage” Sub-longissimus Plane (SLoP) block (type 2). The full description is available in the main text.
Fig. 1 C) Ultrasound image showing performance of the “anterior passage” Lumbar Anterior Lateral Transverse-process (LALaT) block. The injection site is reached after the needle make bony contact with the lateral portion of the TP, between the TP and the PMM or, alternatively, between the ITL and the PMM. Relevant data about the technique (indications, procedure details, rationale) are available in the main text.
Fig. 1 D) Ultrasound image showing performance of an “anterior-passage” Quadratus Lumborum Block (QLB) - the novel QLB 5 - with an injection point between the PMM and the QLM, similar to a transmuscular-QLB (T-QLB) but from an anterior entry point. Relevant data about the technique (indications, procedure description and rationale) are available in the main text.
Fig. 1 E) Schematic representation of the probe positioning and alignment for the performance of the blocks. The probe is positioned transversally. The needle is inserted in the middle axillary line, anteriorly to the probe and directed towards the transverse process /intertransverse ligament in a medial / posterior direction.
* In these blocks the curved probe was placed in the mid-axillary line with a transverse orientation with the patient in straight supine position. Movement of the ultrasound (US) probe towards the posterior axillary line identifies the quadratus lumborum muscle (QLM). Posterior sliding of the probe stops when the L3 transverse process (TP) is visualized, with its tip vertically orientated towards the skin in the ultrasound image (Fig. 1). The QLM was visualized lying anteriorly and laterally to the most lateral portion of the TP and its tip. Medially (i.e., deeper in the US image), in contact with the TP and vertebral body, the psoas major muscle (PMM) was visualized (Fig. 1). In all the techniques, a shamrock sign is observed, in which the ESM is located posteriorly to the transverse process (TP), the QLM is located more superficially (laterally) and anteriorly to the TP, and the PMM is observed more deeply on the ultrasound image in front of the TP. The QLM
functions as a safe conduct for the needle tracks (the perirenal fat should be not crossed). Additional
description is available is the main text.

Abbreviations: ITL: intertransverse ligament; TP: transverse process; QLM: quadratus lumborum
block; ESM: erector spinae muscle; PMM: psoas major muscle; PRF: perirenal fat; LA: local
anesthetic; AAL: Anterior axillary line; MAL: middle axillary line; PAL: posterior axillary line;
CW: Chest wall; IC: iliac crest; OT: operation table; P: Probe.