

the technique described by Mokini and colleagues actually is a well-known approach of the PCB rather than a modification of a PCB as suggested by the authors. However, as rightly recognized by the authors, the use of this technique has some restriction which should be known to physicians before considering this technique for inguinal surgery. In contrast with lower lumbar dermatomes, the higher lumbar dermatomes are unreliably blocked by a PCB, regardless of which approach has been used.³ A possible explanation for this is the anatomic location of the lumbosacral plexus. Kirchmair and colleagues⁴ reported that in the majority of cases, the lumbosacral plexus lies within the psoas major muscle, and not inside a sheath between the muscles. We wonder if the reproducibility of this technique was also tested in a hernia repair patients group.

Furthermore, the authors rightly pointed out some serious complications of a PCB such as hypotension, epidural- or sub-arachnoid spread, systemic toxicity, renal puncture, and retroperitoneal haematoma. A more cephalad approach of the PCB like the L2–3 approach suggested by the authors could be more prone to an unattended puncture of the kidney. The most frequently occurring undesirable side-effect of a PCB is a bilateral spread of the injected local anaesthetics, resulting in epidural anaesthesia.⁵ It was previously thought that the occurrence of bilateral spread depended on the approach taken for a PCB. However, Gadsden and colleagues⁶ concluded that injection of a local anaesthetic with high injection pressure (>20 psi) during lumbar plexus block commonly results in unwanted bilateral block and is associated with high risk of neuraxial block. Mokini and colleagues did not describe any injection pressure or assessment of bilateral local anaesthetic spread resulting in an epidural anaesthesia in their patient(s). In theory, the suitability of the PCB as anaesthetic technique for inguinal hernia repair suggested by the authors could be erroneously attributed to unnoticed epidural anaesthesia.

Finally, in a time of increased emphasis on patient safety, information with regard to success rate or complication rate of this technique for inguinal surgery is needed. In that sense, some data with regard to the number of patients anaesthetized with this technique and the reliability of the result thereof would have been helpful. Until then, in our opinion, the lack of reliability regarding blocking dermatome L1, together with the fact that this technique probably does not anaesthetize manipulations of the spermatic cord and the peritoneum sac (also described by Mokini and colleagues), makes this technique unsuitable for most patients undergoing inguinal hernia surgery.

Declaration of interest

None declared.

M. A. de Leeuw*

R. S. G. M. Perez

Amsterdam, The Netherlands

*E-mail: marceldeleeuw@icloud.com

1 Mokini Z, Buccino G, Vitale G, Mauri T, Fumagalli R, Pesenti A. Psoas compartment block for anaesthesia during surgical repair of inguinal hernias. *Br J Anaesth* 2013; **111**: 298–9

- 2 Hanna MH, Peat SJ, D'Costa F. Lumbar plexus block: an anatomical study. *Anaesthesia* 1993; **48**: 675–8
- 3 Mannion S. Psoas compartment block. *Contin Educ Anaesth Crit Care Pain* 2007; **5**: 162–6
- 4 Kirchmair L, Lirk P, Colvin J, Mitterschiffthaler G, Moriggl B. Lumbar plexus and psoas major muscle: not always as expected. *Reg Anesth Pain Med* 2008; **33**: 109–14
- 5 Touray ST, de Leeuw MA, Zuurmond WW, Perez RSGM. Psoas compartment block for lower extremity surgery: a meta-analysis. *Br J Anaesth* 2008; **101**: 750–60
- 6 Gadsden JC, Lindenmuth DM, Hadzic A, Xu D, Somasundaram L, Flisinsky KA. Lumbar plexus block using high-pressure injection leads to contralateral and epidural spread. *Anesthesiology* 2008; **109**: 683–8

doi:10.1093/bja/aeu026

L1–2 roots block with psoas compartment block?

Reply from the authors

Editor—We thank Drs de Leeuw and Perez for their interest in our letter¹ and we would like to make a few comments.

Our modification of the psoas compartment block (PCB) technique is that we aim at eliciting the twitch of the lower anterior abdominal wall (i.e. L1–2 root stimulation), instead of searching for the quadriceps twitch (i.e. L3–4 root stimulation), in order to increase the chance for a successful block and avoid femoral and obturator block, see Figure 1 and accompanying video.¹

In selected inguinal hernia patients where local anaesthetic infiltration was not possible and general or neuraxial anaesthesia was at high risk or impossible to perform, we found reasonable to propose PCB at L2–3 level for three main reasons. First, there is a higher probability to find L1–2

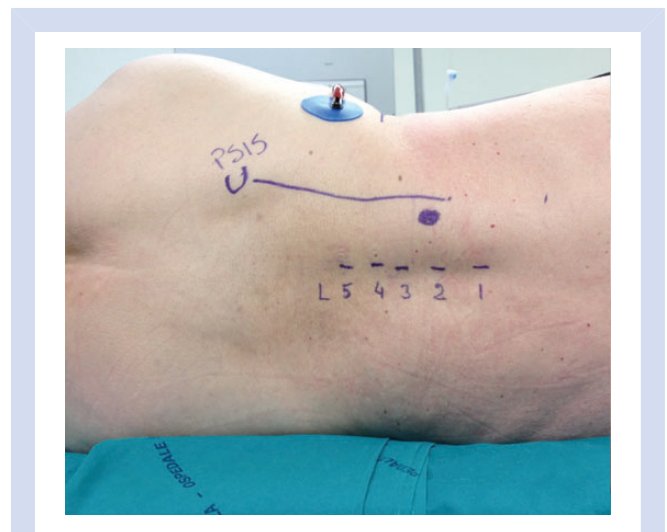


Fig 1 Modification of the psoas compartment block (PCB) technique. If reading the pdf online, please click on the image to view the video.

roots with a stimulated needle placed at L2–3 level since L1–2 terminal rami are found into the substance of the psoas muscle below this level.² Secondly, Mannion and colleagues,³ using MRI, have shown the cephalad spread of contrast media and involvement of L1–4 roots within the psoas muscle by expansion of the intrapsoas fascia after PCB performed as low as L4–5 level. Hanna and colleagues also demonstrated a spread to L1–4 roots in all cases after PCB at L2–3 level using a loss of resistance technique with only 10 ml of dye in cadavers.⁴ However, the limited number of experiments in anatomic and imaging studies may not reflect the features of the general population and caution is needed when they are translated to clinical practice.

Thirdly, clinical randomized trials in adults and children confirm the findings of anatomic and imaging studies. Imbelloni and colleagues⁵ reported L1–2 involvement in 92% of patients with analgesia lasting ~21 h after PCB with 40 ml of bupivacaine at L3–4 level. Kirchmair and colleagues⁶ reported effective anaesthesia and analgesia of the inguinal region in children after PCB with ropivacaine at L4–5 level. Ozkan and colleagues⁷ reported L1–2 involvement in 92% of patients after 5 ml of bupivacaine injected at L1 level. Pandin and colleagues⁸ reported 77% and 100% success in blocking L1 and L2 roots, respectively. Mannion and colleagues reported 70% of L1–2 block rate, but we could not find this information in the listed reference.^{9,10} Taken together, these data suggest that even classic PCB could extend to block L1–2 roots in an acceptable proportion of patients.

We cannot offer at the moment a large and consecutive series of patients, but in the past 3 yr, we have performed PCB in 20 patients.

The mechanism for analgesia after L2–3 approach may be due both to the anaesthetic solution spreading to L1–2 roots into the psoas sheath and to the paravertebral space outside the fascia.^{4,8,10} We have had no cases of contralateral analgesia. Since the L3 transverse process is the longest, the chance for epidural or subarachnoid spread may be reduced, and also the occurrence of sympathectomy or puncture of the inferior cava vein or aorta.^{5,10} Despite this advantage, psoas major is narrower at L2–3 level, requiring more accurate needle positioning.¹⁰ We did not measure injection pressure, but we usually inject the anaesthetic slowly. Infiltration of skin (T11/T12 contribution),⁸ spermatic cord, or peritoneum and sedation may be needed, but these same events may occur also during inguinal field block performed by surgeons. Finally, we have had two cases of transient homolateral hypoaesthesia over the anterior thigh (lasting <4 h).

In conclusion, we think that further research is needed to evaluate the optimal PCB technique in order to achieve L1–2 root block for hernia surgery. This level can be potentially reached in a good proportion of patients and may be useful in challenging anaesthetic situations.

Declaration of interest

None declared.

Z. Mokini*
G. Vitale
C. Buccino
T. Mauri
R. Fumagalli
A. Pesenti
Milan, Italy
*E-mail: zheri@hotmail.com

- 1 Mokini Z, Buccino G, Vitale G, Mauri T, Fumagalli R, Pesenti A. Psoas compartment block for anaesthesia during surgical repair of inguinal hernias. *Br J Anaesth* 2013; **111**: 298–9
- 2 Uribe JS, Arredondo N, Dakwar E, Vale FL. Defining the safe working zones using the minimally invasive lateral retroperitoneal transpsoas approach: an anatomical study. *J Neurosurg Spine* 2010; **13**: 260–6
- 3 Mannion S, Barrett J, Kelly D, Murphy DB, Shorten GD. Magnetic resonance imaging of distribution of injectate after two approaches for psoas compartment block. *Reg Anesth Pain Med* 2005; **30**: 567–71
- 4 Hanna MH, Peat SJ, D'Costa F. Lumbar plexus block: an anatomical study. *Anaesthesia* 1993; **48**: 675–8
- 5 Imbelloni LE, Beato L, Beato C, Cordeiro JA. Postoperative analgesia for orthopedic surgeries of the hip and femur: a comparison between psoas compartment and inguinal paravascular blocks. *Rev Bras Anesthesiol* 2006; **56**: 619–29
- 6 Kirchmair L, Enna B, Mitterschiffthaler G, et al. Lumbar plexus in children: a sonographic study and its relevance to pediatric regional anaesthesia. *Anesthesiology* 2004; **101**: 445–50
- 7 Ozkan D, Akkaya T, Cömert A, et al. Paravertebral block in inguinal hernia surgeries: two segments or 4 segments? *Reg Anesth Pain Med* 2009; **34**: 312–5
- 8 Pandin PC, Vandesteene A, d'Hollander AA. Lumbar plexus posterior approach: a catheter placement description using electrical nerve stimulation. *Anesth Analg* 2002; **95**: 1428–31
- 9 Sim IW, Webb T. Anatomy and anaesthesia of the lumbar somatic plexus. *Anaesth Intensive Care* 2004; **32**: 178–87
- 10 Mannion S. Psoas compartment block. *Contin Educ Anaesth Crit Care Pain* 2007; **5**: 162–6

doi:10.1093/bja/aeu027

Position is everything in life

Editor—The recent article by Mokini and colleagues¹ deals with a psoas compartment block (PCB) for an inguinal hernia repair. The authors stated that the block is good for poor-risk patients and patients who are obese but did not mention the weight of patients requiring this anaesthesia method or how much of a poor-risk patients must be. Although surgeons like to use local anaesthesia in these types of patients, the amount of local anaesthetic drugs may reach toxic levels. Neuraxial anaesthesia has been administered for inguinal hernia repair, but could also lead to problems. Therefore, the authors' technique works for them. However, the authors do admit that PCB may be associated with complications. They placed their patients in a modified lateral decubitus position to insert the needle. This may work in thin patients, but in obese patients, finding the L2–3 or L4–5 interspace can be difficult, especially in patients