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Obstetric anesthesia: pearls and pitfalls in anesthesia for caesarean delivery

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Obstetric anesthesia is a worldwide concern mostly because we deal with fetal-maternal safety and well-being. Pain can often be underestimated and undertreated, and patients may evolve with hyperalgesia, displaying persistent postoperative pain and postpartum depression. Furthermore, cesarean section may be associated with moderate to severe postoperative pain leading to delayed recovery, postponing return to daily living activities, and thus affecting maternal-child bonding and breastfeeding.<sup>1</sup>

Currently, perioperative analgesia for cesarean section involves a multimodal approach including neuraxial analgesia with intrathecal or epidural morphine, associated with non-opioid analgesics (acetaminophen and non-steroidal anti-inflammatory drugs) as well as a tactic administration of opioids for severe breakthrough pain.<sup>2</sup> Although spinal opioids continue to be the gold standard for postoperative analgesia in obstetric patients, ultrasound-guided interfascial plane blocks, peripheral nerve blocks, and wound infiltration have recently gained momentum as effective and safe techniques. In fact, in the context of ERAS (enhanced recovery after surgery), their use has been linked to reduction in opioid requirements, as well as a decreased incidence of side effects and improved quality of recovery with fewer hospital resources utilization.<sup>2</sup> In this issue of the Brazilian Journal of Anesthesiology, some contemporary regional anesthesia techniques are addressed in the obstetric scenario, namely the lumbar

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paravertebral block, transverse abdominal plane block, quadratus lumborum block, and erector spine plane block. In fact, what are the main evidences for each of those techniques in obstetric anesthesia?

### **Lumbar paravertebral (LPV) block**

In terms of Pfannenstiel incision, a bilateral paravertebral approach should be used, mostly at level of T10-L1. Additionally, paravertebral sympathetic block could be added incorporating the spread of local anesthetics to uterine innervation via preganglionic and postganglionic sympathetic fibers of superior and inferior hypogastric plexus, avoiding visceral pain associated with the cesarean section.<sup>2</sup> The paravertebral block has some advantages in contrast to other fascial plane abdominal blocks that target cutaneous nerves only, since the former covers the block of sympathetic chain ganglion minimizing visceral pain. Nevertheless, it carries a higher risk of epidural and intrathecal spread and requires advanced skills to be performed. Importantly, there is a lack of evidence regarding the application of the LPV block for postoperative analgesia after cesarean delivery.<sup>3</sup>

### **Transverse abdominal plane (TAP) block**

TAP block is a field anesthesia technique for thoracolumbar nerves, covering dermatomes from T6 to L1 and running the fascial plane between internal oblique muscle and the transversus abdominis muscle.<sup>4</sup> There is a great deal of evidence provided by clinical trials and systematic reviews comparing TAP block with spinal opioids and other interfascial plane blocks.<sup>4</sup> Studies have overall failed to show any superiority of TAP over other techniques. Nonetheless, similarly to continuous wound infiltration<sup>5</sup> and other isolated nerve blocks (for instance, ilioinguinal and iliohypogastric nerve blocks),<sup>6</sup> TAP block does not cover visceral pain associated with cesarean section.<sup>4</sup>

To the best of our knowledge, the available evidence suggests that TAP is a good choice for postoperative analgesia when the administration of intrathecal opioids is not possible as in general anesthesia for cesarean section.<sup>2</sup>

### **Quadratus lumborum (QL) block**

The QL block is an interfascial plane anesthesia technique where the needle is directed more posteriorly than the transversus abdominis muscle until the transversus

aponeurosis.<sup>7</sup> The goal is to achieve the thoracolumbar fascia that surrounds the QL muscle contiguous to other back muscles, thus, characterizing anterior, middle, and posterior layers. Large volumes of local anesthetics into these layers can spread into lateral cutaneous branches of ilioinguinal, iliohypogastric, and subcostal nerves, diffusing into the paravertebral space, as well as reaching the sympathetic chain and providing visceral and somatic analgesia. However, the dermatomal spread of QL block can vary and is largely dependent on the anesthesiologist's skills and patient's anatomy. The transmuscular approach, in which the local anesthetic is injected into the plane between the psoas major muscle and the QL muscle, is the preferred technique, given the proximity to the lumbar plexus and more predictable spread to paravertebral space.<sup>7</sup>

Many clinical trials have shown the superiority of QL block over TAP block or placebo regarding analgesia for cesarean section.<sup>8-10</sup> Nevertheless, more robust studies are still needed to show the benefits of QL block over intrathecal morphine when it comes to pain relief and lowering adverse events. It is of utmost importance to bring light to potential adverse reactions such as local anesthetic systemic toxicity (LAST) due to the requirement of large volumes of local anesthetics and fast systemic spread.<sup>2</sup>

### **Erector spine plane (ESP) Block**

The ESP block is a relatively new interfascial plane block described by Forero et al. in 2016 and designed to relieve chronic thoracic pain.<sup>11</sup> Dissecting this blockade technique, the local anesthetic can be deposited down into the anterior plane of the erector spinae muscles and superficial to the transverse processes of thoracic or lumbar vertebrae, with a cerebral-caudal and medial-lateral spread leading to dorsal and supposed ventral rami dispersion.<sup>12</sup> Its mechanism of action is not fully elucidated and is a theme of investigation in numerous cadaveric and clinical studies.<sup>12</sup> More recently, some clinical trials and metaanalysis have addressed the real benefit of ESP block for postoperative cesarean delivery analgesia.<sup>13,14</sup> Considering those recent findings, further robust studies are still warranted to clearly state the benefits and safety of the ESP block in the pain management after cesarean section.

Plenty of clinical studies have demonstrated that some regional anesthesia techniques (i.e., LVP, TAP, QL, and ESP blocks) are associated with a reduction of opioid requirements and lower pain scores postcesarean delivery. Indeed, pain relief, patient satisfaction, and early mobility should also be taken into account. Furthermore, regarding interfascial plane blocks, it is imperial to be aware to the possibility of LAST,

since high volumes of local anesthetics are often used in a bilateral approach. Thus, consideration to the toxic dosage of local anesthetics as well as a minded, skilled and properly trained anesthesiologists are of utmost importance to achieve a successful and uneventful blockade.

Pre-operative factors, for instance pain and anxiety, could significantly contribute to postcesarean delivery pain and other poor outcomes, including postoperative psychological vulnerability and postpartum depression.<sup>16</sup> It is well-known that up to 20% of new mothers can develop postpartum depression during the first year after giving birth.<sup>17</sup> The resulting increased risks of suicide ideation, infanticide, as well as childhood and adolescent developmental and behavioral problems make this a serious public health issue.<sup>18</sup> Nevertheless, labor analgesia (e.g., neuraxial analgesia) can effectively relieve labor pain, being a potentially modifiable risk factor against the development of postpartum depression.<sup>19,20</sup> In this context, anxiety is perhaps the most common problem in the preoperative period. This anxiety increases postoperative pain, delays healing, and prolongs the hospital stay.<sup>21</sup> Among the surgical population, a higher level of preoperative anxiety has been seen in obstetric patients, which is meaningfully associated with moderate to severe perioperative pain. Additionally, preoperative anxiety is correlated to hypotension after spinal anesthesia for cesarean delivery, due to higher baseline sympathetic activation.<sup>22</sup>

Considering such aspects, the care in obstetric anesthesia must be integral, accounting for physical and psychological matters that may impact the patient long after the peripartum period. Importantly, a multidisciplinary approach should be implemented in order to provide comfort and safety to the obstetric patient. For example, when cesarean delivery is necessary, to mitigate maternal anxiety is crucial to manage metabolic and endocrine responses. In this issue of the Brazilian Journal of Anesthesiology, an interesting and simple pharmacological strategy to manage perioperative anxiety in the obstetric setting is proposed.<sup>23</sup> In their study, Oliveira et al. have demonstrated that the preoperative administration of low doses of midazolam ( $0.0125 \text{ mg.kg}^{-1}$ ) is associated with a reduction in maternal anxiety while maintaining consciousness and recall of birth without affecting Apgar scores.<sup>23</sup>

In summary, a multimodal analgesic regimen is necessary for optimal pain management after cesarean delivery, performed under neuraxial anesthesia or general anesthesia. Recommended techniques include the combination of analgesics such as paracetamol or metamizole, non-steroidal anti-inflammatory drugs, and dexamethasone

associated with a local or regional analgesic technique, including wound infiltration, fascial plane blocks or low dose intrathecal morphine.<sup>24</sup> We need to highlight the indications and contraindications of all medications and procedures to provide the best clinical resource to our obstetric patients. A good and individualized clinical judgment can improve outcomes when dealing with postoperative pain following a cesarean section. Yet, further research is needed to understand and expand the main indications of field blocks for postcesarean delivery multimodal analgesia. In fact, the benefits of local and regional analgesia techniques are still not clearly superior when compared with the use of intrathecal morphine and new clinical trials are urgently needed to improve patient care and change paradigm in the obstetric setting.

## Conflicts of interest

The authors declare no conflicts of interest.

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