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A study of peripheral nerve block for analgesia during caesarean section

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Abstract. *In multimodal analgesia regimens for postcesarean delivery, peripheral nerve block plays a special role. The peripheral nerve block, including transversus abdominis plane, quadratus lumborum, iliohypogastric and ilioinguinal, erector spinae, continuous wound infiltration and paravertebral blocks will be discussed in this review paper. Anatomy, data from the literature, and particular areas that require more study will all be evaluated. In the context of emergency caesarean sections, considerations for local anaesthetic toxicity and informed consent for these modalities will be highlighted.*

Keywords: *peripheral nerve block, analgesia, obstetrics*

Introduction

Currently, neuraxial anaesthesia with intrathecal or epidural morphine, scheduled giving of opioid-free analgesics (acetaminophen and non-steroidal anti-inflammatory drugs) and strategic use of opioids for severe breakthrough pain are all used for routine multimodal caesarean delivery analgesia (1, 2). Peripheral nerve block is employed in non-obstetric surgical circumstances as a component of multimodal analgesia regimens. These procedures are associated with decreased opioid use, improved recovery quality, and reduced use of hospital resource (3–6). Peripheral nerve block, albeit not frequently used, is important for caesarean section analgesia.

Options for peripheral nerve block during caesarean section will be discussed in this review paper. Paravertebral, transversus abdominis plane (TAP), quadratus lumborum (QL), iliohypogastric (IH) and ilioinguinal (II), and wound infiltration (CWI) blocks will receive special consideration. Anatomy, current data, and particular study topics will all be evaluated. In an emergency caesarean section under general anaesthesia, factors such local anaesthetic toxicity, liposomal bupivacaine, and informed permission will be taken into account.

Methods

With the help of a health sciences librarian, we searched the electronic databases PubMed and MEDLINE for information on peripheral nerve block in caesarean section for this narrative review study. The only articles accepted were those written in English and released between January 1, 1980, and December 31, 2022. From these findings, the papers that were most pertinent to the stated goals of assessing anatomy, gathering data for use in clinical practise, and identifying particular research gaps were chosen. A small number of items from before 1980 were included for historical perspective.

Lumbar Paravertebral Block

Dermatomes Anatomy

The term “paravertebral lumbar sympathetic block” (also known as “paravertebral nerve block”) refers to a nerve root level block that is implanted outside the dura mater (7). They can be carried out with the use of ultrasonography or landmark guidance methods. Dermatomal coverage is unilateral and is influenced by the amount of local anaesthetic administered, the number of injections administered, and the level of coverage chosen (8). Four dermatomal levels are typically the maximum dermatomal spread for a single-level block with a 5 mL injection volume (9). The lower thoracoabdominal nerves (T6–T12), which innervate the abdominal wall, are covered by paravertebral nerve block during the majority of abdominal procedures (10). For the Pfannenstiel incision often used for caesarean deliveries (L1), those dermatomes might not always be enough.

Approach

Bilateral paravertebral lumbar block at T12–L1 is recommended for the Pfannensteil skin incision, which is frequently utilised for caesarean section (11). The T10–L2 vertebral levels, which correspond to the innervation of the uterus by the preganglionic and postganglionic sympathetic fibres of the superior and inferior hypogastric plexi (branches of the hypogastric nerve), can also be used to add additional paravertebral sympathetic blockade for the visceral pain connected to caesarean delivery (12). Because the neural foramen is reached perpendicularly, a parasagittal in-plane approach is linked with a lower risk for epidural dissemination than a transverse in-plane approach (13–17). A location 2–2.5 cm lateral to the spinous process tip is located and identified using this method. The pleura, costo-transverse ligament, and transverse process are recognised. The ultrasound probe’s cephalic tip is used to implant a 21–18-gauge needle, which is then moved towards the costo-transverse ligament and seen as it does so. A tactile “pop” is felt when this ligament is crossed. 2–7 mL of the preferred local anaesthetic, such as ropivacaine 0.5%–0.75 % along with or without epinephrine, are then administered after a negative aspiration. The distribution of local anaesthetic can be seen in a multilayered (two or more) spreading linked to anterior pleura displacement.

Benefits and Drawbacks

The main benefit of paravertebral nerve blockades is that analgesia may be given to individuals for whom neuraxial analgesia may be challenging, such as those who had instrumented spine surgery or neuraxial anatomical anomalies (18). The paravertebral block of the sympathetic chain ganglion has distinct benefits over conventional abdominal wall blocks that exclusively target cutaneous nerves for non-incisional (visceral) discomfort during caesarean section. If catheter-based procedures are not employed, a repeat surgery may be required because to the normal analgesic duration of 9 to 12 hours (18). Although a meta-analysis in thoracotomy patients was unable to draw definitive conclusions on variations in side effects between epidural and paravertebral blockade, patients with paravertebral blocks may be ambulatory and have fewer adverse reactions (urinary retention and hypotension) than those with epidural analgesia (19, 20). It takes some ability to conduct a paravertebral block, and accidental epidural or intrathecal drug injections have been known to occur. These factors, together with greater clinical comfort in administering neuraxial blockade to obstetric patients, may account for the small number of studies that have been conducted thus far in caesarean section patients.

Evidence now available and upcoming research directions

It is difficult to compare the effectiveness of paravertebral nerve block with epidural analgesia for caesarean section analgesia in randomised control studies. Paravertebral nerve block for labour analgesia have been the subject of published literature, which can shed some light on their potential use for analgesia during caesarean delivery. The available literature only includes case studies of certain patients for whom standard epidural analgesia was not recommended. In one instance, a patient with spina bifida occulta, a tethered cord, and nonpalpable spinous processes received paravertebral nerve block with 0.375 % bupivacaine and a pudendal nerve block for labour analgesia. This procedure was successful in providing the patient with appropriate analgesia (21). A patient with Harrington rods and a non-palpable spinous process who had previously experienced multiple unsuccessful epidural attempts got a pudendal block and bilateral paravertebral nerve block with 15 mL of 0.375 % with 1:400 000 epinephrine and reported adequate labour analgesia (21).

Transversus abdominis plane block

Dermatomes Anatomy

The TAP block is a block that affects the thoracolumbar nerves, that run in the fascial plane between the muscle of the internal oblique and the transverse abdominis muscles (maximum dermatomal coverage, T6–L1; frequently mentioned, T10–T12) (22, 23). The transversus abdominis and internal oblique muscles are crossed by the anterior primary rami, which then divide onto the anterior and lateral cutaneous nerves at around the midaxillary line.

Approach

There are mainly two TAP strategies. The landmark-guided approach determines the location and depth of the needle insertion using the "double pop" technique through the Petit triangle. The latissimus dorsi edge, external oblique muscle and the iliac crest all abut this anatomic region on its anterior, posterior, and inferior sides, respectively (23, 24). The phrase "double pop" describes the sensation of the needle penetrating the external oblique muscle's fascia and then the internal oblique muscle's fascia (23). In the ultrasound-guided lateral approach, the internal oblique, external oblique and transversus abdominis muscles are identified (from superficial to deep) by positioning the transducer perpendicular to the midaxillary line between the costal border and the iliac crest. The tip of the needle and injection should preferably enter the TAP near the midaxillary line when using an in-plane technique. Non-pregnant women may have distinct ultrasonographic pictures of the fascial planes between the internal oblique muscles and the transverse abdominus for TAP and those who have had caesarean deliveries.

Benefits and Drawbacks

When a woman is not getting neuraxial morphine for any reason, TAP during caesarean section is helpful (1). Even after a caesarean section, the ultrasonographic anatomical to do the block is often recognisable. TAP's primary drawback is that it doesn't offer visceral anaesthesia (table 1). This oversight most likely explains why several studies have been unable to demonstrate TAP's advantage over traditional multimodal analgesia with intrathecal opiates.

Evidence now available and upcoming research directions

Studies comparing post-cesarean TAP to a placebo or no treatment demonstrate benefit. With landmark-based TAP, McDonnell et al showed a considerable decrease in opioid needs (24). TAP reduced morphine consumption across a 48-hour period, with the biggest reductions occurring in first 12 hours (33 mg vs 6 mg). The pain scores (on a visual analogue scale) did not decrease consistently lower with time for both resting and moving, though. Similar to this, several studies have discovered longer times between the initial request for analgesics (24–27) and lower mean threshold pain medication (opioid and tramadol) requirements; however, pain reduction was not constant across studies. With TAP vs no TAP, there was no change in pain levels at rest or 24 hours after surgery, according to two meta-analyses (28, 29). However, one meta-analysis revealed a decrease in opioid usage as well as a decrease in pain ratings after 24 hours (28). Another meta-analysis found that postcesarean TAP was linked with decreased pain levels at rest (6 and 12 hours) and with mobility (6 and 12 hours) (29). Overall, according to the research, TAP reduces the need for opioids and may even reduce pain levels in first 12 hours following caesarean section.

Can TAP replace or strengthen intrathecal morphine for post-c-section analgesia? Studies that compared TAP to control (14 studies), TAP to intrathecal morphine (two studies), and TAP + intrathecal morphine vs intrathecal morphine alone (four trials) were all reviewed in a 2016 meta analysis by Champaneria et al. TAP was less efficient than intrathecal morphine for pain when at rest but more effective than the control for early pain. During the first 24 hours, adding TAP to ITM had no further pain alleviation effects. TAP was once more more effective than control when the authors assessed pain with mobility in the first 24 hours, while intrathecal morphine was once more beneficial at 6 and 24 hours postoperative. TAP was added to ITM, which decreased discomfort at 6 hours after surgery but not after 24. A comparison of TAP to intrathecal morphine demonstrated decreased opioids requirement for the intrathecal morphine patients, however only at select time periods, whereas the evaluation of opioid requirements showed that TAP lowered morphine intake efficiently for up to 24 hours. In the only experiment that assessed this parameter, the inclusion of TAP to intrathecal morphine had no extra impact on opioid use (28). When intrathecal morphine is not feasible or desirable, such as when general anaesthesia is necessary for a caesarean section, the best available data shows that TAP is useful for postoperative analgesia. Given that local anaesthetic plasma levels have been seen to surpass lethal levels following TAP (30, 31), the optimal dosage for post cesarean TAP has been called into doubt. Three intervention groups were used in Singh et al.'s comparison of two local anaesthetic doses: Intrathecal morphine with a placebo, intrathecal morphine with TAP with high-dose ropivacaine (3 mg/kg, maximum 300 mg), and intrathecal morphine with TAP using low-dose ropivacaine (1.5 mg/kg, maximum 150 mg) (32). Notably, the injectate quantities were the same (60 mL) for both the high and low dosage ropivacaine groups. There was no difference among the high-dosage and low-dosage groups in the pain ratings at rest at 24 hours, with movement at 24 hours, or in the need for breakthrough pain medication (32). At 6 and 12 hours, the high-dose group had decreased pain levels with mobility. Numerous reports of cases and cohort studies demonstrating neurological symptoms associated with local anaesthetic use have been reported. Following TAP for a caesarean section, there was systemic toxicity (30, 33–35). In a meta-analysis, Ng et al. compared studies that compared the effectiveness of high- and low-dose local anaesthetics. The authors divided dosages into high- and low-dose categories using bupivacaine equivalents, defining a high-dose as more than 50 mg per block each side. According to the findings (opioid intake, time to first request, and pain ratings at 24 hours), low-dose and high-dose groups experienced comparable levels of analgesia following surgery and opioid-sparing effects (34). Therefore, at a certain dosage threshold, local anaesthetic benefits might not grow, and low-dose methods for post cesarean TAP might lower the risk of local anaesthetic toxicity without sacrificing analgesic efficacy.

Quadratus lumborum block

Dermatomes Anatomy

Ultrasound was used to trace the transversus abdominis further posteriorly till the transversus aponeurosis appeared in order to first explain the QL block peripheral nerve block approach (36). Understanding the layers that encircle the QL muscle will help you better comprehend the anatomy. The posterior, middle, and anterior portions of the thoracolumbar fascia wrap the QL muscle and a number of other back muscles. The thoracolumbar fascia has three layers: an anterior layer that lies next to the QL muscle, a middle layer that lies between the erector spinae and the QL muscle, and a posterior layer that encloses the erector spinae (36). Any of these fascial planes can be affected by large volume infusions of local anaesthetic, often the long-acting amides such as ropivacaine or bupivacaine 0.125–0.375 % (15–30 mL each side, 0.2–0.4 mL/kg). This affects the nearby nerve fibres, including the lateral cutaneous nerves of the trigeminal nerve. Subcostal, IH, and II nerves can extend into the paravertebral area. The sympathetic chain may be impacted by this posterior expansion into the paravertebral area, resulting in both somatic and visceral analgesia. The different ways to QL block have varying degrees of dermatological dissemination. Patients who have undergone caesarean section versus non-pregnant patients may show distinct ultrasonographic tissue plane identifications for QL.

Approach

There are four QL block techniques that have been described so far (36). The first method, known as QL1 or the lateral QL, involves injecting a substance deep into the transversus abdominis aponeurosis. In the second method, known as posterior QL or QL2, local anaesthetic is deposited posterior to the QL muscle after an injection deep into the erector spinae muscle. An injection is given into the plane between the psoas major muscle and the QL muscle using the transmuscular (QLT) or anterior technique. Finally, local anaesthetic is administered directly into the QL muscle for the intramuscular QL (QLI) described in the paediatric population (37). With the various QL block techniques, dermatome spread varies slightly.

Benefits and Drawbacks

In patients undergoing caesarean delivery, QL block has been linked to decreased postoperative opioid intake and pain scores; however, these studies have been difficult to interpret due to the dearth of study groups receiving standardised multimodal pain relief with neuraxial morphine. After a caesarean delivery, Blanco et al. demonstrated that posterior approach QL (QL2) injection of 0.125 % bupivacaine at 2 mL/kg reduced morphine use at 6 and 12 hours, decreased morphine requests at 6, 12, 24, and 48 hours, and decreased pain scores while moving and resting (not significantly at 24 hours) (38). There were substantial variations in morphine consumption, the delay to the first application for postoperative opioid, and the average score of the pain numeric rating scale within 48 hours postoperatively, according to one research among patients arbitrarily allocated to QL1 with ropivacaine 0.375 % versus control (39). TAP and QL block effects on caesarean section outcomes were compared. After 12, 24, and 48 hours following birth, patients undergoing posterior access QL (QL2) required fewer morphine than patients getting TAP, but there was no apparent distinction at 4 or 6 hours. After 6, 12, 24, and 48 hours, the morphine needs of the QL group were also lower. Visual analogue scales did not significantly differ across the groups during either rest or movement (40). Contrary to TAP, the QL area is located nearer the vertebral column; as a result, QL blocks might be loosely connected with paravertebral spread. Visceral analgesia can be increased by this paravertebral spread, but it can also provide more hemodynamic alterations. Concerning local systemic anaesthetic toxicity can arise from the QL block's absorption in the general circulation through the highly vascularized muscle bed (37).

Evidence now available and upcoming research directions

QL has been shown in randomised controlled studies to date (38, 40) to be superior to spinal anaesthesia alone and to TAP block plus spinal anaesthesia during caesarean deliveries. With both getting 0.125 % bupivacaine 0.2 mL/kg in both sides for a total of 0.4 mL/kg, Blanco et al (40) evaluated QL and TAP blocks following caesarean delivery. At 12, 24, and 48 hours, morphine doses were lower in QL block patients than in TAP patients. Both groups saw almost the same amount of total pain alleviation when at rest and while moving. It is important to note that research have been constrained up to this point due to the lack of spinal anaesthesia comprising ITM and standardised postpartum multimodal analgesia. This restriction prevents any inferences from being drawn regarding QL's superiority to existing clinical practise standards. To evaluate the usefulness of quality assurance as a standard component of a to determine the best method of QL block (QL1, QL2, QLT, or QLI) for caesarean section analgesia, an integrated analgesia regimen that includes neuraxial anaesthesia with morphine is used.

Ilioinguinal-iliohypogastric block

Dermatomes Anatomy

Transversus abdominis muscles that are superior and medial from the anterior superior iliac spine (ASIS) are penetrated by the II and IH nerves, which originate from the L1 nerve root (41). The skin above the inguinal area receives sensory innervation from the IH nerve. The Inguinal is where the II nerve enters. The medial thigh and scrotum's skin get sensory innervation from this canal (41). The external oblique muscles are penetrated by the ventral branch, which also gives sensory innervation to the suprapubic region (41). The ventral branch first penetrates the internal oblique muscle, supplying innervation to the internal and external oblique muscles. Despite the fact that the II and IH nerves are traditionally taught to originate from L1, autopsy studies reveal that the II nerve can also come from nerves stretching from T12 to L3 and the IH nerve can come from T11 to L1 (42).

Approach

On the aforementioned anatomy, the reference point approach for II–IH nerve block is predicated. The ASIS (41) is positioned 1–2 cm medial and 1–2 cm superiorly when the needle is placed. Alternatively, a first "pop" sensation occurs with a penetration of the external oblique and a second "pop" is felt with a piercing of the internal oblique (41). A "pop" is felt as the needle penetrates the opening between the internal oblique and transversus. In the internal oblique and transversus abdominis muscles, local anaesthetic is injected. To enable improved local anaesthetic dispersion, Bell et al. created a multi-injection approach (43). In order to conduct an II–IH nerve block, ultrasound guidance can also be employed. In this procedure, a transducer is placed along the path between the ASIS and the umbilicus, and local anaesthetic is applied to the transversus abdominis muscle and internal oblique muscles.

Benefits and Drawbacks

The lateral femoral cutaneous and femoral nerve may be blocked by drugs sliding beneath the inguinal ligament, and bowel perforation is an uncommon complication of II–IH block. The technical difficulties and unpredictability of the multiple-injection "double pop" approach are drawbacks compared to the landmark or blind method.

Evidence now available and upcoming research directions

The L1 dermatome is covered by the II nerve block, which has been investigated as a potential target for analgesia following caesarean deliveries. One of the earliest studies was written by Bunting in 1988 and it described both sides of II nerve blockages in 26 individuals undergoing general anaesthesia for caesarean sections (44). The study found that patients who underwent an II nerve block had decreased pain scores over the first 24 hours. Additionally, they demonstrated that at 24 hours, the intervention group's opioid needs were much lower (44). In contrast, an additional study (45) evaluating II and IH blocks performed before and following the incision for caesarean delivery found no distinction in morphine intake in the initial 24 hours between patients who received II–IH and those who did not. The rate of failure of blocks inserted before surgery was approximately 50 %, whereas there were no failed blocks in blocks inserted after surgery, which put a cap on the study. For the II nerve block, Bunting employed a single injection procedure, whereas Bell discussed the "multilevel II–IH (II–IH) block" methodology (43). Patients in Bell et al.'s trial received postoperative II–IH blocks with a claimed 95 % success rate after neuraxial anaesthesia (without ITM). Additionally, they reported a sizable the II–IH intervention group's use of injectable patient-controlled analgesic (PCA) morphine decreased over the course of 24 hours, but there was no difference in pain intensity or side effects such nausea and itching (43) When performing a caesarean delivery under general anaesthesia, Sakalli et al used Bell's approach and similarly showed decreased tramadol intake in the II–IH group as well as lower pain score at resting for twenty-four hours along with activity in the first 8 hours (46). The results showed no difference in the research groups' levels of nausea, vomiting, pruritus, or sedation in Sakalli's or Bell's trials. TAP vs II–IH (47) and combined II-TAP (I-TAP) blocks (48) have been contrasted by other researchers. In one trial, TAP demonstrated lower tramadol consumption following caesarean delivery with spinal anaesthesia without ITM as compared to II–IH blocks (47). Individuals with unsuccessful blocks were not included in this study, which strengthened the findings. The L1 dermatome is more consistently covered by the I-TAP block than by TAP alone (TAP blocking is expected to fail in providing L1 sensory block in > 50 % of patients) (48). This is because the I-TAP blocked blends the area of block of TAP with the particular nerves of the II–IH block. The combination I-TAP showed lower opioid use than placebo at all time points in a prospective in nature, triple-blind, placebo-controlled randomised experiment. Additionally, in the initial 24 hours following surgery, it decreased pain levels both at rest and while moving (48). Sedation, vomiting, nausea, or itching were not different across the groups; however, one case of femoral nerve palsy following II–IH nerve blocking was reported (48). Availability of additional peripheral blocks in a greater degree of dermatomal circulate (and potential visceral impact) indicates that study time and effort could be better used in other areas. While more data are required prior to IH-II blocks can be suggested as an effective method for caesarean delivery analgesia, it is already clear that they are not the only option.

Continual wound infiltration

A catheter, often multi orifice, is inserted at the surgical site and attached to an elastomer infusion pump to administer a steady, fixed rate infusion of drugs to nearby nerves as part of the CWI analgesic approach (49). CWI gives nerves surrounding the affected area cutaneous analgesia rather than analgesia in a dermatomal distribution catheter. Before the surgical closure, the surgeon usually positions the catheter close to the nerve innervating the surgical site and tunnels it under the skin to avoid catheters migration and infection. Catheter placement during caesarean delivery is either deep to the fascia or between the rectus membrane and subcutaneous tissue (50). Although diclofenac and other anti-inflammatory medications have been mentioned, local anaesthetics are more frequently administered (51).

Benefits and Drawbacks

Single-shot wound infiltration might offer sufficient analgesia, but its potency is constrained by the pharmacokinetics of the chosen medication, making sustained analgesia less dependable. During after delivery for up to 4 days, CWI permits ongoing administration of local anaesthetic either alongside or without also nonsteroidal anti-inflammatory medications (52). There is a danger for infection and catheters migration with any indwelling catheter. One significant drawback of CWI is the unresolved plasma content of local anaesthetic during continuous infusion, which theoretically might result in systemic toxicity of local anaesthetics. However, considering the low concentration and frequent infusion rates associated with CWI, this problem is improbable. Another drawback is that the surgeon may not properly put the catheter close to the afflicted nerve beds, which results in variable analgesia. Lastly, the infusion patterns and quantities used to provide analgesia frequently result in leakage within the location of the wound, which may be upsetting to both patients and healthcare professionals.

Evidence now available and upcoming research directions

The use of fewer opioids has been linked to CWI during spinal anaesthesia for caesarean section (51). ITM (100 mcg) in saline subfascial CWI and intrathecal saline (control) alongside ropivacaine CWI both lengthened postoperative analgesia by an average of 100 minutes contrasted with placebo (both saline ITM and CWI), but there was not a statistically significant distinction between ITM and CWI for pain or opioid consumption outcomes (53). In a randomised control trial involving 58 women who had elective caesarean deliveries, CWI was associated with lower pain scores at rest at 2, 6, and 48 hours after delivery compared to epidural morphine, and CWI patients experienced fewer episodes of vomiting, nausea, pruritus, and urinary retention (54). In order to lessen post-cesarean pain and lower systemic morphine needs, Lavand'homme et al. demonstrated that CWI with diclofenac was equally successful as CWI with 0.2 % ropivacaine with systemic diclofenac (51). A different study compared CWI deeper to the fascia with CWI superficially to the fascia, and the former group reported considerably less pain at rest and less overall postoperative morphine intake (55). A randomised control experiment comparing ITM paired with saline CWI infusion to 48 hours of CWI utilising ropivacaine or saline (no ITM), in contrast to these studies that show the benefits of CWI. These results imply that ITM continues to provide extra analgesic benefit by treating visceral pain in addition to incisional discomfort, whereas CWI is only useful in treating incisional pain. There are still details to be clarified regarding the application of CWI for analgesia during caesarean delivery. Although research on the cost-effectiveness of CWI contrasted with other modalities for analgesia during caesarean section, such as ITM, TAP, or QL, such as parenteral or epidural analgesia, are sparse, CWI has been proven to be cost-beneficial in comparison to other open abdominal surgeries (57).

Erector spinae plane block

This relatively novel procedure for a truncal block includes depositing local anaesthetic in the plane anterior of the erector spinae muscle and superficially to the transverse processes of the thoracic or lumbar vertebrae, leading to significant dissemination in both the cephalo-caudad and medial-lateral planes. While involvement of the ventral rami of neighbouring segmental neurons is more unpredictable, dissemination via the dorsal rami is guaranteed (58). It has not been widely used to provide analgesia following caesarean deliveries. Only two case reports with promising outcomes have been published thus far (59, 60), one of which mentions a possible risk for motor block.

Liposomal bupivacaine

For peripheral nerve block during caesarean deliveries, liposomal bupivacaine is becoming more popular. For postoperative pain relief by single-dose infiltration, the US Federal Drug Administration (FDA) has approved the prolonged-release (as much as to 72 hours) version of bupivacaine known as liposomal bupivacaine (61). Questions about its use in analgesia for caesarean deliveries have been raised due to the benefits of sustained analgesia without the need for a catheter. The few information that is currently available on liposomal bupivacaine in this group of people has been methodologically constrained and has produced mixed findings. Reduced postoperative opioid needs and postcesarean pain scores were demonstrated in two retrospective trials, 1 using intraincisional liposomal bupivacaine while the other on liposomal bupivacaine TAP blocks (62, 63). In contrast, Prahbu et al.'s (64) randomised control trial contrasted liposomal bupivacaine and a placebo by fascial or epidermal penetration, before fascial closure. In the first two days following surgery, there were no differences among the groups in terms of pain levels or opioid use, according to the results. Both groups' pain levels were significantly less below institutional norms (pain scores in both groups were around 2, while institutional pain scores are normally around 5), which raises the possibility of observer bias. In conclusion, biases in the published research on liposomal bupivacaine, such as retrospectively method and observer ("Hawthorne") effects, have been a problem. There are presently no firm recommendations about the routine application of liposomal bupivacaine for peripheral nerve block during caesarean deliveries based on the existing evidence. Future studies on this subject ought to take into account the following: (1) the addition of a third control arm to lessen bias among observers or a placebo impacts; (2) neither inferiority study designs; and (3) an emphasis on subgroups known to be more pain-sensitive, like those women who were unable to receive neuraxial morphine.

Conclusion

Peripheral nerve blockades for caesarean deliveries are believed to be most beneficial in situations where traditional multimodal analgesia using neuraxial morphine or non-opioid analgesics has failed, or in which neuraxial morphine cannot be administered (e.g. general anaesthesia for a caesarean section). A monitoring period of 40 to 90 minutes following truncal wall blocks is recommended in order to minimise the risk of local anaesthetic toxicity without sacrificing analgesia. The functions using paravertebral nerve block or erector spinae blockers for analgesia during caesarean delivery require further study. It is best to make decisions regarding informed consent when administering peripheral nerve block for analgesia during emergency caesarean sections.

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Declarations

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Дослідження блокади периферичних нервів для знеболення під час кесаревого розтину

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Анотація. *У мультимодальних схемах знеболення після кесаревого розтину особливу роль відіграють блокади периферичних нервів. Ці периферичні нервові блокади, включаючи поперечну площину живота, квадратний м'яз попереку, клубово-підчеревний і клубово-пахвинний нерви, блокади випрямлячів хребта, безперервну інфільтрацію рани та паравертебральні блоки оглянуто в цьому документі. Оцінено анатомію, дані з літератури та окремі області, які потребують додаткового вивчення. У контексті екстреного кесаревого розтину висвітлено міркування щодо токсичності місцевої анестезії та інформованої згоди на ці умови.*

Ключові слова: *блокади периферичних нервів, знеболювання, акушерство*