Case Report

The erector spinae plane block for obstetric analgesia: a case series of a novel technique

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Summary

The management of pain during labour is central to obstetric anaesthetic practice. While epidural analgesia has long been considered the gold standard for intrapartum analgesia, neuraxial techniques can be challenging to perform, are contra-indicated in circumstances such as coagulopathy. The erector spinae plane block is an interfascial plane block that has generated interest because of a needle tip position away from the neuraxis. This has the potential to mitigate the risks of nerve injury and epidural haematoma formation. The mechanism of action is linked to both paravertebral and epidural distribution of local anaesthetic, providing both somatic and visceral analgesia, with potential utility in obstetric settings. Four women in active labour received either unilateral or bilateral erector spinae plane blocks. All experienced a reduction in pain, ranging from 3 to 6 points measured on a 10-point numerical rating scale. The duration of analgesia ranged from 60 to 120 min. In this report, we discuss potential for using the erector spinae plane block in the management of obstetric pain.

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Introduction

The erector spinae plane (ESP) block, first described as a novel technique for the treatment of neuropathic chest pain, has extended its indications to the provision of analgesia in the cervical region, abdominal cavity and recently the lumbar region [1, 2]. This diversification of indications is partly attributable to its proposed mechanism of action: magnetic resonance imaging shows that local anaesthetic injected into the ESP spreads to the paravertebral and epidural spaces in both cranial and caudal directions from the point of injection, therefore potentially producing both somatic and visceral analgesia in multiple segments [3]. In addition to its technical simplicity, the location of the ESP away from the neural axis might mitigate potentially serious complications associated with neuraxial techniques. The paravertebral-epidural spread of local anaesthetic indicates that ESP blocks may have a role in obstetric practice, thus we implemented this technique in our institution. In this case series, we report the use of ESP blocks in four patients who requested labour analgesia.

Report

Patient one

A 27-year-old gravida 1 para 0 woman at 38 weeks' gestation, requested analgesia at 8-cm cervical dilatation and a pain score of 9/10 on a numerical rating scale. Bilateral single-shot lumbar ESP blocks were performed at the level of the L4 transverse process

with the patient in the right lateral decubitus position. The needle was inserted in-plane from cranial to caudal, using ultrasound guidance with a curvilinear (2–5 MHz) probe placed to obtain a paramedian sagittal transverse process view (Fig. 1) [4]. Twenty millilitres of ropivacaine 0.2% was injected on each side. An epidural catheter was also inserted for the provision of rescue analgesia if required. Within 15 min of completion of bilateral ESP blocks the patient rated her pain as 4/10, which was sustained for the next two hours. At 10-cm cervical dilation, 10 ml of lidocaine 2% with adrenaline 1:200,000 was administered through the epidural catheter. The patient's pain reduced to 2/10; vaginal delivery was uneventful. There were no complications associated with the ESP block.

Patient two

A 24-year-old gravida 1 para 0 woman at 40 weeks' gestation requested analgesia at 7-cm cervical dilatation and a pain score of 10/10 on the numerical rating scale. A multihole catheter was inserted through an 18 G Tuohy needle into the left ESP at the level of the L4 transverse process using ultrasound guidance as described above, and loaded with 20 ml ropivacaine 0.5%. Her pain decreased to 7/10. After 2 h, her pain scores increased to 9/10 and an additional bolus of 10 ml of lidocaine 2% with adrenaline 1:200,000 was administered, decreasing the pain to 6/10. Though the ESP catheter was unilateral, the patient reported an equal, bilateral pain distribution of analgesia. Caesarean section was subsequently required for delivery due to obstructed labour, and this was undertaken uneventfully under spinal anaesthesia. There were no complications associated with the ESP block. We took the decision to perform unilateral instead of bilateral ESP blocks in this and subsequent cases due to our recently-published finding of bilateral epidural spread after unilateral ESP block administration [5].

Patient three

A 17-year-old gravida 1 para 0 woman at 39 weeks' gestation requested analgesia when at 8-cm cervical dilatation and a pain score of 10/10 on a numerical rating scale. A multihole catheter was inserted into the left ESP unilaterally at the level of the L4 transverse process as described above and loaded with 20 ml of lidocaine 1.5% with adrenaline 1:200,000. Pain scores reduced from 10/10 to 4/10. Thirty minutes later, an additional bolus of 5 ml of lidocaine 2% with adrenaline 1:200,000 was administered for delivery. The patient reported only a slight discomfort (pain 2/10) during the delivery. Sensory assessment to pinprick demonstrated a reduction in sensation bilaterally from the level of umbilicus (T10) to the upper thigh (L2). There were no complications associated with the ESP block.

Patient four

An 18-year-old gravida 1 para 0 woman at 39 weeks' gestation requested analgesia at 6-cm cervical dilatation and a pain score of 8/10. A multihole catheter was inserted into the right ESP unilaterally at the level of the L4 transverse process as described above and loaded with 20 ml of lidocaine 0.5% with adrenaline 1:200,000. Pain decreased to 5/10 and remained at this level

Figure 1 (a) Illustration depicting ultrasound probe position and needle approach to the ESP block at the level of the L4 transverse process (b) Ultrasound image showing landmarks, needle approach and spread of local anaesthetic within the erector spinae plane. ESM, erector spinae muscle; PM, psoas major; TP, L4 transverse process. Reprinted with permission of Vicente Roques Escobar.

until the cervix was 9-cm dilated. When fully dilated, 10 ml of lidocaine 2% with adrenaline 1:200,000 was administered and the pain decreased to 2/10 and remained at this level during delivery. The delivery was uneventful and there were no complications associated with the ESP block.

Discussion

Epidural analgesia is commonly used to provide optimal management of obstetric pain. When contra-indicated an alternative is intravenous administration of opioid such as remifentanyl through a patient-controlled analgesic pump. Ours is the first case series to examine the clinical utility and feasibility of the ESP block in the provision of obstetric analgesia. Our experiences suggest that continuous ESP could be useful in this setting and may play an important role in clinical scenarios with contra-indications to epidural analgesia.

Bilateral ESP blocks have been successfully used to provide analgesia for midline abdominal incisions as well as visceral analgesia [6]. However, spread into the epidural space has also been reported, indicating that unilateral ESP block can have bilateral analgesic effects [5, 6]. After obtaining departmental approval, we initially performed bilateral ESP blocks in the maternity setting, but in the second and subsequent cases, it was apparent that unilateral ESP block could provide labour analgesia bilaterally.

When we performed the ESP block in the first patient, we were uncertain if this would be able to produce beneficial analgesia for the second stage of labour as the pain pathways involve the sacral nerve roots. As such, we administered an additional epidural dose of lidocaine with adrenaline at 10-cm cervical dilatation. However, ESP boluses in advanced labour in the other three patients did provide analgesia in advanced labour, and patients three and four reported effective analgesia for delivery. The mechanism of this effect may relate to spread of local anaesthetic to the sacral level with additional boluses, but further study is needed to elucidate the exact process [7].

In this case series, all patients experienced a meaningful reduction in pain scores, dropping from a median numerical rating scale score of 9/10 before the block to 5/10 following the procedure (Table S1).

Labour pain has two well-defined components: visceral and somatic pain. The ESP block mechanism of action is linked to both paravertebral and epidural distribution, providing somatic and visceral analgesia. The intercostal-paravertebral-epidural spread of local anaesthetic injected into the ESP resembles the mechanism of action of epidural analgesia [3–5]. Literature suggests that a single shot ESP block of 20–30 ml spreads in cranio-caudal direction over eight vertebral levels. The L4 level was therefore selected as it is located mid-way between the 10th thoracic and 4th sacral nerve roots, so hypothetically would be the optimal site of injection for labour analgesia [5, 7]. Although epidural is considered the gold standard for obstetric analgesia, it has its own limitations which are mainly related to the insertion of the needle into the vertebral canal. In contrast, the ESP block has minimal risk of causing compressive haematomas or spinal cord injury.

The ESP block has demonstrated comparable pain outcomes to thoracic epidural analgesia in the setting of cardiac surgery [8]. Its use has also recently been reported in a case series of patients who underwent left ventricular assist device implantation, a procedure that requires anticoagulation, with no complications related to vessel puncture or maintenance of analgesia during the anticoagulation period [9]. This potential advantage of the ESP block deserves further investigation in obstetrics, considering that conditions associated with coagulopathy are relatively commonplace among parturients. Literature also suggests that the ESP block confers analgesic characteristics without motor block or haemodynamic disturbance. This is thought to be due to the filtering effects of the soft intertransverse tissues, limiting the spread of local anaesthetic to the intercostal-paravertebral-epidural space [10].

This case series highlights several learning points, including the possibility that the ESP block can provide useful analgesia in obstetric practice; that unilateral lumbar ESP block seems to be sufficient for bilateral analgesia in obstetric patients; and that prolonged analgesia can be achieved by intermittent boluses through an ESP catheter. There was no obvious motor block of the lower limbs observed in the patients in our case series. Likewise, there appeared to be no decrease in the frequency or intensity of uterine contractions on cardiotocograph monitoring, and there was no evidence of hypotension or bradycardia. Though the ideal dosing regimen for ESP block use in obstetrics has not been determined, it appears that 20 ml of lidocaine 0.5% or 1.5% with adrenaline 1:200,000 and 20 ml ropivacaine 0.5% are all effective during the first stage of labour. Although we did not encounter any adverse events, safety precautions for local anaesthetic toxicity or cardiovascular events should be taken, as with any other regional anaesthetic technique involving large doses of local anaesthetic.

The major limitation of this report is the small number of patients, which is inherent to this type of publication. This limits the ability to generalise our findings and carries a risk of over-interpretation. However, this case series serves as a pilot to examine

the feasibility of applying unilateral ESP block with or without catheters in obstetric practice, and a larger prospective study is required to determine the safety and efficacy of this technique in a broader population.

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Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Table S1. Summary of cases of ESP blocks in obstetric patients included in this series. BMI, body mass index; ESP, erector spinae plane; NRS, numerical rating scale.