

Case Series: Novel Use of a Erector Spinae Plane Block At A Lumbar Spinal Level For Coverage Of Sacral Dermatomes

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ABSTRACT

The erector spinae plane (ESP) block is a recent and novel regional anesthesia procedure used primarily for the thoracic region. There is limited use of this block for the lumbar and sacral regions. Here we investigate the use of lumbar ESP blocks for three cases; hip disarticulation, penile burn, and perineal injury. For each case, an 18-gauge Tuohy needle was inserted into the paraspinous region at the L4 level and caudally directed towards the interfascial plane posterior to the transverse process via ultrasound. Once in place, 20-30 mL of 0.5% bupivacaine was injected. Opioid consumption was measured before and after block placement to evaluate for pain control. The ESP block yielded a significant reduction in opioid use for the penile burn and perineal injury cases, while a non-significant reduction was observed in the hip disarticulation case. The use of lumbar ESP block has shown the feasibility and effectiveness for sacral innervated injuries. This nerve block technique has strong potential to improve patient satisfaction and pain control while minimizing opioid reliance in the postoperative and traumatic injury recovery periods for lumbar and perineal injury patients.

Keywords

Erector Spinae Plane Block, Sacral Innervation, Lumbar Innervation, Perineal Injury, Regional, Anesthesia.

Abbreviations

ESP: Erector Spinae Plane, CPNB: Continuous Peripheral Nerve Block, IRB: Institutional Review Board, APS: Acute Pain Service, TBSA: Total Body Surface Area, MVC: Motor Vehicle Collision, PT: Physical Therapy.

Introduction

An erector spinae plane (ESP) block is a regional analgesic technique that has been associated with both a reduction in perioperative pain and opioid consumption as well as a significant prolongation in time before rescue analgesia is requested [1]. ESP blocks use an injection of anesthetic between the erector spinae muscle and the vertebral transverse processes guided with ultrasound [2]. This block has been shown to have a lower risk of major complications as it is relatively far from underlying neurovascular structures [2].

This allows for significant pain management in cardiac and spine surgery cases as these patients would otherwise not be candidates for effective regional anesthesia [2]. Moreover, the ESP block is minimally invasive, providing a low risk of systemic toxicity and high efficacy in the treatment of acute and chronic pain [3]. Because of these advantages, the ESP block is now recognized as an alternative to the conventional thoracic epidurals and paravertebral blocks for acute and chronic pain in a variety of clinical cases involving breast, thoracic, abdominal, and spinal surgeries [3].

The ESP block has shown the most benefit in relieving pain related to rib fractures. Historically, the ESP block is typically performed in the thoracic region, with some reports showing efficacy in analgesia for upper limbs [2]. However, novel case studies have discussed the benefit of ESP blocks in the lower body. In lumbar level cases, there have been numerous reports of inadequate pain control post procedure [4], as pain treatment protocols heavily focus on opioid use, raising long-term concerns about dependence

[4]. The low ESP is reported to be useful in lumbosacral spinal surgery and in transfeminine bottom surgery, avoiding opioid dependence while providing effective analgesia [4,5]. In this case series, the low ESP continuous peripheral nerve block (CPNB) was explored to provide pain relief in areas innervated by the lumbar and sacral spinal roots.

Materials and Methods

Patient informed consent obtained. As the case series is devoid of patient identifiable information, it is exempt from Institutional Review Board (IRB) review requirements as per University of Tennessee Health Science Center.

Case Series/Results

All three of the following cases utilized lumbar ESPs for pain management. To perform the lumbar ESP block, an 18-gauge Tuohy needle was inserted into paraspinous region at the L4 level and caudally directed towards the interfascial plane posterior to the transverse process via ultrasound guidance; once in place 20-30mL of 0.5% bupivacaine was injected. The catheters were threaded caudally and left in place for a CPNB.

Case 1: Hip disarticulation

A 20 year-old male with no significant medical history presented to the level 1 trauma center after a motorcycle crash with several traumatic injuries ultimately resulting in the patient having a hip disarticulation. The Acute Pain Service (APS) was consulted on day 5 of this patient's hospitalization. Initially, the pain was attempted to be controlled with fascia iliaca and popliteal-sciatic nerve blocks. As the patient's care continued, a hip disarticulation was the operative plan, and the anesthesia plan was to place a lumbar ESP in hopes of covering this patient's pain. Due to the patient's injury the pain evaluation was based upon discussions with the patient every morning and noting opioid use. Opioid usage followed a bimodal distribution, peaking around day 22 and day 51. Day 22 was early after the low ESP block was utilized and day 52 was the day after discussing lowering the low ESP infusion. The patient noted that his pain score was significantly reduced with block placement.

Case 2: Penile Burn

A 51 year-old male with a history of substance abuse presented to level 1 trauma center with 1% Total Body Surface Area (TBSA) deep partial and full thickness burn to the penis and scrotum after attempting to pour gasoline into a fireplace. The patient reported a pain score of 10/10. The patient was placed on a multimodal analgesic plan, but ultimately the APS service was consulted on day 4 due to concern for pain control due to the patient's substance abuse history. Given the location of the burns and concern for frequent opioid use, bilateral lumbar ESPs were placed. After block placement the patient noted decreased sensation from T12 downward and had a significant decrease in opioid use. Unfortunately, due to the patient having withdrawal symptoms

and agitation from the bilateral ESP catheters, the catheters were pulled out on day three. There was a significant decrease in opioid consumption following the bilateral ESP placement. While the patient had the bilateral ESPs oxycodone was not used for pain control.

Case 3: Perineal Injury

A 31 year-old female with a history of juvenile rheumatoid arthritis and substance use presented to a Level 1 trauma center after a MVC with a large perineal laceration from left labia to rectum. The APS was consulted on day 4 due to concern for extended duration of intense pelvic/perineal pain consistently reported as 8-10/10 that was intolerant to traditional analgesics. Additionally, due to the patient's history of substance abuse, concerns were noted for frequent opioid use as a potential pain control protocol. This, in combination with inability to meet physical therapy (PT) goals due to pain, led to placement of a low ESP block. After ESP block placement, the patient reported a decrease in pain level, from moderate to severe to none to mild, for their remaining hospital course. Opioid utilization frequency also decreased from an average of 5.43 times daily to 1.47. The patient was also able to tolerate PT activities, such as walking and chair transfers resulting in significant improvement in overall morbidity.

Our findings showed a circumstantial decrease in opioid consumption after lumbar ESP block placement for our penile burn and perineal injury patients. For both these cases, lumbar ESP might be considered a viable alternative for pain control, allowing safer analgesia in patients with substance abuse or other contraindications to opioid use. Exploratory tests with our data suggested a significant difference, however, further testing is required to ascertain the effectiveness of the procedure and determine if the difference in opioid usage is statistically significant.

Discussion

The ESP block is a novel and simple regional anesthetic technique first described in 2016 in the use of neuropathic thoracic pain from metastatic disease and rib fractures [6]. Subsequent studies and case reports have explored the application of ESP in a variety of perioperative and pain control scenarios. Use of ESP was shown to decrease in opioid consumption and improve patient mobility in open cardiac surgery [7]. Continuous ESP has also been used for thoracotomy as an alternative to the epidural analgesia [8]. Lower thoracic ESP blocks have also been performed for lumbosacral spine surgery [4], and breast surgery resulting in reduced opioid use and reported pain scores [9,10]. Most recently, the ESP block provided effective analgesia and reduced morphine usage in penetrating chest trauma secondary to battlefield explosion in the ongoing conflict in Ukraine [11]. Beyond perioperative pain control, ESPs have been performed on chronic pain patients in frozen shoulder, myofascial pain, and postoperative pain with high patient satisfaction [12].

A few cases of lumbar ESP have been reported in the literature. Lower ESP blocks yielded decreased opioid consumption and reported pain in lumbar herniated disc surgery [13]. It was also used as the main anesthetic method for hip surgery in high-risk elderly patients [14]. Our cases show an additional use for a low ESP blocks as they can be used in severe trauma and injuries involving the sacral spinal nerve distribution. In Orthopedics, peripheral nerve blocks are commonly performed and have proven to reduce opiate consumption, allowing for spread of safer opioid prescribing practices and enhanced outcomes [15-17]. In our study, the cases 2 and 3 showed a decrease in opioid use frequency after the placement of the lumbar ESP block, and demonstrated that this technique can be a feasible alternative when compared with standard use of hydromorphone/oxycodone medication.

While low ESP blocks can be a broader alternative for sacral innervated regions, further applications are required to ascertain its effectiveness. While the change in opioid use in case 1 may be due to the timing of the block, or the variance in provider technique, it's also possible that the technique is not effective in this patient's specific hip disarticulation. However, it's also possible that the bimodal peak of opioid use might have affected the results. Increased consumption following the beginning of ESP blocks on day 22 and the weaning discussion on day 51 may have been linked to the patient "preparing" for more pain due to a change, and preemptively intaking a higher dose of opiates.

Acute pain management can be greatly benefited by techniques that reduce opioid intake. Lumbar ESP blocks might be a feasible option for patients with a history of opioid addiction or inability to tolerate opioid analgesics, especially in penile or perineal injuries. Patient satisfaction is another factor typically associated with improved pain control and the ESP may lead to improved clinical experiences following a traumatic sacral injury. As seen in case 3, the ability to tolerate PT at an accelerated pace is associated to effective analgesia. PT is an essential component of any patient's postoperative course or prolonged hospitalization and works closely with pain management services. This synergy between the ESP block's improved pain control and PT may allow patients to begin PT earlier and reach goals more quickly.

Given the decades-long opioid epidemic in the developed world, there has been a paradigm shift away from ordering and prescribing opiates towards multi-modal patient centered pain control. Our case series has shown the effectiveness and feasibility of a low ESP block for lumbar sacral injuries in reduction of opiate consumption, and improvement in pain control, patient satisfaction, and physical therapy. Usage of low ESP Blocks needs to be assessed using studies with greater size and scope with broadened indications, as well as determining a clearer mechanism of action. ESP blocks have potential to become a standard tool in lumbar and perineal pain management.

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