

# Surgeon Placed Erector Spinal Plane Block Catheter for Administering Continuous Regional Anesthesia after Lumbar Fusion

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## Abstract

Regional anesthesia for spine surgery is difficult to provide on a consistent basis. This is especially important after arthrodesis procedures which tend to have significant post operative pain. Poor postoperative pain control leads to immobility, increased length of stay, increased narcotics usage, and lower patient reported outcome measures.

**Keywords:** Injections/Interventions; Surgery; Thoracolumbar; Spine regional anesthesia; Regional anesthesia; Following lumbar fusion

## Introduction

The erector spinae plane block ( ESPB) has been recently described as a solution for this difficult clinical challenge. ESPB has become a popular treatment modality due to its ease of application and extensive safety profile. The variability of the spinal anatomy may dictate how clinically effective ESP can be as a regional anesthesia treatment option for spine surgery patients. [1]. Specifically, craniocaudal spread for local anesthetics for ESPB is limited in the lumbar region when compared to the thoracic region. Different volume of anesthetic agent has been noted to provide adequate coverage. One study found a median of 3.3 mL of local anesthetic was needed to cover one vertebral level, but when considering the whole vertebral column, 2.5 mL was needed for thoracic, and 5 mL were needed for the lumbar area.

The cervical, thoracic or lumbar regions of the spine for the desired block requires different approach, trajectory and depth to create an effective “plane block”. For lumbar spine indications, the application point is deeper and more lateral, therefore, ESPB is more challenging and difficult to perform and visualize with ultrasound when compared to thoracic spine trajectories. [2].

There are descriptions of anatomic landmark guided ESPB as an alternative option. In landmark guided ESPB, the procedure can be performed by targeting the transverse process 3 cm lateral to the spinous process for the thoracic and 5–6 cm lateral to the spinous process for the lumbar area. Lumbar ESPB (L4) using the landmark technique has also been reported with adequate analgesia obtained in hip surgery. These landmarks are easily identified in the lumbar spine with the use of fluoroscopy [3].

## Discussion

ESP “ single shot “ blocks have been found to provide benefit to patients undergoing lumbar fusion. One study showed that total opioid consumption, as morphine equivalent, was higher in the control group than the ESPB group. In the ESP block, local anesthetic spreads within the musculofascial plane deep to the erector spinae muscle and acts on the dorsal rami of spinal nerves at multiple levels [4]. The branches of the dorsal rami innervate the paraspinal muscles and the vertebrae itself. A review of the literature two randomized controlled trials showed that ESPB may reduce postoperative opioid consumption and pain scores in patients undergoing lumbar surgery. One study suggested that the ESPB “ single shot “ could last for 6– 8 hrs after the operation. The duration of ESPB block was related to the type and dose of local anesthetics [5].

To provide similar coverage in the lumbar spine requires twice the volume of local anesthetic, when compared to effective blocks in the thoracic spine. Therefore, the efficacy ESP for regional anesthesia of the spine may be volume dependent, making single shot ESP less effective. Thus, would a catheter based continuous infusion be able to overcome the limitations of single shot ESPB.

The volume of medication also has regional effects. Evidence indicates that 20 ml of injectate can extend 3–8 vertebral levels. Implementing the ESP block for PLIF surgery has been found to provide a significant reduction in postoperative pain and length of hospital stay, by allowing earlier mobilization. Interestingly, only one article reported that postoperative pain in the lumbar spine was relieved by ESPB and catheterization (placement of a continuous peripheral nerve catheter) [6]. After low concentration and high-volume boluses, 5–10 mL/h continuous infusion maybe suitable for interfascial plane blocks.

In a lumbar ESPB performed using a thoracic approach, Darling et, placed a catheter at the T11-12 level and advanced the catheter caudally to the lumbar area with excellent results. Continuous infusion of anesthetic at low volumes (7cc per catheter) would provide sufficient volume for the lumbar region [7].

Only two reports of catheter use for continuous infusion for regional anesthesia both in knee surgery population have been reported with successful result

## Purpose

To evaluate the efficacy of surgeon placed erector spinae plane block with fluoroscopic guidance for catheter placement and continuous bupivacaine infusion in lumbar fusion patients [8].

## Study Design/Setting

Case Report, retrospective chart review from single surgeon at a single institution. for lumbar 23 one- and two-level MIS lumbar

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Received: 25-Jul-2022, Manuscript No. JPAR-22-69535; Editor assigned: 27-Jul-2022, PreQC No. JPAR-22-69535 (PQ); Reviewed: 09-Aug-2022, QC No. JPAR-22-69535; Revised: 15-Aug-2022, Manuscript No. JPAR-22-69535 (R); Published: 22-Aug-2022, DOI: 10.4172/2167-0846.1000453

Citation: Verdon M (2022) Surgeon Placed Erector Spinal Plane Block Catheter for Administering Continuous Regional Anesthesia after Lumbar Fusion. J Pain Relief 11: 453.

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fusion patients had surgeon placement of ESP block catheter with 1-3 days of infusion of bupivacaine placement. We compared this data to similar patients undergoing the same procedure with the same surgeon without ESP blocks or catheter placement.

Standardized, multimodal analgesia including acetaminophen, Toradol, and oral opioids (titrated to pain scores) were provided to both groups [9].

### Technique

At the close of surgery, we accessed the Erector Spinae Plane, 2 levels proximal to index surgery level. Starting 5-6 cm off midline to estimate the pedicle location with an 18 and 20-gauge spinal needle into erector spinae muscle. We took fluoroscopic images for localization and guidance with AP and Lateral views. We utilize fluoroscopic images to place the spinal needles and catheter on bone at the junction of the lateral aspect of the facet and superior aspect of the transverse process. This is a familiar starting point for pedicle screw placement or a medial branch block. This also places the surgeon in the subfascial plane to for ESP. We administered a 10cc, bolus (block) through catheter. This allowed “opening” of the erector spinae plane. In PACU attach “Pain ball”, infusion begins from both catheters at 7 cc/hr. for 3 days.

### Outcome Measures

The primary outcome was total opioid consumption and length of stay. Total opioid consumption comprised the sum of oral and intravenous (clinician-administered and intravenous) opioid used, during the PACU and floor phases of care. LOS, duration of intravenous and oral, opioid-consumption between PACU admission and hospital discharge [10].

Without ESP, block LOS = 3.77 days

Avg Narcotics IV= 3.8 mg Dilaudid

PO= 201mg Oxycodone

With ESP, LOS = 1.6 days ( Total )

Total 1.285 ( single Level )

Avg Narcotics IV=0 mg Dilaudid

PO= 33.5 mg Oxycodone

This is a case report for the twenty-five consecutive patients undergoing MIS lumbar fusion (10- 2 level, 15- 1 level) with fluoroscopically guided, surgeon placement erector spinae plane catheter for continuous local anesthetics infusion. This provided regional anesthesia via bupivacaine infusion for 1-3 days during the immediate postoperative period. This was compared to 25 patients by the same surgeon at the same institution who underwent the same MIS 1-2 level Lumbar fusion without regional anesthesia (ESP) for lumbar spine surgery.

### Conclusion

For spine surgeons, regional anesthesia requires relying on the

availability and expertise of other physicians. Often the inconsistent availability of anesthesia providers, leads to eliminating it as a consistent treat modality for post operative pain. This is the first description of surgeon placed ESP catheters using fluoroscopy, a technique familiar to most spine surgeons. In a busy spine surgery practice the availability of anesthesia providers are who are comfortable with erector spinae plane block or catheter placement for post operative spine surgery patients is not predictable or feasible. These patients do not have access to this technique currently offered by a finite number of anesthesia providers. Spine surgeons are well versed in the fluoroscopic anatomy of the lumbar spine and have a skill set amendable to safe, reproducible placement of ESP blocks and catheters for continuous anesthesia regional block.

The overall length of stay for patients who received ESPB and catheter infusion, was decreased by 60 % and for one level surgery the LOS was one-third of the non-ESP group. Narcotic consumption was also impacted. From an average of 3.88 mg IV Dilaudid to avg of 0 mg IV dilaudid and oral opiate consumption went from 200mg Oxycodone to 30mg, representing an 85% decrease

We believe this warrants further randomized data collection to evaluate if the benefits of decreased LOS and narcotics consumption can be reproduced across multiple sites and practices.

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