Effect Of Ultrasound-guided ESP Block In Patients Undergoing Lumbar Open Fusion Surgery: A Retrospective Case-control Study

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Figures

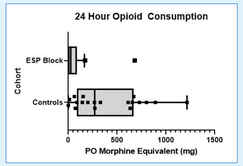

Figure 1: Univariate box-plot illustration of 24hr opioid consumption measured in oral morphine milliequivalents (mg)

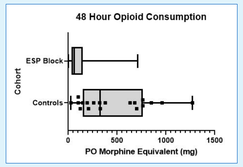

Figure 2: Univariate box-plot illustration of 48hr opioid consumption measured in oral morphine milliequivalents (mg)

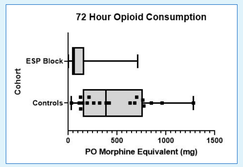

Figure 3: Univariate box-plot illustration of 72hr opioid consumption measured in oral morphine milliequivalents (mg)

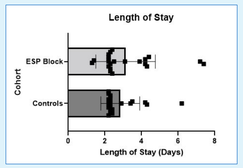

Figure 4: Univariate box-plot illustration of length of hospital stay measured in days

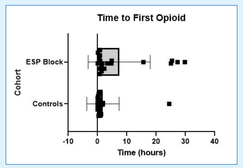

Figure 5: Univariate box-plot illustration of time to first opioid measured in hours

Introduction

Open transforaminal lumbar interbody fusion can be associated with significant postoperative pain, often requiring inpatient hospital admission due to inadequate analgesia or opioid-related adverse effects. Regional anesthesia has become widely accepted in the current era of opioid-sparing anesthesia and the combination of general and regional anesthesia has been shown to provide excellent analgesia in most clinical settings. The erector spinae plane (ESP) block is a recently described ultrasound-guided fascial plane block that has been shown to be an effective method for post-operative analgesia after breast and thoracic surgery. Our anesthesia practice adopted the use of lumbar ESP blocks for lumbar spine surgery as part of an enhanced recovery after surgery (ERAS) protocol in June 2020. The goal of this study was to compare post-operative opioid consumption between patients treated with ESPB versus historical controls in patients undergoing lumbar open fusion.

Methods

In this study, we performed a retrospective, observational study of patients undergoing lumbar fusion at an urban, community hospital in Connecticut. This study was reviewed by Hartford Hospital Institutional Review Board. The study involved two cohorts of patients, those receiving lumbar open fusion surgeries with ESP blocks from June – September 2020 and those who underwent the same type of surgery without ESP blocks from January 2020 – May 2020. The sample was comprised of men and women, aged 18-89 who underwent elective, posterior lumbar spine fusion from January – September 2020. Those with a preoperative BMI >50 and those using more than 20 morphine milligram equivalent (MME)/day preoperatively, as documented in the medical record, were excluded. Cumulative opioid requirements were tabulated in MME for the first 24, 48, and 72 hours after surgery.

Data Collection & Results

Records were identified through the hospital electronic health record (EHR) based on type of procedure, using an ICD code consistent with lumbar pain, radiculopathy, disc degeneration, disc herniation, foraminal stenosis, or 1-2 level spondylolisthesis or deformity. SPSS was used for statistical analysis. Student T-tests were used to compare cohorts. Results yielding $p<0.05$ were deemed statistically significant.

A total of 41 patients were included in the study (19 control group, 22 ESP group). A demographic breakdown of cases and controls can be seen below:

Age	Controls (no ESP)	Cases (ESP)
20 - 39	2 (10.5%)	1 (4.5%)
40 - 59	11 (57.5%)	7 (31.8%)
60 - 79	6 (31.6%)	13 (59.1%)
80+	0 (0.0%)	1 (4.5%)

Gender	Controls (no ESP)	Cases (ESP)
Male	11 (57.9%)	10 (45%)
Female	8 (42.1%)	12 (55%)

At 24 hours after surgery, the mean (and SD) MME was 410.9 (353.3) and 72.59 (144.81) for control and ESP groups respectively ($p = 0.0002$). At 48 hours after surgery, the mean (and SD) MME was 463.8 (353.9) and 126.3 (183.3) for control and ESPB groups respectively ($p=0.0004$). At 72 hours after surgery, the mean (and SD) MME was 472.7 (351.5) and 143.8 (192.2) for control and ESP groups respectively ($p=0.0005$).

Mean time to first opioid was lower in the control group (1.8 hours) compared to ESPB group (7.4 hours) but this was not statistically significant. Mean length of stay was not significantly different in the control group (2.8 days) versus ESPB group (3.1 days).

Discussion

Although there is a robust body of literature recommending regional anesthesia for spine surgery, there is a lack of consensus on the optimal type of block, be it erector spinae blocks, retrolaminar blocks, or thoracolumbar interfascial plane blocks. In this retrospective study, we found that bilateral lumbar ESP blocks were both logistically easy to implement in our workflow and yielded robust decreases in postoperative opioid consumption. It is important to note that this study has limitations, including lack of ability to control for our multimodal analgesia regimen, and possible restrictive inclusion criteria.

Conclusion

A statistically significant decrease in opioid requirement in the ESP block group, as compared to the historical control group, was noted up to 72 hours after open transforaminal lumbar interbody fusion surgery. The data from this study supports ESP blocks as an effective method of post-operative pain management after open fusion. Additional investigation will help to determine the role of the ESP in terms of other outcome measures (rehabilitation metrics, quality of recovery, and cost-benefit analysis analysis) as well as gauge its relative efficacy with minimally invasive surgical approaches.

References

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