

## Efficacy of Dexmedetomidine Plus Ropivacaine 0.375% Versus Dexamethasone Plus Ropivacaine 0.375% Administered by Ultrasound-Guided Bilateral Spinal Erector Block on Post-Surgical Patients of Lumbar Spine Surgery

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### Abstract:

**Introduction:** The ultrasound-guided erector spinae block is an analgesic option that has shown a positive response in postoperative pain control in spinal surgery.

**Objective:** To evaluate the efficacy of dexmedetomidine plus 0.375% ropivacaine compared with dexamethasone plus 0.375% ropivacaine administered in the ultrasound-guided bilateral erector spinae plane in the management of postoperative pain in patients undergoing lumbar spine surgery at Hospital Civil de Guadalajara.

**Material and Methods:** Fourteen patients scheduled for lumbar spine surgery were included, divided into two groups. Group A received dexmedetomidine plus ropivacaine bilaterally in the plane of the spinal erector guided by ultrasound, while group B received ropivacaine plus Bilateral dexamethasone using the same technique.

**Results:** Post-surgical pain in group A and group B presented an average baseline pain of  $3.88 \pm 0.84$  and  $5.17 \pm 1.17$  on VAS, respectively. At 8 hours, an average value of  $3.13 \pm 1.64$  and  $2 \pm 1.55$  on VAS, at 24 hours. hours was  $2.13 \pm 0.84$  and  $2.33 \pm 1.03$  VAS and at 48 hours it was  $1.88 \pm 0.641$  and  $2.33 \pm 1.37$  VAS.

**Conclusions:** The administration of dexamethasone generates a more effective analgesia at 8 postoperative hours compared to dexmedetomidine in our group. The spinal erector plane block is a good alternative for post-surgical pain, demonstrating efficacy and safety in patients scheduled for lumbar spine surgery.

### 1. INTRODUCTION

Spine surgery causes intense and severe pain in the postoperative period. Surgical patients require effective analgesia, since immediate post-surgical treatment has an important influence on early recovery, mobilization, days of hospital stay and complications. Postoperative pain management should include blocking different pain pathways because during surgical procedure the manipulation of different tissues like vertebrae, intervertebral discs, ligaments, subcutaneous and cutaneous,

innervated by the dorsal branches of the spinal nerves are directly involved in pain..

The management for pain in spinal surgeries is based on multiple modalities from non-steroidal anti-inflammatory drugs, opioids, ketamine, gabapentinoids, intravenous lidocaine, neuraxial blocks, and regional anesthetic techniques, such as the thoracolumbar interfascial plane block and the lumbar plane block. Ultrasound-guided erector spinal plane block is an analgesic option that has shown a positive response in postoperative

pain control in spinal surgery, as well as a reduction in adverse effects related to opioids use. (1)

The spinal erector plane block (SEPB) is considered an easy procedure to perform where the local anesthetic injected in the fascial plane towards the erector muscle is dispersed at different levels performing a multidermatomal coverage, which blocks the ventral and dorsal branches of the spinal nerves, and also the communicating branches which are responsible for transmitting sympathetic information; It can be useful, in multiple procedures, in addition to the use of adjuvant drugs that perform functions such as prolonging analgesia. (2)

## **2. ULTRASONOGRAPHY-GUIDED SPINAL ERECTOR BLOCK IN SPINE SURGERY**

The Spinal Erector plane block (SEPB) is based on the spread of local anesthetics cranially in the fascial plane deep to the erector spinae muscles and superficial to the vertebrae (specifically transverse process and intertransverse ligament). This fascial plane allows the spread of the local anesthetic to the paravertebral space to encompass the ventral and dorsal rami, with an average of 4.6 intercostal spaces. The original description of thoracic SEPB block identifies 3 muscles superficial to the hyperechoic transverse process: trapezius, rhomboid major, and erector spinae. The erector spinae muscle can be identified at the lumbar level superficial to the transverse processes, covered by the thoracolumbar fascia. The relationship of the erector spinae muscle with the paravertebral space and the adjacent structures does not change between the thoracic and lumbar regions, which justifies the feasibility of the block at the lumbar level. (3,4)

Non-opioid-based techniques, such as ultrasound-guided bilateral SEPB; it is a regional anesthetic technique that produces analgesic effects like epidural blocks, however, it is far from the spinal cord and with a simplicity in the process, this technique promises to reduce the complications associated with the use of opioids, as well as a reduction in costs and days of hospital stay. Most of the studies carried out with this technique as post-surgical analgesia in lumbar spine surgery are case reports; there are very few cohort studies or randomized controlled

trials. In the Latin population there are no studies carried out with this option of analgesic technique and drugs in lumbar spine surgery that evaluate its efficacy. (5,6)

### **Objective**

To assess the efficacy of dexmedetomidine plus ropivacaine 0.375% versus dexamethasone with ropivacaine 0.375% administered in the ultrasound-guided bilateral erector spinae plane for postoperative analgesia in patients undergoing lumbar spine surgery.

**Type of study:** Clinical trial, open randomized conducted by the anesthesiology Service on the Civil Hospital of Guadalajara Fray Antonio Alcalde.

### **Inclusion criteria:**

1. Patients scheduled for lumbar spine surgery that includes (lumbar intervertebral disc prolapse, narrow canal, discectomy, lumbar disc protrusion, lumbar fracture, lumbar stenosis or laminectomy).
2. Patients between 18 and 65 years old.
3. Patients with physical status ASA I, II.
4. BMI < 35.

### **Exclusion criteria**

1. Patients with severe hematological diseases.
2. Severe lung disease (GOLD class C or D).
3. Patients with severe heart disease (NYHA III-IV, AHA D).
4. Patients with severe kidney disease (estimated glomerular filtration rate 60ml/min x 1.73 m<sup>2</sup>sc).
5. Severe liver disease (Child-Pugh B-C).
6. Allergy to local anesthetics
7. Recent lumbar surgery less than 1 year (laminectomies).
8. Patients with poor echosonographic window

## **3. STATISTIC ANALYSIS**

The information was analyzed in SPSS Statistics version 23, after coding the variables, the analysis of the results, obtained chi square or Fisher's method for dichotomous nominal qualitative variables, Student's T for comparison of means and Mann Whitney U for ordinal qualitative variables and for

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quantitative variables with non-parametric distribution. Statistical significance was taken when obtaining  $P < 0.05$ .

### Financial resources

The resources used depended on the hospital, no income from laboratories or third parties was used.

### 4. RESULTS

Group A (dexmedetomidine plus ropivacaine) has a total of 8 patients, of whom 37.5% are female and 62.5% male, with a mean age of

$45.3 \pm 13.9$  years, classified according to physical status in ASA I with 12.5% and in ASA II 87.5% of the patients in the group, the average duration of the surgery was  $172 \pm 66.58$  minutes. In group B (ropivacaine plus dexamethasone) there is a total of 6 patients, of which 16.7% are female and 83.3% male, with an average age of  $55.1 \pm 7.7$  years, 16.7% were classified as ASA I. and in ASA II 83.3% of the patients belonging to this group, the average duration of surgery was  $174.5 \pm 40.52$  minutes and they had an average hospital stay of  $2.17 \pm 0.41$  days (Table 1).

**Table1.** Demographic comparison of groups a and b.

Variables	Group A (n=8)	Group B (n=6)	p
Age (years)	45.38 ( $\pm 13.96$ )	55.17 ( $\pm 7.71$ )	0.149
Weight (Kilograms)	92.25 ( $\pm 10.67$ )	77.33 ( $\pm 14.60$ )	0.084
Height (meters)	1.72 ( $\pm 0.084$ )	1.66 ( $\pm 0.054$ )	0.112
BodyMass Index	31.35 ( $\pm 4.23$ )	28.11 ( $\pm 4.39$ )	0.192
Gender (%)			
Feminine	37.5	16.7	
Masculine	62.5	83.3	
Asa (%)			
I	12.5	16.7	
II	87.5	83.3	
Diabetes			
Yes	25	16.7	
No	75	83.3	
Surgical time (hours)	172 ( $\pm 66.58$ )	174.5 ( $\pm 40.52$ )	0.932
Days of hospital stay	3.13 ( $\pm 0.64$ )	2.17 ( $\pm 0.41$ )	0.008

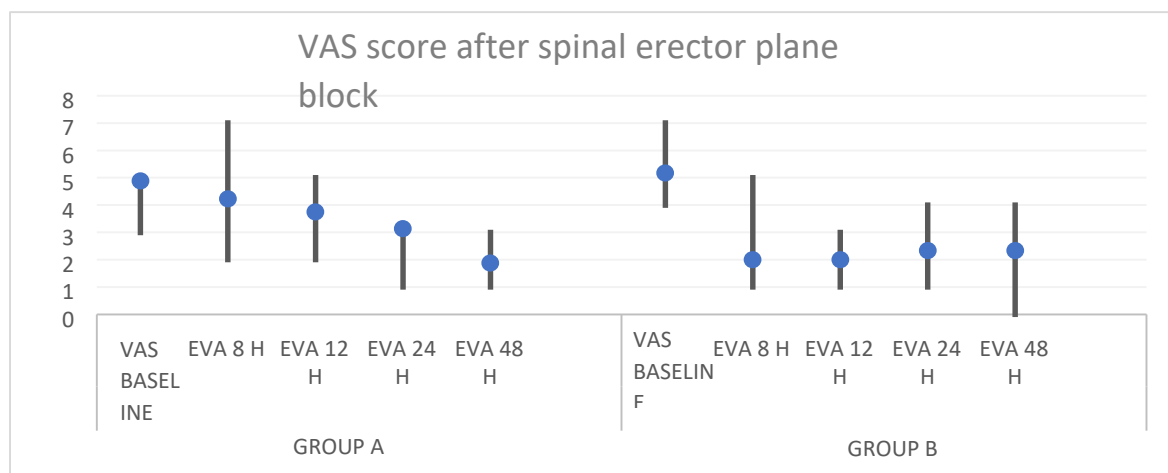
The diagnosis of patients in group A was 25% narrowed canal, 25% disc protrusion, 12.5% disc herniation L3-L4, 12.5% disc herniation L3-L4, L4-L5, 12.5% disc herniation. disc L2-L3, L3-L4 and 12.5% of disc herniation L1-L2; while in group B 16.7% were L2-L3 disc herniation, 16.7% L5-S1 disc herniation, 16.7% disc protrusion, 16.7% spinal fusion, 16.7% L2-L3 disc herniation, L3-4 and 16.7% of vertebral fracture. The type of surgeries performed in group A was 62.5% laminectomy and 37.5% discectomy; in group B, 66.7% had laminectomy, 16.7% discectomy and 16.7%.

Regarding the adverse effects of both groups, only nausea/vomiting occurred at 8 hours in 2 patients from group A, urinary retention in one patient from group A and post-surgical ileus in

2 patients from group A. Group B did not present any effect secondary.

Regarding the evaluation of postoperative pain, group A presented an average baseline pain of  $3.88 \pm 0.84$  on VAS, at 8 hours an average value of  $3.13 \pm$

$1.64$  on VAS, at 12 hours an average of  $2.75 \pm 1.04$  VAS, at 24 hours it was  $2.13 \pm 0.84$  VAS and at 48 hours it was  $1.88 \pm 0.641$  VAS. In group B, baseline pain of  $5.17 \pm 1.17$  VAS was found, at 8 hours an average value of  $2 \pm 1.55$  in VAS, at 12 hours an average of  $2 \pm 0.89$  VAS, at 24 hours an average of  $2.33 \pm 1.03$  VAS and at 48 hours was  $2.33 \pm 1.37$  VAS (Graph 1). Obtaining a value of  $p=0.048$  for the baseline VAS,  $p=0.216$  for the VAS at 8h,  $p=0.173$  at 12h,  $p=0.695$  at 24h and  $p=0.473$  at 48h. In group A, 2 patients required analgesia, while in group B only 1 ( $p=0.707$ ).



**Graph1.** Baseline VAS score, at 8, 12, 24 and 48h in the patients.

## 5. DISCUSSION

Lumbar spine surgery is a frequently performed surgical procedure, due to the type of implications in matters of nerve root manipulation and spinal cord compression, pain management is something that forces us to seek treatments and strategies for effective post-surgical analgesic control. In this study the efficacy was assessed and the use of adjuvants such as dexmedetomidine was compared with dexamethasone in conjunction with local anesthetic (ropivacaine 0.375%), in ultrasound-guided bilateral erector spinae plane block, to improve postoperative analgesia.

Multiple studies point to the bilateral erector spinae block at the lumbar level in microendoscopic surgeries with lower numerical pain ratings than the group that did not receive the block, likewise Swati S et al. point out that the group that received bilateral ESP block showed that postoperative consumption of morphine was significantly less in patients in the ESP block group compared to the control group, and pain at 6 hours after surgery was less in the ESP block group compared to the control group. (7) The studies by Fusco P et al., who point out that the addition of dexamethasone as an adjuvant in ultrasound-guided spinal erector blockade can provide long-lasting analgesia and improve the quality of analgesia, as well as reduce the intensity of postoperative pain and consumption of opioids.

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Our results revealed lower levels of pain by means of VAS in the first 12 in the dexamethasone group, however, in the dexmedetomidine group the VAS score at 48 hours was lower, as soon as the effects related to opioids were found to have a higher incidence. lower (no patients) in the dexamethasone group compared to the dexmedetomidine group, consistent with what we have found in this study. (8,9)

Some studies indicate the use of ESP blockade to reduce rescue analgesics by up to 48%, with 79% of our total patients not requiring rescue medication. [10]

## 6. CONCLUSION

Our study shows that both analgesia schemes for lumbar spine surgery can be performed safely, however, the administration of an adjuvant such as dexamethasone generates more effective analgesia at 8-12 postoperative hours compared to dexmedetomidine.

In general, the spinal erector plane block can be considered a good alternative for post-surgical pain, demonstrating efficacy and safety in patients scheduled for lumbar spine surgery. It can be inferred that both analgesia schemes reduce the adverse effects of drug use. Opioid. Although our population is small to consider significance and reproducibility of the study, we highly recommend reproduction on higher scale.

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**Citation:** Javier Iván Armenta Moreno, et.al., *Efficacy of Dexmedetomidine Plus Ropivacaine 0.375% versus Dexamethasone plus Ropivacaine 0.375% Administered Byultrasound-Guided Bilateral Spinal Erectorblockon Post-Surgical Patients of Lumbar Spine Surgery.* *ARC Journal of Anesthesiology.* 2023; 8(1):1-5. DOI: <http://dx.doi.org/10.20431/2455-9792.0801001>.

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