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A Prospective Randomised Single Blinded Controlled Study to Evaluate the Effect of Single Shot Usg Guided Erector Spinae Block on Postoperative and Intraoperative Analgesia in Lumbar Spine Surgeries in Patients Receiving balanced General Anaesthesia.

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Abstract

BACKGROUND: Postoperative pain management is a matter of concern for every anaesthesiologist. Effective pain management is now an integral part of modern surgical practice. **Objectives:** This work aimed to evaluate whether single dose USG guided erector spinae block post induction prior to surgery decreased the requirement of opioid both during intra operative period and in the postoperative period in the form of delayed first demand of analgesic. **METHODS**: Eighty patients belonging to ASA Grade I/II, aged 18-60 years, scheduled for lumbar spine surgeries under general anesthesia were included in the study conducted at Govt; medical college hospital Srinagar. The patients were divided into two groups A and C each group comprising of 40 patients. Group A (ERECTOR SPINAE) was given 40ml 2% ropivacaine 20ml on each side of spine as single shot post induction prior to incision and after giving prone position. GROUP C (CONTROL) was given 40ml of 9% normal saline 20ml on each side of spine post induction and after giving prone position. **Results:**

Results displayed that the first demand of analgesia was delayed in patients of group A as compared to control group which was statistically significant (P<0.05). The intraoperative Fentanyl consumption was less in group A as compared to patients of group C which was statistically significant (P<0.05). Postoperative fentanyl consumption was less in patients of group A as compared to control group (P<0.05). The consumption of rescue analgesia injection tramadol was less in patients of group A (ERECTOR SPINAE) then in patients of group C (control) (P<0.05). Conclusion: Giving single shot USG guided erector spinae block 40ml 2% Ropivacaine 20 ml on each side of spine post induction and prior to surgical incision provides good quality of analgesia, reduces opioid consumption both intraoperative and postoperative.

Keywords: Erector Spinae Block, Ropivacaine, USG Guided, Postoperative Pain.

INTRODUCTION

Pain control is an important direction of postoperative management in lumbar spinal surgery. Inadequate pain control increases cardiac and respiratory complications, as well as delays mobilization, increasing the length of hospital stay and the risk of chronic pain syndrome .[1] For all these reasons, multimodal analgesia is most likely an important strategy in reducing postoperative pain following spinal surgery .[2] Opioids are known to play a role in moderate-to-severe pain management, while NSAIDs are effective in pain management where inflammation is the cause. However, the side effects of opioids, such as respiratory depression, nausea, vomiting, and pruritus, should also be considered. Systemic methods, as well as regional methods, are an important step in multimodal analgesia. Recently, interfascial plan blocks have started to be involved in postoperative pain management after lumbar surgery .[3] Interfascial plane blocks reduce opioid consumption without motor blocks, such as neuraxial blocks, providing adequate long-lasting postoperative analgesia .[4] Fascial plane blocks are techniques used to manage pain, both in the perioperative period and in the treatment of chronic pain. In recent years, different types of fascial blocks have been described and there has been an increase in their clinical applications. The main advantages offered by these techniques include the ease of performing them, the analgesic efficacy, and the low risk of complications. One of the newest techniques that have been described recently is the erector spinae plane (ESP) block.

Erector spinae plane (ESP) block is one of the newer interfascial techniques with potential applications. ESP block is an interfascial block that can be performed by superficial or deep needle approach. In superficial needle approach technique, drug is injected between rhomboid major muscle and erector spinae muscle, whereas in the deep needle approach, drug is injected below erector spinae muscle. The ESP block, is a block made by injecting local anesthesia between the deep fascia of the erector spinae muscle and the transverse process and targeting the dorsal and ventral rami of the spinal nerves. Although studies have not completely defined the mechanism of the ESP block, the analgesic efficacy of the ESP block is thought to be due to local anesthetics spreading to the paravertebral space. [5,6]

MATERIALS AND METHODS

The present study was conducted in the department of anesthesiology in Govt; medical collage Srinagar from September 2018 to September 2019 for eighty patients of (ASA) physical status I-II of both sexes, aged between 18 to 60 years, equally divided in to two groups, Group A (n=40) and Group C (n=40), (scheduled for lumbar spine surgeries under general anesthesia were included in this prospective, randomized, observational study. After getting approval from Institutional Ethical Committee, written informed consent was obtained from all the patients before surgery.

All patients were transported to the operating room without premedication. On arrival to operating room, an 18-gauge intravenous (IV) catheter was inserted and 6ml/kg/h crystalloid was infused intraoperatively, monitoring of electrocardiography, non-invasive blood pressure, oxygen saturation (SpO_2) was started and baseline values were recorded. Pre-oxygenation with 100% oxygen (O_2) was done for 3 min. General anesthesia was induced with IV propofol 2.0–2.5 mg/kg followed by succinyl choline 2 mg/kg to facilitate tracheal Intubation. The trachea was intubated with a cuffed trachealtube(flexomettalic) of appropriate size. Anesthesia was maintained with 60% N_2O in oxygen with 0.5–1% isoflurane. Intermittent boluses of atracurium bromide were used to achieve muscle relaxation. Minute ventilation was adjusted to maintain normocapnia (end tidal carbon-dioxide [$EtCO_2$] between 34 and 38 mm Hg) and $EtCO_2$ was monitored.

All the patients were then given prone position. A high-frequency linear ultrasound transducer sagittally placed against the target vertebral level in the prone position and moved in approximately 3-cm lateral to the spinous process. The erector spinae muscle and transverse muscle were then identified, and a needle was advanced through the interfascial plane between the erector spinae and the underlying transverse process; thereafter, the local anesthetic was administered into the space. The bilateral ESP blocks were performed by injecting 40 mL of 2% Ropivacaine (20 mL into each side) into the fascial plane between the deep surface of the erector spinae muscle and the transverse processes of the lumbar vertebrae in group A (ERECTOR SPINAE) and GROUP C (CONTROL) was given 40ml of .9% normal saline 20ml on each side of spine post induction.

The primary outcome measurement was the Numerical Rating Scale (NRS) pain score (a scale of 0–10, where 0=no pain and 10=worst pain) at various time points until the morning of postoperative day 2. Each patient's pain level was measured by two nurses at 1, 2, 4, 6, 12, and 24 hours postoperatively and on the morning of postoperative day 2. The secondary outcome measures were the amount of intravenous Fentanyl bolus administered during the first 24 hours after surgery and the number of patients who reported complications such as nausea and vomiting until the morning of postoperative day 2.

RESULTS

In total, 80 patients were analyzed; of these 40 patients received ESP block Group A whereas the other 40 received equal amount of normal saline. Patient demographic data are reported in Table 1, The ESP block was performed by anesthesiologists who were skilled in ultrasound-guided nerve block. The NRS pain scores in the A group were lower at 1, 2, 4, 6, 12, and 24 hours, as well as on the morning of postoperative day 2, as compared with those in the C group (comparisons at all measured time points were $p<0.05$).

Table 1: Demographic Profile of patients.

Variables	Group A (n=40)	Group C Control (n=40)	P value
Age	48.68 ± 8.54	46.72 ± 6.62	>0.05
Weight	61.52 ± 4.63	62.20 ± 4.35	>0.05
Height	157.10 ± 4.59	155.38 ± 4.79	>0.05
M/F	14/26	12/28	>0.05
ASAI/II	28/12	31/9	>0.05
Duration of surgery	75.65 ± 12.30	77.80 ± 16.10	>0.05

Numerical Rating Scale (NRS) pain score at different time intervals were statistically significantly lower at all times in Group A than Group C p-value ($p<0.05$).Fig.1

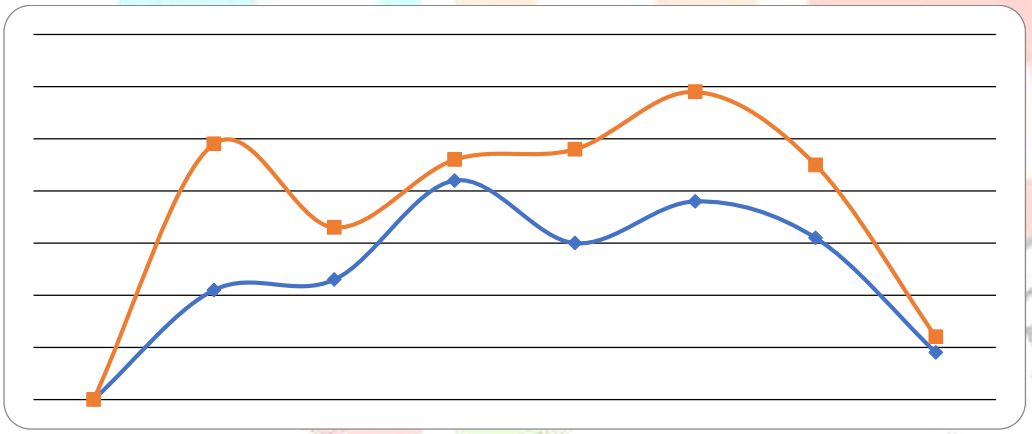

Fig .1:Post operativeNumerical Rating Scale (NRS) pain score (mean±SD) in studied groups.

Table 2: The amount of Fentanyl bolus administration intravenously during intraoperative and postoperative period among the study groups:

Variables	Group A (n=40)	Group C Control (n=40)	P value
Intraoperative Fentanyl	40 ± 10.50	80 ± 15.75	<0.05
postoperative Fentanyl	20.10 ± 5.55	60.30 ± 10.50	<0.05

The amounts of Fentanyl administered were lower in the Group A than in the Group C at all measured time points (all data were less than p <0.05). As per as post operative complications is concerned like vomiting and nausea there was no such incidents in the study population.

DISCUSSION

The ultrasound-guided erector spinae plane (ESP) block is one of the newly described interfascial plane blocks that provide thoracic analgesia at the T5 leveland abdominal analgesia at the T7 to T9 level. We were interested in ESP block because it is easily performed and safe under ultrasound guidance (USG). Therefore, we think that ESP block could be a good alternative to other techniques in postoperative analgesia management after spine surgery.

Major lumbar spine surgery causes severe postoperative pain. The primary objective of this randomized controlled study was to compare the effect of ultrasound (US)-guided erector spinae plane (ESP) block on 24-hour postoperative opioid requirements.

In the present study, Postoperative and intraoperative Fentanyl consumption was significantly lower in patients in the ESP group compared with those in the control group (20.10 ± 5.55vs60.30 ± 10.50 mcg (40 ± 10.50vs80 ± 15.75) respectively; P<0.005). All patients in the control group required supplemental Fentanyl compared with only 7 (5.71%) in the ESP block group (P=0.001). Pain scores immediately after surgery (P=0.001) and at 6 hours after surgery (P=0.002) were lower in the ESP block group compared with the control group. Patient satisfaction scores were more favorable in the block group (P<0.0001). The results of our study are in accordance with the study of a research published in the journal of Neurosurgical

Anesthesiology (S Singh, 2019). They conducted a study designed as Bilateral Ultrasound- guided Erector Spinae Plane Block for Postoperative Analgesia in Lumbar Spine Surgery. Postoperative morphine consumption was significantly lower in patients in the ESP group compared with those in the control group (1.4±1.5 vs. 7.2±2.0 mg, respectively; P<0.001).

There was statistically significant difference between the groups in terms of NRS scores. Numerical Rating Scale (NRS) pain score at different time intervals were statistically significantly lower at all times in Group A than Group C p-value ($p<0.05$). These results indicate that the ESP block was able to exert an effective analgesic effect until the morning of postoperative day 2 following lumbarlaminoplasty. Thus, the ESP block affected the dorsal rami of the lumbar nerves.This study reported similar results as another cadaveric study .[7] Compared with other peripheral nerve blocks, such as epidural anesthesia and paravertebral nerve block, the ESP block is more safe because it is a more superficial block.[8,9] Moreover, the ESP block reportedly relieves perioperative pain over a wide region and is therefore an effective analgesic for various surgeries [10-13] and is effective in relieving visceral pain as well.[14]

Advances in regional anaesthesia in recent years have included the description of a number of important fascial plane blocks differentially blocking the dorsal, lateral and anterior cutaneous nerves of the thorax and abdomen. These include the transversus abdominis plane (TAP) block ,[15] Rectus sheath block ,[16] quadratus lumborum (QL) block ,[17] PECS block ,[18] serratus plane block , [19]retrolaminar block ,[20] and now the erector spinae plane (ESP) block .[21] The key advantage common to all of these techniques is that they are technically easier to perform compared with neuraxial, nerve plexus, and targeted nerve blocks.

Furthermore, while further studies are required, they offer the possibility of fewer serious side-effects (such as spinal cord damage, nerve trauma, pneumothorax etc.). As less technical expertise is required, it should be possible to make these methods more widely available to patients undergoing surgery, or suffering from acute or chronic pain syndromes.

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