

## Ultrasound guided pre-emptive erector spinae plane block as a part of Enhanced Recovery After Surgery (ERAS) in abdominal surgeries

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Abdominal surgeries are associated with significant post-operative pain attributable to large incisions, exploration, drain tube placement and distension. This pain will greatly affect recovery of patient. In this report of six cases, we observed safety, efficacy and role of ultrasound guided single shot pre-emptive erector spinae plane block (ESPB) for enhanced recovery after surgery (ERAS) in patients scheduled for various elective abdominal surgeries, open or laparoscopic, in a tertiary care centre. Ultrasound guided single shot ESPB was administered with bupivacaine with or without adjunct. Postoperatively, patients were assessed for pain using visual analog scale, need for rescue analgesia and duration of stay in hospital. Patients receiving ultrasound guided ESPB had better outcomes in terms of analgesia, reduced opioid usage and early mobilization and early discharge from hospital.

**Key words:** Erector spinae plane block; enhanced recovery after surgery; abdominal surgeries

**Key message:** ESPB is a recent technique in pain control. Single shot ESPB administered with adjuncts can provide adequate analgesia in post-operative period. This helps in early mobilization, recovery meanwhile avoiding opioids and other analgesics.

### Introduction

The pain following abdominal surgeries, in the immediate post-operative period, will affect recovery and discharge of patient from hospital. It may turn into persistent post-operative pain. Multimodal, preferably non opioid analgesia is crucial in avoiding nausea, vomiting, pruritis, respiratory depression, biliary colic, constipation etc.<sup>1</sup>

ESPB, introduced by Forero et al in 2016 for thoracic surgeries,<sup>2</sup> is gaining importance as a part of multimodal analgesia. ESPB appears to be a beneficial method to control post-operative pain in abdominal surgeries.<sup>3</sup>

Our aim was to observe the adequacy of pain control, recovery and need for additional

analgesics in patients undergoing abdominal surgeries.

### Case report

Patients were enrolled to the study after obtaining approval from institutional ethical committee and written informed consent from the patients.

The ESPB was administered to six American Society of Anaesthesiologists Physical Status (ASA PS) 1 and 2 patients aged between 18 to 60 years scheduled for different abdominal surgeries planned under general anaesthesia.

The block was given in pre-operative room with all standard monitoring attached. Patients were positioned in sitting position. The skin was prepared with 5% povidone iodine solution, 70% isopropyl alcohol and covered with sterile sheets. The ESPB was administered using high frequency (8 – 12 Hz) linear ultrasound transducer [Siemens ACUSON freestyle TM, Germany] and 22G-80mm facet type Sonoplex needle (Pajunk, Geisingen, Germany). The ultrasonography probe was placed on the spinous process of vertebrae at the level of T12 by identifying the 12th rib. The spinous process of the vertebra at which the block to be given

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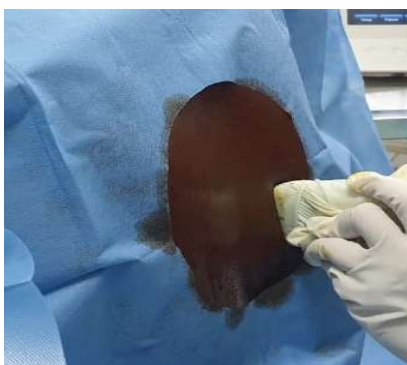
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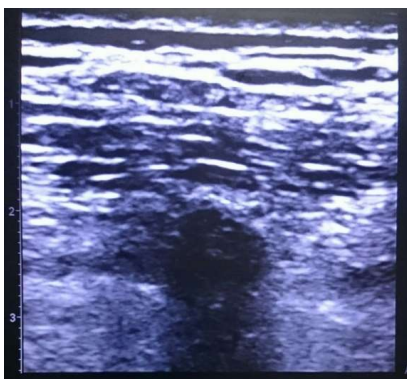


was identified. Probe was moved laterally about three centimetre and rotated clockwise. The erector spinae muscle and the transverse process were seen. After negative aspiration, the needle position was confirmed by the administration of a normal saline looking for hydro dissection. Bupivacaine 0.5% with or without adjuncts like dexamethasone, dexmedetomidine was injected deep into the erector spinae muscle in cranial to caudal direction.

**Figure 1:** Locating the transverse process of vertebra with ultrasound probe under sterile aseptic precautions



**Figure 2:** Hump shaped transverse process of T10 vertebra visualised under ultrasound.



All patients were monitored closely with haemodynamic parameters. Patients were induced with propofol 2mg/kg, fentanyl 1.5 to 2mcg/kg and atracurium 0.5mg/kg. Anaesthesia was maintained with sevoflurane 0.8 – 1% with 40% of oxygen in air with fresh gas flow of 2.5 to 3L/min. Bispectral index (BIS) was maintained between 45-55 and inhalational agent setting was adjusted accordingly. At the end of surgery, patient was extubated and

monitored in post anaesthesia care unit (PACU). Visual analog scale (VAS) score was recorded every hour for initial 12 hours and sixth hourly for next 36 hours.

Mean age of the patients enrolled for the study was 44.3 years. Out of 6 patients, three were laparoscopic abdominal surgeries and other three were open. Mean perioperative morphine consumption was 4mg and mean fentanyl consumption was 40mcg. Mean duration of the surgeries considered was 2 hours 15 minutes. All the patients had smooth and early extubation. In PACU, patients were pain free. Post operatively, median VAS score was 2.5 after 6 hours of surgery, 2 after 12 hours, 1 after 36 hours and 1 after 48 hours of surgery. Low VAS scores were helpful in early mobilization of patients and early discharge from the hospital. Mean stay of the patients in the hospital was three days post operatively. Thus these patients seemed to require lesser dose of opioids and analgesics in the early recovery period than patients who did not receive block.

### Discussion

ESPB is a newly described regional anaesthesia technique that blocks the dorsal and ventral rami of the spinal nerves and the sympathetic nerve fibres. Erector spinae muscle consist of three muscles spinalis, longissimus and iliocostalis running along the length of spine.<sup>4</sup> ESPB is administered by injecting local anaesthetic agent deeper to erector spinae muscle around transverse process of vertebra. This inter-fascial block provides combined effect of neuraxial, paravertebral and retro- laminar blocks since it acts both on dorsal and ventral rami of spinal nerves and sympathetic chain as well.<sup>2</sup>

Being a more superficial and simpler technique ESPB is gaining much importance for pain management in chronic pain and post-operative pain settings. ESPB being an interventional technique, requires proper patient counselling and complete cooperation from the patient. For ESPB, the coagulation profile has to be done in addition to other routine investigations. Other possible drawbacks of this block could be, failure of block and pleural injury (if block is administered without proper visualization of needle tip).

ERAS protocol includes multidisciplinary approach in perioperative patient care to

improve outcome after elective surgeries. It includes optimizing patients prior to surgery, evidence-based treatment during hospital stay and rehabilitation post discharge.<sup>5</sup>

**Table 1:** Summary of cases considered for study and the outcome.

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
<b>Clinical evaluation</b>	58/F ASA PS <sup>†</sup> 2 HTN <sup>†</sup> since 3 years. Controlled	43/F ASA PS 1	48/M ASA PS 2 HTN since 1 year. Controlled.	58/M ASA PS 1	31/F ASA PS 2 Hypothyroidism. Controlled.	28/F ASA PS 1
<b>Surgery</b>	Laparoscopic right radical nephrectomy	Open cholecystectomy	Laparoscopic incisional hernioplasty	Right relook PCNL <sup>‡</sup>	Laparoscopic cystectomy	Right PCNL
<b>Block level</b>	T11 TP <sup>§</sup>	T7 TP	T10 TP	T11 TP	T10 TP	T10 TP
<b>Drug injected</b>	15mL of 0.25% Bupivacaine + 15mL of 2% Lignocaine divided for bilateral injection.	20mL of 0.25% Bupivacaine	20mL of 0.5% Bupivacaine divided for bilateral injection.	20mL of 0.5% Bupivacaine + 1mcg/Kg (50mcg) Dexmedetomidine	25mL of 0.5% Bupivacaine + 8mg dexmedetomidine divided for bilateral injection.	20mL of 0.5% Bupivacaine + 0.5mcg/kg (25mcg) Dexmedetomidine
<b>Duration of surgery</b>	3hrs 30 mins	1hr 30 mins	2hrs	3hrs	2hrs 30 mins	1hr 15 mins
<b>Total opioid consumption</b>	5mg Morphine	3mg Morphine + 30mcg Fentanyl	5mg Morphine	50mcg Fentanyl	3mg Morphine	4mg Morphine
<b>VAS 6 hours Post op</b>	2	2	4	3	3	2
<b>VAS 12 hours post op</b>	4	3	2	2	2	2
<b>VAS 24hours post op</b>	2	1	2	1	2	1
<b>VAS 48 hours post op</b>	1	1	2	1	1	0
<b>Day of discharge post-surgery</b>	Day 5	Day 3	Day 2	Day 3	Day 2	Day 2

\*ASA PS: American Society of Anaesthesiologists Physical Status, <sup>†</sup>HTN: Hypertension, <sup>‡</sup>PCNL: Percutaneous nephrolithotomy, <sup>§</sup>TP: Transverse process.

ERAS also aims at improving patient management by decreasing overall morbidity, without compromising life style of the patient, shortening length of hospital stay, reducing the expenses.

Implementation of ERAS protocol involves counselling, optimization, preparation of the patient, minimal invasive surgeries, standard anaesthetic care, reducing opioids, early mobilization and discharge.<sup>6</sup>

Pain management plays an important role in post-operative treatment response from the patients in any surgery. Abdominal surgeries, being more invasive and painful, need well planned pain control strategies for better outcome. Opioids and other analgesics are routinely used for controlling pain.

Advanced ultrasound technologies, portability and availability have made practice of regional anaesthesia easier than before. Regional blocks improve patient response and comfort. Hence, several regional blocks have been incorporated in ERAS protocols.

Though laparoscopic surgeries are considered minimal invasive surgeries, pain in such surgeries is attributed to diaphragmatic irritation by abdominal pressures, peritoneal stretch and carbon dioxide insufflation.<sup>7</sup> Above factors in laparoscopic surgeries cause more of visceral pain than somatic pain. In open surgeries, large incisions along with tissue handling, exploration, distensions, drain tube placements etc. cause both somatic and visceral pain. ESPB provides both visceral and somatic analgesia which is much required in open or laparoscopic abdominal surgeries.<sup>8</sup>

ESPB has proved to be one such measure from the above case series, which can improve the recovery post surgery and help in early discharge of the patient from hospital. Further studies are required to strengthen the evidence of usefulness of ESPB in ERAS protocol.

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