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Corresponding Author
Dr. Jyoti H. Chauhan,
Department of Anaesthesia, P.D.U. Medical College and Hospital, Rajkot, Gujarat, India

Author Designation
[1]Tutor
[2]Assistant Professor
[3]Professor and HOD
[4,5]Resident Doctor

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Efficacy of Usg Guided Erector Spinae Plane Block for Postoperative Analgesia In Lower Abdominal Gynecological Surgery

[1]Dr. Palak P. Shah, [2]Dr. Vrinda Oza, [3]Dr. Vandna S. Parmar, [4]Dr. Payal Palabhai Karmur and [5]Dr. Jyoti H. Chauhan
[1-5]Department of Anaesthesia, P.D.U. Medical College and Hospital, Rajkot, Gujarat, India

ABSTRACT
Erector spinae plain block is newer inter facial plain block that is gaining wide attention now a days. It can be useful for acute postoperative pain and chronic pain control. Aim of the study was to assess the efficacy of bilateral Erector Spinae Plane Block(ESPB)for postoperative analgesia in patients undergoing lower abdominal gynecological surgeries under general anesthesia. Primary objectives were to evaluate duration of post-operative analgesia, no. of rescue analgesia required in first 24h. Secondary objectives were to evaluate intra operative hemodynamic parameters and side effects of procedure. Patients were divided into two groups. Group S (Study Group): Patients will be given USG Guided Bilateral Erector Spinae Plane(ESP)Block with Inj. Bupivacain (0.25%) 20mL before administering general Anesthesia. Group C (Control Group): Patients will be given general anesthesia only. Total tramadol consumption in the first 24 h was significantly higher in the control group compared to the ESPB group 212±52.59 mg vs 88±43.96 mg respectively., P=0.0001., The VAS pain score was significantly lower in group S for the first 12 h postoperatively . No side effects or complications were recorded in either group. Erecter spinae plane block is a effective and having less side effect than opioid analgesia for 12 h postoperatively and all the patients had stable intraoperative hemodynamic.

INTRODUCTION

Lower abdominal gynecological surgeries are commonly performed surgeries and area associated with moderate-to-severe postoperative pain. Regional block for pain management has many advantages in such patients including provision of adequate analgesia, reduced need for opioids, decreased postoperative nausea and vomiting, postoperative pulmonary complications, enhance recovery, ear lyam bulletin, reduced chances of chronic pain[1,4]. Ultrasound [USG] guided erector spinae plan block was first described by Forero[6] for providing thoracic analgesia at T5 transverse process. Thoracic epidural, paravertebral block, transverse abdominis plan blocks have been used in different studies with good results[2,3,5]. ESPB gained wide attention as it is a faster procedure that carries a lower risk of hypotension, easy to perform and requires less training. The local anaesthetics diffuses into the paravertebral space through spaces between adjacent vertebrae and blocks both the dorsal and ventral branches of the thoracic spinal nerves. Moreover bilateral ESPB performed at low thoracic levels was recently shown to provide satisfactory analgesia for gynecologic and abdominal surgeries. The aim of the study was to assess the efficacy of bilateral erector spinae plane block (ESPB) for postoperative analgesia in patients undergoing lower abdominal gynecological surgeries under general anesthesia. Primary objectives were to evaluate duration of post-operative analgesia, no. of rescue analgesia required in first 24h. Secondary objectives was to evaluate intra operative hemodynamic parameters stability, side Effects of procedure.

MATERIALS AND METHODS

After approval from Institutional ethical committee (PDUMC/IEC/29/2022) and registration of trial with the clinical trial registry of India(CTRI/2023/02/050160), all the patients were enrolled according to Helsinki declaration (2013). Our study is a randomized, prospective, double blind, single center study on 50 female patients, age 30-70 years, ASA I, II and III posted for lower abdominal gynecological surgeries under general anesthesia in the duration from Aug 2022 to May 2023.Infection at the block site, Bleeding disorder/ Patient on Anti-Coagulation Therapy, Known Allergy to study Drug, Severe Hepatic/Renal/ Endocrine/Neurologic /Gastrointestinal or Cardiacdys function, Those who unable to speak or understand commands for analyzing analgesia, Spine Deformity, Patient's Refusal were excluded from study.

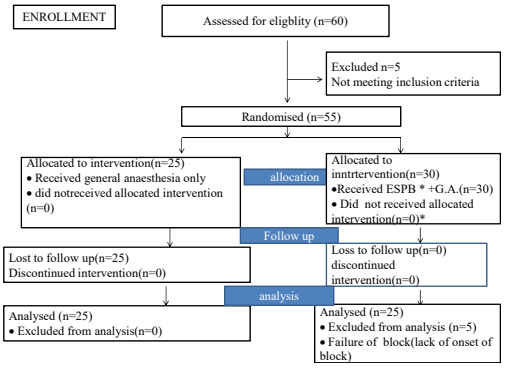

Fig. 1: Consort Diagram

Sample Size was Calculated Using: We considered that achieving a 50% reduction in tramadolconsumption 24 h in postoperative period in erector spinae group with a statistical power of 0.8 and type 1 error rate of 0.05, a sample size calculation determined that 25 patients per group was required to demonstrate this difference using a two-tailed Student's t-test. The study permits type 1 alpha error=0.05, with a type 2 error of beta=0.2. An online randomization program was used to generate a random number list Patient randomization numbers will be concealed in opaque envelopes that will be opened by the study investigator. All members of the study group involved in obtaining data will be blinded to randomization. Patients were divided into two groups. Group S (Study Group) : Patients will be given usg guided bilateral Erector Spinae Plane (ESP) Block with Inj. Bupivacain (0.25%) 20ml before General Anesthesia. Group C (Control Group): Patients will be given General anesthesia only. Day before surgery all the patients were informed about vas scale. Preoperatively IV line will be secured with 20 G IV Cannula, standard monitors (NIBP, SpO2 and ECG)connected and vitals recorded. The group swill under go USG-guided ESPB before administering general anaesthesia at T9 vertebrae level in sitting position with 20ml of bupivacaine 0.25%. A linear US transducer will be placed vertically 3cmlateraltothe mid line to visualize back muscles: from up to bottom the trapezium the rhomboid major, erector-spinae. The transverse process (TP) (hyper echoic finger like shadow-trident sign)and pleura(shimmering) seen in between the tp. After 2-3 ml of 2% lidocaine infiltration, a22-gauge short bevel needle (Spinocan, B. Braun Melsungen AG, Germany) was inserted in the cranial-caudal direction towards the TP in-plane with the US transducer until

the needle touched the TP crossing all three muscles. Correct needle placement was confirmed by needle tip contact to TP and hydro dissection of the interfacial plane between the erector spinae muscle and TP with 2ml of normal saline by visualizing the local anesthetic spread in a linear pattern between the muscle and the bony acoustic shadows of the TP. Then, up to 20ml bupivacaine 0.25% was injected. The same procedure applied on opposite side of the back. Block success is tested by reduced cold sensation at the planned surgical in cision site 5 min after block completion. The patients were excluded from study if no block success rate. Whole intra-operative and post-operative assessment will be done by investigators. The control group will be given General anesthesia only. All the patients were pre medicated with Inj. Glycol pyrro late 0.2 mg IV, Inj. On dansatron 4 mg IV and Inj. Fentanyl1 mcg/kgIV. Induced with inj. Propofol 2-2.5 mg/kg iv, inj. Atracurium 0.5mg/kg, E.T tube of appropriate size inserted maintained withO2+N2O+sevoflurane+Inj Atracurium+IPPV Mode of Ventilation Inj. Paracetamol 1gmIV Given Before Starting Of reversal and were reversed with Inj. Glycopyrrolate 8 mcg/kgIV, 2. Inj. Neostigmine 0.05 mg/kg IV. Intra operatively hemodynamic parameters will be observed and compared in two groups. Postoperatively for 24 hrs we observed-duration of postoperative analgesia (effective analgesia-time of onset of sensory block to the first request of analgesia by using VAS score). VASS core, Total requirements of analgesics in 24hrs, Complications and side effects. Postoperatively pain will be evaluated every 30mins forfirst2hours, every 60mins for next 6 hours and at 12 hours and 24 hours in recovery room. Pain will be assessed by VAS (visual analogue scale). Here patient will be given a scale marked from 0-10 and will be asked to mark on the scale the degree of pain he /she experiencing from 0 (no pain) to 10 (maximum pain). When VAS >4, rescue analgesia given with Inj. Tramadol 1.5mg/kgIV. Results will be expressed as mean±standard deviation or number (%). Parametric data will b e compared using Student's unpaired t test. Fisher's exact test was done to determine statistical significance of incidence of side effects. Results will be considered significant if p value is <0.05 and highly significant if p<0.01. Statistical analysis was done by medcalc version 22.016.

RESULTS AND DISCUSSIONS

This study included 50 female patients (25 per group)., in case group 30 patients enrolled but 5 were excluded because of lack of onset of block. No significant difference was noted for age, weight, ASA physical status, or surgery duration(Table 1). Total tramadol consumption in the first 24 h was significantly higher in the control group compared to the ESPB group(212±52.59 mg vs 88±43.96 mg respectively P=0.0001., (Table 2). The VAS score was highly significant in group c for the first 12 h postoperatively (Table 3). Post operative nausea vomiting was noted in both the groups but difference was not significant.

Table 1: Demographic Data

	Control group (Mean±SD)	Case group (Mean±SD)	P value
Age	49.48±13.76	48.56±10.5	0.98
Weight	55.64±3.76	59±11.11	0.158
ASA grade2/3	11/14	10/15	0.77
Duration of Surgery	162.4±15.3	174±28.72	0.0812

Table 2: Duration of Analgesia and No of Rescue Analgesic Required

	Control Group Mean±SD	Case Group Mean±SD	P Value
Duration of analgesia(hrs)	3.26±2.04	11.6±4	0.0001
No of rescue analgesic required	2.12±0.52	0.88±0.43	0.0001
Total consumption of analgesic (tramadol mg) in 24 hrs	212±52.59	88±43.96	0.0001

Table 3: VAS Score

Vas Score	Control group (Mean±SD)	Case group (Mean±SD)	P Value
30 MIN	3.2±1.3	1.8±1.11	0.002
2HR	3.72±1.17	2.36±0.86	0.0001
4HR	4.08±0.99	3.2±0.76	0.0009
6HR	3.4±1.75	1.96±1.01	0.0008
12 HR	5.2±1.41	3.68±1.62	0.0009
24 HR	4.4±1.75	3.96±1.01	o.2817

Table 4: Complications

	Control Group Mean±SD	Case Group Mean±SD	P Value
Haematoma	0	0	0
Infection	0	0	0
Motor Weakness	0	0	0
Nausea Vomiting	6	3	0.05

Pain after abdominal surgery is significant and major culprit are anterior abdominal wall and abdominal viscera. The ESPB was described as a way to provide analgesia through truncal nerve block, penetration of LA acted on dorsal and ventral rami through connective tissue and branch communication leads to visceral analgesia, paravertebral spread of LA[8], epidural spread[9]. Erector Spinae muscle extends throughout the lumbar region, an ESPB can also provide abdominal analgesia if it is performed at a lower thoracic level[11]. The ESPB represents a more straight forward, safer alternative to epidural anaesthesia because the ultrasonic target(TP) is easily visualized., the injection point is far from theneuroaxis, pleura and large vascular structures and wide craniocaudal diffusion of the anaesthetic allows extensive coverage with a single injection[12]. There were also some publications describing its use for

abdominal surgery, such as repair of ventral hernias[7], abdominoplasty[10], barbaric surgeries[16], laparoscopic abdominal surgeries[20] and lower segment cesarean section[16]. A cadaver model demonstrated that when 20 ml of fluid was injected at the T7 TP, it spread to the level of the C7-T 2 vertebra levels cranially and L2-3vertebra levels caudally[8] . Based on those studies, we decided the level of block at T9.There are limited study in a literature regarding postoperative analgesic efficacy of ESPB in lower abdominal gynecological surgeries, so we conducted to assess the postoperative analgesia efficacy of bilateral ESPB in females undergoing abdominal hysterectomy via Pfan nenstiel incision under general anaesthesia. Compared to patients without ESPB, there was a marked decrease in tramadolconsumption in the first 24 h after surgery. Despite being one of the mainstays of postoperative pain management, opioid analgesic use is limited due to side effects like vomiting, sedation urinary retention, ileus, constipation and respiratory depression[21]. These side effects contribute to delayed hospital discharge and delayed resumption of normal activities of daily living. Moreover, opioid-induced immuno suppression can affect surgery outcomes including increased risks of infection and possibly metastasis in cancer patients[22]. As a result, multi modal opioid-sparing analgesia has become an alternative for postoperative pain management. We preferred general anaesthesia over spinal anaesthesia because spinal anaesthesia may become a confounding factor of analgesic effect of ESPB in immediate postoperative period. in our study time of first rescue analgesia(duration of post operative analgesia) was 11.6±4 hrs, hamed *et al* found >12 hr of analgesia[6], other study found 16.32±1.33 hrs[13-15], total tramadol consumption in 24h was 88±43.96mg compared to 212±52.59 in control group[16] (100 mg vs 328±43.12)., hamed *et al* in their study observed that patients with ESPB had significantly lower fentanyl requirement (445+67+49 mcg) compared to the patients in control group (485+20.39 mcg) in first 24h after surgery. Patients of study group were remaining hemodynamically stable compared to control group in our study. Postoperative pain management is a major concern for both clinicians and patients. In the current study, VAS pain scores were significantly higher in the control group compared to study group in the first 12 h post operatively. Other studies (hamed *et al*, Mukesh *et al*) found that the VAS pain score was significantly lower in patients with ESPB block till 12,24hr postoperatively respectively[6,17-20]. Tulgar *et al* performed ESPB in three patients who underwent multiple abdominal procedures reported 17, 13 and 16 h of postoperative analgesia for those cases. In the current study, the VAS score difference was statistically in significant at 24h., this can be attributed to the use of a single injection. If catheter would have placed and intermittent bolus would have given one can prolong duration of postoperative analgesia. Postoperative pain can lead to increased morbidity, impaired mobility, increased opioid requirement, increased cost of care. Moreover, early postoperative pain can trigger persistent pain that may last for months aftersurgery[21]. The rate of chronic pain after hysterectomy is reported to range from 5%-32% based on extensive evidence that correlates high postoperative pain levels with an increased prevalence of chronic post surgical pain. In our study early VAS scores were significantly lower in the ESPB group indicate that ESPB may also reduce chronic pain, but this requires additional studies. It is important to prevent post surgical pain, as the cost of treating chronic pain that develops from acute pain in a 30-year-old individual could be as much as$1 million over their estimated lifetime[22]. Similar to our study, Hamed *et al.* observed no significant side effects or complications. Short term follow up, single shot injection are limitation of surgery. Despite these short comings, our findings demonstrate that ESPB has a role in decreasing opioid consumption and pain score and can use das a part of multi modal opioid-sparing analgesia protocol.

CONCLUSION

We concluded from our study that ESPB provides effective analgesia up to 12 hr post surgery, can reduce post operative tramadol consumption, can be used as multi modal analgesia technique in combination with other analgesics.

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Conflict of Interest: We do not have any conflict of interest.

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