# Comparison of Paravertebral Block with Spinal Anaesthesia in Unilateral Inguinal Hernia Repair

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***Abstract*- Aim:** The aim of our study was to evaluate the efficacy of Paravertebral block in unilateral inguinal hernia repair comparing with spinal anaesthesia with respect to post operative analgesia, ambulation, perioperative and postoperative complications.

Paravertebral block can be used as an alternative to spinal anaesthesia in unilateral inguinal hernia repair. It offers better hemodynamic control, prolonged post operative analgesia and early ambulation compared to spinal anaesthesia.

**METHODS:** Total of 60males patients of ASA 1, 2 with age 18-65 years were taken up for study. They were randomly assigned into two groups group P and group S with 30 in each group. Paravertebral block was given as 2 segment block at T10 and L1.Both groups received propofol infusion titrated to light sleep.

**RESULTS:** The time of first rescue post operative analgesia was taken as primary outcome and was 348±39 min. in group P and 207±26 min. in group S ($p < 0.001$).Time of ambulation was 249± 20 min. in group P and 371±18 min. in group S ($p< 0.001$). Incidence of urinary catheterization was higher in group S ($p < 0.05$). No Patients in group P were catheterized. No patients of group S bypassed recovery room

**CONCLUSION:** It can be concluded that paravertebral block is efficacious to spinal anaesthesia in unilateral inguinal hernia repair with respect to prolonged analgesia, early ambulation and decreasing complications seen with spinal anaesthesia.

***Index Terms*-** Thoraco-lumbar Paravertebral block, Spinal anaesthesia, Inguinal hernia Repair, post operative analgesia,Visual acuity scale, Early ambulation

## I. INTRODUCTION

Paravertebral block is used as anesthesia for surgical procedures like breast surgery, thoracotomy, inguinal hernia repair, renal surgery predominantly in unilateral procedures as well in chest trauma(rib fracture) for analgesia. Paravertebral block can also be used for surgical anesthesia in patients with serious co-morbidites like chest infection, bronchial asthma etc who could not tolerate general anesthesia or neuraxial blocks.[1] In case of inguinal hernia surgery which is predominantly done under central-neuraxial anesthesia, Paravertebral block which has segmental block offers an attractive alternative in terms of better hemodynamic control, prolonged post-operative analgesia and in decreasing complications like post operative nausea vomiting(PONV), urinary retention and delayed ambulation[2]. Paravertebral block is also been used in ambulatory surgery unit for inguinal herniorrhaphy and in outpatient procedures[3].

## II. METHODS

The study was an experimental double blinded randomized controlled study. After obtaining Institutional ethics committee's approval 60 male patients of age group 18 to 65 years with ASA physical status 1 and 2 scheduled for elective unilateral hernia repair were selected for study. The patients were explained about the procedure and its complications, VAS scoring during the pre operative examination. The exclusion criteria were patient's refusal, significant cardiovascular, respiratory, hepatic, diabetes, metabolic diseases, morbid obesity, coagulation disorders, mental dysfunction and allergy to local anesthetics. Patients were randomly assigned to two groups– P and S, according to a sealed envelope method to receive one of the following two anaesthetic techniques – Paravertebral block (PVB) or Spinal anaesthesia (SA), respectively

Para vertebral block was given as 2 segment block, T10, L1[4]. The patient was positioned in the sitting position. The back should assume kyphosis similar to the position required for neuraxial anesthesia. The patient's feet were rested on a stool to allow for a greater comfort and degree of kyphosis. This increases the distance between the adjacent transverse processes and facilitates advancement of the needle beyond the contact with the transverse process. With aseptic precautions, a point 3 cm. lateral to the cephalad aspect of spinous processes of T10 and L1 was marked. Skin was infiltrated with 2% lignocaine at this point. A 23 G Quincke (QBC) needle was inserted perpendicular to the skin at this point to contact transverse process. The needle was then withdrawn a bit and walked off the transverse process by redirecting the needle to the cephalad or caudad to 1 cm. After negative aspiration of blood and cerebrospinal fluid (CSF), with the help of extension line connected to Quincke (QBC) needle 15 ml of bupivacaine (0.5%) at T10 and 5 ml of bupivacaine (0.5%) at L1 was injected. Patients were repositioned to supine after the procedure.

The patients of group S were preloaded with 15ml/kg of IV fluid. Under strict aseptic precautions L3 – L4 level after skin infiltration with 2 % lignocaine sub arachnoid space was approached using 25 G QBC needle. 12.5 mg of 0.5% Bupivacaine (H) injected. After the procedure patients were shifted to supine position. Level of sensory block was assessed by pinprick and level slightly higher than T 10 would be achieved. Motor blockade was assessed by Modified Bromage score [5].0–3 (0- full flexion of knees and feet; 1- just able to flex

knees, full flexion of feet; 2 - unable to flex knees, but some flexion of feet possible; 3-unable to move legs or feet). Any episode of hypotension [mean arterial pressure (MAP) <70mmHg] was managed with rush of I.V fluids and 6mg I.V mephentermine and repeated if necessary. Any episode of bradycardia (heart rate < 45/min) was treated with Injection Atropine 0.6 mg I.V.

During surgery, patients of both the groups received an I.V infusion of propofol titratable to light sleep with easy arousability. Total dose of propofol used was noted.

After surgery, patients were transferred either to the recovery room under strict monitoring or directly to the ward, if the patients met the criteria for transfer adequately. Patients were evaluated using a modified Aldrete score by the recovery room anaesthetist who makes decision regarding the patient's eligibility to bypass recovery going directly to the ward. It includes ability to move extremities, respiratory effort, consciousness, blood pressure and oxygen saturation. Patients were bypassed recovery room only with modified Aldrete score of 9 or more[6].

Time to first rescue postoperative analgesia, time to ambulation, total analgesia consumption in first 24 hours and incidence of side effects were measured. Pain was assessed using visual acuity score VAS (0 to 10; 0- no pain 10 – worst pain). All the patients were explained before surgery regarding VAS score. Any time VAS score > 4 were treated with rescue analgesia of injection Tramodol 50 mg. iv repeated if necessary. Inj. Ondansetron 4 mg. iv was given as rescue anti-emetics. Any patient, if not passed urine for more than 3 hours or complaining of urinary retention, was catheterized. Any other complaints and side effects were noted.

## III. STATISTICS

Statistical package SPSS-vers.11.5 /17.0 was used to do analysis. P value < 0.05 was considered as significant.

## IV. RESULTS

The two groups were statistically comparable with respect to age, weight, ASA scores, preoperative vital parameters, SBP, DBP, SPO2. (Table 1)

Intra operatively incidence of hypotension and use of vasopressor was high in group S, 15 patients( 50%) as compared to no such incidence in group P. Total consumption of propofol was higher in group P compared to group S ( $p < 0.001$) (Table 2)

The VAS score was highest at 6 hours for group P ($p < 0.001$) and 4 hours for group S($p<0.001$) and was significant at 4, 6 hours. At 12, 24 hours there was no significant difference (Graph 1). The rescue analgesic Tramadol in boluses of 50mg IV was used if VAS score > 4 and repeated every 15 min until pain was relieved (VAS < 3). Time to the first dose of analgesic was significantly different in the two groups ($P< 0.0001$) and total analgesic consumption in 24 hours also was significant in two groups ($p<0.001$) (Table 3).

The time of ambulation was also significant between two groups and was higher in group S ($P< 0.001$). 4 patients(13.3%) experienced post operative nausea vomiting (PONV) in group S and 1 patient(3.3%) in group P which was statistically not significant ($p= 0.161$). 5 patients in group S were catheterized in post operative period due to urinary retention whereas no patients were catheterized in group P($p= 0.05$ significant). All patients in group P bypassed recovery room.(Table 3)

**TABLE 1**
**Demographic profile and baseline vital parameters for patients undergoing inguinal hernia repair**

| PARAMETERS | GROUP P(n =30) | GROUP S( n =30) |
|---|---|---|
| AGE ( in years) | 49±8.67 | 47±12.10 |
| WEIGHT (in kg.) | 60.08±9.34 | 58.47±9.67 |
| ASA ½ (%) | 18/12(60/40) | 20/10(66.7/33.3) |
| PRE OP SBP ( mm of Hg.) | 136.84±15.24 | 133.60±14.08 |
| PRE OP DBP ( mm of Hg.) | 82.84±6.839 | 81.66±7.63 |
| PRE OP SPO2 (%) | 99.38 ±0.637 | 99.06±0.828 |

All tests are Fischer's exact T test except ASA for which Pearson's chi square test was used. All values are presented as mean±SD except for ASA which is presented as number of patients (%).

Group P Paravertebral group, Group S spinal group, SBP Systolic Blood pressure, DBP diastolic blood pressure, SPO2 oxygen saturation, Pre op pre operative.

**TABLE 2**
**Intra-operative drug requirement in both groups P and S**

| PARAMETERS | GROUP P | GROUP S |
|---|---|---|
| Use of Mephentermine (n & %) | 0 (0%) | 15(50%)* |
| Propofol dosage (mg.) | 166±19 | 66±10* |

*significant ($p<0.05$)

For use of Mephentermine Pearson's chi square test was used results presented as no. of patients; For propofol dosage Fischer's exact T test was used and results described as mean ± SD.

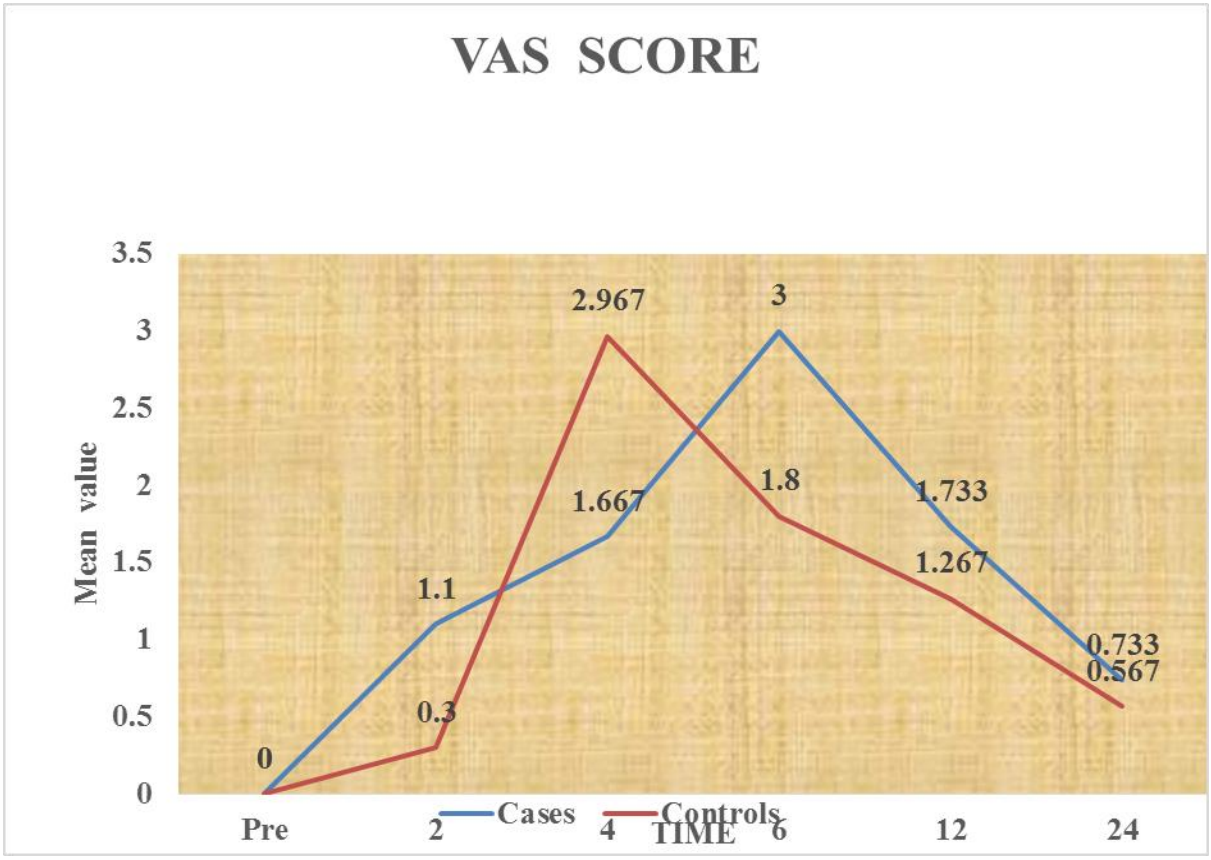
**TABLE 3**
**Postoperative recovery times and adverse events**

| PARAMETERS | GROUP P | GROUP S |
|---|---|---|
| Time to first analgesia(min) | 348±39 | 207±26* |
| Time to ambulation ( min) | 249±20 | 371±18* |
| Total analgesia consumption (Tramodol in mg.) | 75±32 | 161±36* |
| Patients with PONV(n)# | 1 | 4 |
| Urinary catheterization(n)# | 0 | 5* |
| Recovery room bypass(n)# | 30 | 14* |

*Significant ($p<0.05$)

#Pearson's chi square test was used. For others Fischer's Exact T test was used. Results presented as mean ± SD, no. of patients (n), total amount in mg.

**GRAPH 1**




**GRAPH 1** showing VAS scores at different time interval in both groups

## V. DISCUSSION

From our study we found 2 segment Paravertebral block (PVB) as an alternative to spinal anaesthesia in unilateral inguinal hernia.

This was possible due to segmental nature of Paravertebral block (PVB) and persisting sensory block resulting in prolonged pain relief. Even after ambulation patient had good pain relief which was not seen in spinal anaesthesia due to its non segmental nature and complete block of lower thoracic and lumbar segment block and shorter period of analgesia. The findings were similar to Mandal et al in which they compared PVB with unilateral spinal anesthesia[4].

Poor recovery room bypass was seen in group S spinal anaesthesia group due to prolonged motor block ($p< 0.001$).Bilateral Spinal anaesthesia (SA) with high dose of Bupivacaine without opioid may explain the delayed ambulation and increased need for recovery room use in the spinal group, probably related to the residual motor and sympathetic blockade. In contrast, ambulation is much earlier after PVB for inguinal hernia repair, probably due to minimum motor blockade of lower extremities in group P. Propofol consumption was higher in group P when compared to group S due to slower onset of block and due to differential innervations of inguinal sac contents and segmental block.

Bhattacharya P et al used 4 segment Paravertebral block in their study on inguinal hernia[3] and Mandal et al used 2 segment PVB in the study. Saito T and his collegues favoured single injection, multi-segment Paravertebral block as an alternative to multiple injection technique[7]. Although multi-segmental PVB provided good anaesthetic condition, they caused discomfort to patient due to multiple pricks and more chance of pneumothorax in case of higher thoracic levels. Lonnquist and Hildngston described at the level of T 12 psoas musle interrupted the Paravertebral space[8]. So Mandal et al used 2 segment PVB at T 10 and L 1 and we used same method in our study.

In the spinal anaesthesia group S the use of intra-operative mephentermine was increased due to hypotension which was not seen in Paravertebral block indicating good hemodynamic control in PVB group compared to group S. Five patients (16%) of group S required urinary catheterization after 3 h of post-operative period as compared with none in group P. This increased incidence of urinary retention might be related to hypotension which required more frequent volume expansion, as also assumed by Fanelli et al[9]. In the postoperative period Paravertebral block could avoid the complications seen with spinal anaesthesia like urinary retention and catheterization, postoperative nausea and vomiting (PONV), post dural puncture headache (PDPH). However use of finer small bore pencil-point needles (25G) decrease incidence of PDPH.

Limitations were that Paravertebral block was not routinely practiced was time consuming, chances of failure and higher chances of pneumothorax which increases with increase in number of injections and in thoracic level. The chances of partial block or block failure could be higher due to inexperience with the technique and inconsistent nature of block. We could see patients requiring more propofol in PVB group compared to spinal anaesthesia group. Use of peripheral nerve stimulator (PNS) or ultrasound guidance block could decrease the failure rate and increase the efficiency of block.

To conclude Paravertebral block can be used as an alternative to spinal anaesthesia in unilateral inguinal hernia repair. Its efficacy can be seen in better hemodynamic control, prolonged postoperative analgesia, no residual motor blockade, early ambulation and decreased urinary retention. The efficiency of Paravertebral block can further be improved by using Peripheral nerve stimulator (PNS) as well as ultra sound guided block.

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