

Comparison of Paravertebral Block and Spinal Anaesthesia in Inguinal Hernia

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Abstract

Background: present study was undertaken to see the comparison of paravertebral block and spinal anaesthesia.

Aims & objective: Comparison paravertebral block with spinal block in inguinal hernia repair. Evaluation of efficacy of spinal anaesthesia & Paravertebral block in inguinal hernia repair with respect to postoperative analgesia, ambulation, perioperative and postoperative complication.

Material & Methods: fifty (ASA) I-II patients between 18-60 years with unilateral inguinal hernia were enrolled for study, and statistical analyses was done. Patients were randomly divided into two groups, with 30 patients in each: Group S, spinal anaesthesia and Group P, paravertebral block. Standard monitoring was done, and mean arterial pressure and heart rate were recorded during the procedure. Demographic variables, surgical data, patient satisfaction, the onset time to reach T10 dermatome to reach peak sensory level, & modified Bromage 3 motor block recorded. Postoperative nausea, vomiting and pain at postoperative hours 0-24 with visual analog scale measured.

Results: Compared to pre- anaesthesia measurements, decrease in HR and MAP during 10th-90th minute was significant in Group S. In Group P, sensory block duration time was higher, whereas motor block was higher in Group S. In Group S there was a need to supplement Inj. Propofol, due to partial or inadequate block. Bromage scores were significantly different between the groups. Time required and drug volume to achieve block was higher in Group S.

Conclusion: Paravertebral block is better than spinal block for unilateral

Keywords: Paravertebral Block, Spinal Block, Inguinal Hernia

Introduction: Inguinal hernia is one of the most common diseases in the males. Treatment of this pathology is exclusively surgical. It can be performed using various anaesthetic methods like Subarachnoid block, General Anaesthesia, Epidural Anaesthesia, Hernia block alone or in combination & patient satisfaction can be provided.^{1,2} Severe postoperative pain may have consequences increasing the stress response to surgery seen as a cascade of endocrine, metabolic and inflammatory events that ultimately may contribute to organ dysfunction, morbidity,

increased hospital stay and mortality. The pain often causes the patient to remain immobile, thus becoming vulnerable to deep venous thrombosis, pulmonary atelectasis, muscle wasting and urinary retention. Besides restlessness caused by severe pain may contribute to postoperative hypoxemia.³ inguinal herniorrhaphy is commonly performed under various techniques viz. general anaesthesia, infiltration anaesthesia, central neuraxial anaesthesia, nerve-blocks and paravertebral blocks. The choice of anaesthesia for inguinal hernia remains a controversial topic.⁴ Local anaesthesia has been described in the literature as the optimal technique, however general and spinal anaesthesia are commonly used in practice despite known complications and side effects. The regional technique of paravertebral block has been successfully used for inguinal herniorrhaphy. Its attributes are prolonged unilateral sensory block with minimization of postoperative pain, reduction of nausea and vomiting, shortened hospital stay, patient satisfaction and rapid return to normal activities. Paravertebral nerve block is an old technique and was initially utilized as an alternative to spinal anesthesia in order to minimize the cardiovascular and respiratory effects of central neuraxial blockade. However, after its initial description paravertebral nerve block was sparingly used to provide anesthesia and analgesia. More recently, there has been renewed interest in this technique for the treatment of acute and chronic pain. Paravertebral nerve block involves injection of local anesthetic in a space immediately lateral to where spinal nerves emerge from the intervertebral foramina.⁵ Paravertebral nerve block has been an established technique for providing analgesia to the chest and abdomen for many years. It has multiple applications and may serve as the primary anesthetic for chest trauma, chest tube insertion, breast surgery, herniorrhaphy, soft

tissue mass excision, bone harvesting from the iliac crest, as an adjunct in laparoscopic surgery, cholecystectomy, nephrectomy and other abdominal and thoracic surgeries. The present study was conducted to compare the characteristics of paravertebral block and spinal block for anaesthesia and postoperative analgesia for inguinal hernia repair surgeries^{6,7,8}.

Materials and Method

The present study was done in the department of anesthesiology and critical care of a tertiary care teaching hospital. After ethical committee's approval, informed written consent was taken. Patients of ASA grade I & II, aged between 18-80 years scheduled for inguinal herniorrhaphy were included in this study. All patients were thoroughly examined and informed consent was taken.

Exclusion Criteria

Patient refusal, allergy to local anesthetic. The cases were divided into two groups by closed envelope method. : Group S (n=30), who received spinal anaesthesia, and Group P (n=30), who received paravertebral block. In group S patient the patient were given spinal anaesthesia with 3.2 ml of 0.5% bupivacaine .In Group P (n=30) paravertebral block was given at 4 segment between T10 to L1, under all aseptic precautions, 1 mL of 2% lidocaine was injected on each level.. Thereafter, transverse processes at each level was found at 4-5 cm depth using 23 gauge Quinckes spinal needle and then 5 mL of 0.5% Bupivacaine was injected . Patient was made supine. The level of anaesthesia was verified by pin prick test for adequate analgesia and then the patient was handed over to the surgical team. Preloading was performed in all cases with 1000 cc of crystalloid. Premedication given with Inj Midazolam 1mg, Inj Ranitidine 150mg and Inj Ondansetron 4 mg .In the operating room, the cases underwent routine monitoring including

electrocardiography (ECG), SPO2 and non-invasive blood pressure until the end of the surgery. Both preoperative and intraoperative mean arterial pressures (MAP) and heart rate (HR) of the cases were recorded at 2- minute intervals for the first 10 minutes and then at 5 minutes interval for 30 mins and then every 15 mins until the end of surgery. Height, weight, gender, ASA class, duration of anaesthesia and surgery were recorded. Maximum level of motor block and sensory block, time to reach to T10 dermatome, time to reach to maximum block height, and time to complete recovery from sensory block and motor block were recorded. Degree of motor block was assessed by Bromage score (0=no paralysis, 1=able to move only knees and feet, 2=unable to flex the knee but moves the feet, 3=total paralysis) and postoperative pain score was assessed by visual analogue scale (VAS) with 0 is the lowest and 10 is the highest score. Hypotension was labelled as mean arterial pressure <70 mmHg, 5 mg of ephedrine was kept ready and 0.5 mg IV atropine was kept ready for the event of bradycardia (HR <50/min). The data was recorded in the proforma. The cases in group S were shifted to recovery room for observation for two hours and then transferred to their respective wards. Whereas the patients in group P could be directly shifted to their respective wards. VAS scores as well as all adverse events encountered within 24 hours (e.g., nausea, vomiting, arrhythmia, pruritus, erythema, headache, and urinary retention) were recorded at postoperative 0, 2, 4, 6, 12, and 24 hours. In the event of a VAS score ≥ 3 , diclofenac sodium at a dose of 75 mg I/M was given.

Results

The study was carried out in a total of 60 cases; however, ten cases were excluded from analysis as the level of spinal block remained below T10 in five cases that underwent spinal anaesthesia. Level of anaesthesia could not be achieved in L1 dermatome in one, perioperative

pain developed in two, and anxiety developed during block in two of five case. Block failure occurred in 5 cases that underwent paravertebral block. Hence total of 50 cases were included in the study, 25 in Group S and 25 in Group P. There was significant difference in age among both the groups ($p=0.039$). In our study table 1 shows the Bromage blockade characteristics in group S. Bromage score I mean was 0, Bromage II mean was 33.80, Bromage III mean was 55.40 and Bromage score IV mean was 76.92 and in group P there was no motor blockade, hence it was statistically significant. -- shows the block characteristics in group S. Sensory level L1 achieved in 52% patients in 30 seconds, T12 achieved in 16% at 30 seconds and 52% at 1 minute, T8 achieved in 64% at 1 minute and in 32% at 5 minutes, T6 achieved in 4% patients at 5 minutes T4 achieved in 8% patients at 10 minutes. Since paravertebral block is a segmental block so its sensory level height cannot be mentioned and it takes 15-20 minutes to act the infiltrated local anaesthetic solution, so block duration was higher in group P. In our study graph no 1 we found that the base line mean arterial blood pressure (MAP) table 2 in group S is 92.24 mmhg and in group P was 92.08 mmhg. ($p=0.0001$). Bradycardia was defined as decrease in heart rate to less than 50 bpm. The significant difference in the heart rate table -- was observed at baseline and 2, 4, and 6 minutes after the block. ($p=0.002, 0.002, 0.012, 0.041$ resp.) This may be due to anxiety while performing the block and positioning the patient supine. The heart rate was not significant from 8 minutes to 45 minutes in both the groups. ($p=0.199$ to 0.105). This may be due to patient have achieved the adequate analgesia. In our study we observed that intraop Propofol infusion was required in group P to achieve proper relaxation of the patient as paravertebral block does not relieve pain arising from pulling the spermatic cord or manipulating the hernia sac. In our study table no.2 shows

mean VAS at 6th hour was 1.28 (VAS 3 in 4 patients) and 0.00 in group S and group P respectively. At 12th hour it was 3.20 and 1.52 in group S and P respectively and at 24th hour it was 4.52 and 3.20 in group S and group P respectively. The difference was statistically significant (P-value 0.0001, S). In group S rescue analgesic was given before 6 hours whereas in group P the post op analgesia was prolonged upto 12 hours. (VAS 3 in 5 patients). And at 24 hours VAS 2 in 2 patients, VAS 3 in 16 patients, VAS 4 in 6 patients, VAS 5 in 1 patient. Prolonged duration of analgesia could be explained by the comparatively less vascularity of the paravertebral space and greater volume of LA. y ambulation was possible and no need to catheterize the patients in group P due to segmental nature of block. In group S patients could not be ambulated till regression of motor block effect later on. In this study, the demand for rescue analgesics was earlier or at 6 hours in group S. And more doses of rescue analgesics were required during 24 hours as compared to group P. In this study no side effects like itching, nausea, vomiting, shivering and Postop retention of urine observed in any group

Discussion

Mandal et al. (9) suggested that 2-segment paravertebral block at T10 and L1 could be an alternative to unilateral spinal anaesthesia owing to early mobilization and prolonged analgesic efficacy. These studies support the trials performed to adopt outpatient anaesthesia method in inguinal hernia surgeries and to shorten the duration of hospital stay, in general. Due to the unintended effects of general anaesthesia such as difficulty in recovery and airway suppression, and possibility of haemodynamic instability, high incidence of nausea and vomiting and postoperative headache by spinal anaesthesia, alternative anaesthesia methods are being investigated. In present study we also found that PVB was associated with early

ambulation, better postop analgesia and recovery room bypass. No side effects were noted in either groups. Naja et al. (10) compared paravertebral block performed with the help of a nerve stimulator with ilio-inguinal nerve block in children that underwent herniorrhaphy. The two methods were compared in terms of intraoperative haemodynamic stability, postoperative pain scores at rest and during activity, requirement for additional analgesics, and parent satisfaction and it was determined that paravertebral block was superior to ilio-inguinal nerve block. The cases first underwent general anaesthesia and then received regional anaesthesia. Paravertebral block was performed in the cases through three different levels as T12-L1, L1-L2 and L2-L3, and the local anaesthetic drug was injected after observing muscle movements at the related level by a nerve stimulator. In present study we found that PVB is superior to spinal anaesthesia in terms of hemodynamic stability, less Postop pain scores and less requirement of analgesics. Weltz et al. (11) started using lumbar paravertebral block for inguinal hernia surgeries. They thought that paravertebral block would be preferred due to prolonged sensory block characterized by minimal postoperative pain and lower use of narcotics, lower incidence of nausea and vomiting, and shorter hospital care requirement. In present study we also found that in PVB there was less postoperative pain, less requirement of analgesics and PACU bypass but no side effects was found in both the groups. Aswin A.B. et al (12) conducted a study by giving 2 segment paravertebral block was given in inguinal hernia repair patients they concluded that 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 while we found that spinal anaesthesia is better than PVB in terms of efficacy, patient cooperation and relaxation, surgeons satisfaction, time required to perform procedure. We also observed that PVB can be better performed using PNS and USG guided for time saving.

Conclusion

From this study we conclude that paravertebral anaesthesia is better in terms of efficacy, patient cooperation relaxation, surgeon's satisfaction and time required to perform procedure. Spinal block is a purely somatic block which does not prevent the visceral pain during the inguinal hernia repair, arising from pulling the spermatic cord or manipulating the hernia sac. Paravertebral block is advantageous for providing segmental anaesthesia, early ambulation and prolonged pain relief so it can be a better choice for analgesia in high risk patients. Paravertebral block can be performed in inguinal hernia patients should be used in day to day practice.

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