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Comparison of Spinal with Paravertebral Block for Elective Open Inguinal Hernia Repair

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Abstract

Background: The inguinal hernia surgery is one of the commonest surgical procedures. There are many modalities of anesthesia for the procedure but the desirable would be one having prolonged analgesia with less motor block.

Aim: to compare the hemodynamic changes, procedure time, time taken for onset of effect and time till there is persistence of effect (hence the requirement of analgesics) between PVB and SA for inguinal hernia repair.

Material and Method: The study included total 60 patients undergoing elective inguinal hernia repair; randomized into two groups having 30 each. Group 1 received paravertebral block and group received spinal anesthesia. The parameters like age, mean arterial pressure (before and after block), heart rate (before and after block), procedural time, time taken to onset of effect and time for appearance of post operative pain were noted. Statistical Analysis was done for the final correlation.

Results: The mean arterial pressure and heart rate after the block was significantly higher in group 1. The procedural time and time for the onset of effect was also significantly more in group 1. However there was no motor blockage and significantly prolonged post operative analgesia in group 1.

Conclusion: The paravertebral block is certainly better aesthetic modality for the inguinal hernia repair but requires more expertise and time taken in procedure.

Key words: Spinal, Paravertebral, inguinal hernia, Anesthesia

Introduction

The surgery for inguinal hernia is one the most common surgical procedure performed in department of surgery worldwide. It may be performed under general, regional or local anesthesia and may be performed in the outpatient setting [1]. There are potential benefits of regional anesthesia methods as compared to general anesthesia for example- absence of unconsciousness, absence of respiratory depression, lower rates of postoperative nausea and vomiting, and more rapid recovery [2, 3].

Spinal anesthesia (SA) being a regional anesthesia has become very popular over general anesthesia for inguinal hernia repair

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as it suppress the stress response to surgical intervention, decreasing morbidity in high risk patients, and enabling maintenance of analgesia in the postoperative period, cardiovascular system-specific adverse events such as arterial vasodilatation, peripheral reflex vasoconstriction, bradycardia and hypotension may pose a problem [4, 5].

However, there are some adverse effects also like undesirable hemodynamic responses, prolonged recovery and discharge from the hospital, urinary retention and post-dural puncture headache [6].

Recently paravertebral block (PVB) has gained popularity as a good alternative for aesthetic management for IH repair. The special merit of paravertebral block is that it involves the unilateral administration of local anesthetic drugs to the nerve roots and related dermatomes without intervening central nervous system [7]. Thus it can be presumed that PVB avoids the adverse effects of spinal anesthesia and it is a good alternative method in patients with cardiovascular diseases and other co-morbidities.

It has been observed that PVB provides rapid recovery and faster returning to daily activities [8]. The present study has compared various aspects of both the procedures so that a reasonable opinion can be drawn.

The purpose of our study was to compare the hemodynamic changes, procedure time, time taken for onset of effect and time till there is persistence of effect (hence the requirement of analgesics) between PVB and SA for inguinal hernia repair.

Material Methods

The study was conducted in the department of general surgery and anesthesia in the U.P. Rural Institute of Medical Sciences & Research, Saifai, Etawah (U.P.), India. After obtaining approval of the Institutional Ethics Committee and the written, informed consent of the patients, 60 ASA physical status I-II patients, aged between 18- 60 years, who were scheduled for elective inguinal hernia repair, were prospectively randomized and enrolled. Patients with body weight 20% higher than ideal body weight, those with liver diseases, allergy to local anesthetics drugs, coagulopathy, infection at the block site, recurrent inguinal hernia, and patients with procedure failure were excluded. The cases were randomized into two groups by closed envelope method. Patients were monitored during surgery and recovery. Heart rate (HR), ECG, mean arterial pressure (MAP) and oxygen saturation (SPO2) were noted before and after the blocks. HR, MAP and SPO2 greater or less than 20% of baseline were pharmacologically treated.

After achieving intravenous access with 18 G IV cannula all patients were premedicated with intravenous (IV) 2 mg midazolam and 50 μg fentanyl in the operating room before block placement for decreasing anxiety and discomfort during the block injections. The same anesthesiologist performed all the spinal and paravertebral blocks.

Group SA (n=30): in this group, which received spinal anesthesia, the patient was placed in a lateral position, with the side to be operated on dependent on the operating table; subarachnoid space was accessed by 25 gauge spinal needle under spinal anesthesia and 4 ml of 0.5% levobupivacaine was injected within 30 seconds. The patient was placed in the lateral decubitus position for a 10 min period; afterward, patient was turned supine. Procedure was started after verifying that the sensory block was at T10 dermatome level.

Group PVB (n=30): in this group, which paravertebral block was used, the patient was placed in sitting position on the operating table. After identifying the right or left transverse processes and vertebral bodies consistent with the hernia site and the spinal processes of vertebras between T9 and L1 were marked at 3 cm distant from the vertebral body.

Under all aseptic precautions, skin wheel was created using 1 mL of 2% lidocaine. Thereafter, transverse processes at each level was found at 4-5 cm depth using 22 gauge stimuplex needle and then 4 mL of 0.5% levobupivacaine was injected after fasciculations were triggered at the abdominal rectus muscle, consistent with the dermatome by 1.5 mA stimulation. The level of anesthesia was verified by pin prick test and then the patient was handed over to the surgical team.

Mean arterial pressures (MAP) and heart rate (HR) were recorded before starting the procedure of spinal anesthesia or paravertebral block and just after the blockade was confirmed. Total procedure time (in minutes), onset of effect, and onset of pain were recorded. Time taken for onset of pain in post operative period was noted in all the cases.

In the event of onset of pain, diclofenac sodium at a dose of 75 mg was given; if pain persisted 100 mg of tramadol was administered via intramuscular route. Ondensetron was given via intravenous route if nausea-vomiting was observed.

Statistical Analysis: Statistical analysis was done using SPSS software version 16.0. For categorical variables Chi-square test was done. For comparing two groups of mean Independent Student's t test was used. P-value <0.05 is considered as statistical significance

Results

This study was performed on 60 patients of elective inguinal hernia repair after taking consent and explaining the procedure. The patients were randomized into two groups group 1 containing patients receiving paravertebral block and group 2 containing patients receiving spinal anesthesia.

Table 1 shows the result of various parameters of study in between the two groups; group 1 the paravertebral block group and group 2 spinal anesthesia group. Group 1 was having patients with mean age 35.90±11.511 years while the mean age of the patients of group 2 was 34.90±11.106. There was no statistical difference in between the two groups (p= 0.733).

The mean arterial pressure before block in group 1 was 72.83±7.566 mmHg while in group 2 it was 73.13±6.404 mmHg and the difference was found statistically insignificant (p= 0.869). The mean arterial pressure after

Table 1- Various parameters between spinal and paravertebral block

	Group 1 (n=30)	Group 2 (n=30)	p-value
AGE (Years)	35.90±11.511	34.90±11.106	0.733
MAP before block (mmHg)	72.83±7.566	73.13±6.404	0.869
MAP after block (mmHg)	70.03±7.252	60.87±3.550	<0.001
HR before block (Beats/minute)	75.10±10.360	72.70±8.583	0.333
HR after block (Beats/minute)	72.90±9.932	63.07±9.501	<0.001
Procedure time(Minutes)	15.17±4.395	9.73±2.766	<0.001
Time taken for onset of Block(Minutes)	12.93±3.704	7.23±2.582	<0.001
Time of disappearance of motor blockage (Hours)	3.0 ± 1.112	4.5 ± 1.560	<0.001
Time of onset of pain postoperatively(Hours)	14.133±2.2550	4.650±1.2673	<0.001

block in group 1 was 70.03±7.252 mmHg while in group 2 it was 60.87±3.550 mmHg and this difference was found statistically significant (p= <0.001).

The mean heart rate of patients in group 1 and group 2 was compared before and after the block. Before the block mean heart rate of patients in group 1 was 75.10±10.360 beats per minute and in group 2 it was 72.70±8.583 beats per minute. This difference was not significant statistically (p= 0.333). Similarly the heart rate was also compared after the block in the two groups. Mean heart rate after block in group 1 was 72.90±9.932 beats per minute and in group 2 it was 63.07±9.501 per minute. This difference again was statistically significant (p=<0.001). However on comparison of the mean procedure time in the two groups, it was found 15.17±4.395 minutes in group 1 and 9.73±2.766 minutes in group 2 and the difference was significant (p=<0.001).

The mean of time of onset of effect after administration was compared in the two groups. It was found to be 12.93±3.704 minutes in group 1 while 7.23±2.582 minutes in group 2 and the difference was statistically significant (p= <0.001).

In the post operative period we have compared the two groups for the mean of the time till the disappearance of motor blockage and onset of pain. We found that the mean of time of disappearance of motor blockage in group 1 was 3.0 ± 1.112 hours while in group 2 it was 4.5 ± 1.560 hours and this difference was statistically significant (p= <0.001).

On comparison of mean of time of onset of pain in post operative period we noticed that it was as high as 14.133±2.2550 hours in group 1 while it was only 4.650±1.2673 hours in group 2. This difference was also significant (p= <0.001).

Discussion

The inguinal hernia repair is one of the most common operative procedures performed. Though the laparoscopic repair is slowly being done very often however open repair is still commonest. The aims remains an ambulatory hernia repair with minimal side effects, better post operative analgesia and a shorter hospital stay.

In spite of various side effects like postspinal headache, urinary retention, motor blockage of lower limbs, intraoperative hemodynamic variations, delayed mobility and discharge from the hospital, spinal anesthesia is the most commonly used anesthesia method [9-12]. The concept of fast-track ambulatory surgery has made it compulsory to use some other regional method of anesthesia [13].

In the current study we have compared paravertebral block with spinal anesthesia in inguinal hernia repair. On analyzing the results of this study we found that the mean arterial pressure after paravertebral block was significantly higher than after spinal anesthesia meaning that the patients suffer less hemodynamic derangement after paravertebral block and are better preserved. We also found that the paravertebral block causes less hemodynamic derangement in the patients than in spinal anesthesia. Although it was found that the procedure of paravertebral block is significantly more time taking than spinal anesthesia also the onset of block was significantly delayed in paravertebral block as compared to spinal anesthesia but paravertebral block was seen to cause less duration of motor blockage to patients as compared to spinal anesthesia and hence may be valuable to make patients ambulatory earlier. Also the study revealed the valuable role of paravertebral block in providing prolonged analgesia post operatively without causing concurrent motor blockage.

Hence, the results of this study have shown that mean arterial pressure and the heart rate are better preserved after procedure in the patients receiving paravertebral block as compared to spinal anesthesia. Though the time taken in procedure and time taken for the onset of block is significantly higher in the paravertebral block group than in spinal

anesthesia group yet the time for the onset of the post operative pain was significantly higher in paravertebral block. It suggests that though the procedure time is long and it takes more time for the effect of block to come, paravertebral block provides prolonged post operative analgesia. The results of this study are consistent with many other previous studies.

The concept of paravertebral block for inguinal hernia surgeries was given by Weltz *et al.*, [8] Who have used lumbar paravertebral block with an idea that paravertebral block would provide prolonged sensory block characterized by minimal postoperative pain and lower use of narcotics, lower incidence of nausea and vomiting, and shorter hospital care requirement. Later these were confirmed on study by Hadzic *et al.*, [14] Who compared paravertebral anesthesia with general anesthesia for inguinal hernia repair. In the study by Canan Tulay Isil *et al.*, also prolonged analgesia was provided in the group that received paravertebral anesthesia [15]. Again Naja *et al.*, compared the efficacy of bilateral paravertebral block and mild sedation with that of general anesthesia in ventral hernia surgeries and concluded that paravertebral block was more effective [16].

The paravertebral block is a technique of regional anesthesia which involves the injection of local anesthetics immediately lateral to the vertebral column into the space where the spinal cord emerges from the intervertebral foraminae and bifurcates into the dorsal and ventral rami [8]. It has been described in various literatures to be a successful alternative for aesthetic management and also an analgesic technique for IH [8, 14, 17-19].

The available literature on paravetebral block suggests that it preserves lower-extremity motor function and provides unilateral, segmental anesthesia of the operative site, prolonged postoperative analgesia, and low incidence of post operative nausea and vomiting [19, 20]. In the study by E. Y. Akcaboy *et al.*, successful paravetebral block was provided in all patients except one, by blocking at T9-L1 levels with 5 mL levobupivacaine 0.5% + 1:400000 epinephrine for each [21].

Conclusions

Paravertebral block is a good option for spinal anesthesia for the surgery of inguinal hernia. It is associated with no motor block and prolonged post operative analgesia; however the expertise to apply, procedure related time and prolonged onset of effect are the concern.

Conflict of Interests

The authors declare that there are no conflicts of interests.

Authors' Contribution

MM: Study Design, Literature Search, Data collection and analysis, Preparation of Manuscript.

SPM: Study Design, Data Collection and Interpretation, Manuscript Preparation.

SPS: Study Design, Approval of Final Manuscript.

Ethical Considerations

The study was approved by the institute ethics committee and written informed consent was obtained from each of the study participant.

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References

1. Kehlet H, White PF. Optimizing anesthesia for inguinal herniorrhaphy: General, regional or local anesthesia? Anesth Analg 2000;93:1367-9.[PubMed]
2. Cwik J. Postoperative considerations of neuraxial anesthesia. Anesthesiol Clin 2012; 30: 433-43.[PubMed]
3. Aklaya F. Postoperative complications and nausea vomiting. Turkiye Klinikleri J

Anest Reanim-Special Topics 2008; 1: 112-6.
4. Donati A, Mercuri G, Iuorio S, Sinkovetz L, Scarcella M, Trabucchi C, et al. Hemodynamic modifications after subarachnoid anaesthesia evaluated with tranthoracic echocardiyography. Minerva Anestesiologica 2005; 71: 75-81 [Pubmed].
5. Kopp S, Horlocker T, Warner ME, Hebl JR, Vachon CA, Schroeder DR, et al. Cardiac arrest during neuraxial anesthesia: frequency and predisposing factors associated with survival. Regional Anesthesia 2005; 100: 855-65 [Pubmed].
6. Van Vlymen JM, White PF. Fast tract concept for ambulatory anesthesia. Curr Opin Anaesthesiol 1998;11:603-13.[PubMed]
7. Baumgarten RK, Greengrass RA, Wesen CA. Paravertebral block: the holy grail of anesthesia for hernia surgery? Anesth Analg 2007; 104: 207. [CrossRef][PubMed]
8. Weltz CR, Klein SM, Arbo JE, Greengrass RA. Paravertebral block anesthesia for inguinal hernia repair. World J Surg 2003; 27: 425-9. [CrossRef][PubMed]
9. Ozgun H, Kurt MN, Kurt I, Cevikel MH. Comparison of local, spinal and general anesthesia for inguinal herniorrhaphy. Eur J Surg 2002;168:455-9.[PubMed]
10. Yilmazlar A, Bilgel H, Donmez C, Guney A, Yilmazlat T, Tokat O. Comparison of ilioinguinal-iliohypogastric nerve block *versus* spinal anesthesia for inguinal herniorrhaphy. South Med J 2006;99:48-51.[PubMed]
11. Gupta A, Axelsson K, Thörn SE, Matthiessen P, Larsson LG, Holmström B *et al.* Low dose bupivacaine plus fentanyl for spinal anesthesia during ambulatory inguinal herniorrhaphy: a comparison between 6 mg and 7.5 mg of bupivacaine. Acta Anaesthesiol Scand 2003;47:13-9.[PubMed]
12. Kehlet H, Dahl JB. Spinal anesthesia for inguinal hernia repair? Acta Anaesthesiol Scand 2003;47:1-2.[PubMed]
13. Salinas FV, Liu SS. Spinal anesthesia: Local anesthetics and adjuncts in the ambulatory setting. Clin Anaesthesiol 2001;16:195-210.[PubMed]
14. Hadzic A, Kerimoglu B, Loreio D, Karaca PE, Claudio RE, Yufa M, et al. Paravertebral blocks provide superior same-day recovery over general anesthesia for patients undergoing inguinal hernia repair. Anesth Analg 2006; 102: 1076-81 [Pubmed].
15. Isıl CT, Ozer Cınar AS, Oba S, Isıl RG. Comparison of Spinal Anaesthesia and Paravertebral Block in Unilateral Inguinal Hernia Repair Turk J Anaesth Reanim 2014; 42: 257-63.[PubMed]
16. Naja Z, Ziade MF, Lonnqvist PA. Bilateral paravertebral somatic nevre block for ventral hernia repair. Eur J Anaesthesiol 2002; 19: 197-202.[PubMed]
17. Wassef M, Randazzo T, Ward W. The paravertebral nerve root block for inguinal herniorrhaphy- a comparison with the field block approach. Reg Anesth Pain Med 1998;23: 451-6.[PubMed]
18. Klein S, Pietrobon R, Nielsen K, Seele R, Klein SM, Martin AH *et al.* Paravertebral somatic nerve block compared with peripheral nerve block for outpatient inguinal herniorrhaphy. Reg Anesth Pain Med 2002;27:476-80.[PubMed]
19. Naja MZ, El Hassan MJ, Oweidat M, Zbibo R, Ziade MF, Lönqvist PA. Paravertebral blockade *vs* general anesthesia or spinal anesthesia for inguinal hernia repair. Middle East J Anesthesiol 2000;16:201-10.[PubMed]
20. White PF. Choice of peripheral nerve block for inguinal herniorrhaphy: Is better the enemy of good? Anesthe Analg 2006;102:1073-5.[PubMed]
21. Akcaboy Ey, Akcaboy Zn, Gogus N. Ambulatory inguinal herniorrhaphy: paravertebral block *versus* spinal anesthesia. Minerva Anestesiologica 2009; 75(12): 684-91.