PARAVERTEBRAL BLOCK OR SPINAL ANALGESIA FOR HERNIOPLASTY

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ABSTRACT

BACKGROUND

Paravertebral block was first given in 1905. A renaissance of this technique is now being extensively done for intraoperative and postoperative pain relief because it is effective, easy to perform and has few complications. Spinal analgesia is a routine procedure for infra-umbilical surgeries, but has the drawback of its cardiovascular effects.

We compared the two techniques of PVB and SA for unilateral hernioplasty done for inguinal hernia to study the haemodynamic characteristics (heart rate and mean arterial pressure), onset and duration of sensory loss and VAS scores in the first 24 hours after surgery.

MATERIALS AND METHODS

This was a randomized, prospective, single blind study. Sixty male patients of American Society of Anesthesiologists physical status grade I – III of age 35 to 65 years with unilateral direct or indirect hernia were taken for study. They were randomly divided into two groups of thirty each. Group SA received spinal analgesia and Group PVB received lumbar paravertebral block. Mean Arterial Pressure, heart rate and SpO_2 were recorded preoperatively and throughout the surgical procedure. Demographic profile, surgical data, patient satisfaction, onset time to reach T_{10} dermatome, peak sensory level and postoperative nausea and vomiting were recorded. The VAS scores at postoperative 0-24 hours were measured.

RESULTS

There was decrease in heart rate and mean arterial pressure in the first 15 minutes in the SA group which was statistically significant compared to the PVB group (p=0.01). The sensory block was longer in the PVB group and with lower VAS scores.

CONCLUSION

Paravertebral block provides good surgical analgesia without haemodynamic fluctuations and gives satisfactory postoperative pain relief.

KEYWORDS

Hernia repair, Spinal analgesia, Paravertebral Block.

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BACKGROUND

There are numerous techniques to anesthetise a case for hernia repair. But the most preferred one is a regional block owing to its advantages over general anaesthesia. Regional anaesthesia is preferred because complications of general anaesthesia like sore throat, delayed recovery, nausea and vomiting, respiratory depression, etc., can be avoided.

Spinal analgesia can be administered uneventfully in healthy young individuals, but for the geriatric or those with unstable haemodynamics the technique is not preferred. Specific adverse effects on cardiovascular system like arterial vasodilatation, peripheral reflex vasoconstriction, bradycardia and hypotension may pose a problem.[1,2]

Paravertebral Block (PVB) is an established regional anaesthetic technique. The injection of local anaesthetic in a space immediately lateral to where the spinal nerves emerge from the intervertebral foramina produces unilateral, segmental, somatic, and sympathetic nerve blockade which is effective for anaesthesia and in treating acute and chronic pain of unilateral origin from the chest and abdomen.

Paravertebral block was first performed in 1905 as an alternative to neuraxial anaesthesia for obstetric procedures.[3,4] The technique was neglected till 1979 when Eason and Wyatt who presented a reappraisal on Thoracic Paravertebral Block (TPVB).[5] Paravertebral blocks are suitable as a primary anaesthetic technique not only for parietal surgeries like hernia repair, breast surgery or chest trauma, but also as an adjuvant for laparoscopic surgeries.

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It is considered to be much safer than neuraxial block, especially thoracic epidural or those on antiplatelet drugs for thromboprophylaxis.[6] Hadzic, Naja, Pusch and Klein reported 100% success in block effectiveness.

MATERIALS AND METHODS

After obtaining Institutional Ethics Committee approval, sixty patients with inguinal hernia, aged between 35 and 65 years, of American Society of Anesthesiologists Physical Status I-III were selected for this prospective, randomized, single blind study. They were randomly divided into two groups through sealed cover. The technique of anaesthesia was explained to them. The same anaesthesiologist performed the blocks in both the groups and a second anaesthesiologist monitored intra and post operatively. The exclusion criteria were unwillingness to the technique, history of allergy to local anaesthetic drugs, those with liver disease, morbid obesity, mental disorders or infection at the local site.

After a preliminary check, and eight hours fasting, the patients were preoperatively loaded with Ringer Lactate and premedicated with Midazolam 2mg. Standard monitoring included heart rate, systolic and diastolic blood pressure, mean arterial pressure, oxygen saturation (SpO_2) and electrocardiography. Group SA (n=30) patients received subarachnoid block with 0.5% Bupivacaine Heavy. After connecting the patient to the multimonitor, he was turned to the right decubitus position; antiseptic dressing and draping was done. 3 ml of 0.5% bupivacaine was given at the $L_2 - L_3$ or $L_3–L_4$ interspace through 25G Quincke spinal needle. And repositioned to the supine position. The patient was handed over to the surgeon after attaining sensory loss to T_{10}.

In the PVB (n=30) group the block was performed in the sitting position. After antiseptic dressing and draping, the lower end of scapula denoting the T_7 spine is identified. Subsequently, T_{10} spine was identified, followed by T_{12} and L_2 vertebral spines. 2.5 cms lateral to these landmarks a 22G spinal needle was inserted so as to hit the transverse process of that vertebra. The needle was withdrawn and redirected one cm caudally. 5ml of 0.5% bupivacaine was injected at each site i.e. $T_{10,}$ T_{12} and L_2. The patient was then made to lie in supine position, pin prick discrimination done every 5 mins for 30 mins checked for analgesia and then handed over to the surgeon.

Monitoring of heart rate, systolic, diastolic and mean blood pressures, SpO2, was done throughout the operation. Time required for performing the block, time to surgical anaesthesia, and duration of surgery were noted. Complications like bradycardia (less than 60 bats per min) or hypotension (20% less than the baseline value) were treated accordingly with atropine, intravenous fluids and phenylephrine or mephentermine. Postoperatively, time to first analgesic, total dose of analgesic requirement in the first 24hours were noted. Nausea and vomiting were treated with ondansetron. Postoperative analgesia was monitored using VAS scores. VAS score >3 was treated with inj. Tramadol.

Statistical Analysis

Student's t test, Chi square test, and Statistical package for Social Sciences (Version 14.0 SPSS Inc Chicago USA) version were used.

RESULTS

All the sixty patients- thirty in each group who participated in the study had successful block. The two groups were comparable with respect to demographic data, ie age, height, and weight. Time required to perform PVB much longer than SAB, which was statistically significant. The baseline haemodynamic parameters between the two groups were comparable. The primary endpoints were visual analogue pain scores at rest and on cough between 0 and 24 hrs. The VAS scores were significantly less in the PVB group. The secondary endpoints were total amount of analgesic (tramadol) requirement, adverse events and patient satisfaction with the analgesia. Tramadol consumption was 96mg in group PVB which was significantly less than that of SA group (tramadol consumption was 238mg). Group SA had a lower MAP after 15 mins of block no such change seen in PVB group.

Parameters	Group SA	Group PVB
Age (years)	52 ± 4.8	53 ± 5.1
Height (Inches)	5.4 ± 0.2	5.3 ± 0.5
Weight (Kgs)	65 ± 3.1	63 ± 2.8

Table 1. Demographic Profile

The demographic profile is statistically not significant (p=0.05). SA = Spinal analgesia, PVB = Paravertebral Block.

	Group SA	Group PVB
0 min	87	88
5 min	92	86
10 min	76	83
15 min	72	80
30 min	68	74
45 min	70	77
60 min	71	78

Table 2. Vital Parameters; Heart Rate

One patient had bradycardia which was treated with inj. Atropine.

	Group SA	Group PVB
0 mins	88	90
5 mins	83	88
10 mins	70	86
15 mins	78	88
30 mins	76	86
45 mins	80	90
60 mins	86	86

Table 3. Mean Arterial Pressure

Mean Arterial Pressure dropped after 10 mins in the SA group but remained around the preoperative level in PVB group.

Parameters	Group SA	Group PVB
Time to perform block (min)	5 ± 1.5	18 ± 3.25
Time to perform surgery (min)	15 ± 0.5	30 ± 1.42
Time for first rescue analgesic (min)	216 ± 14	476 ± 25
Total dose of analgesics required in first 24 hrs (mg)	238 ± 12	96 ± 15
Time to ambulate (min)	190 ± 8.5	75 ± 9

Table 4. Block Characteristics

	Group SA	Group PVB
Urinary retention	3	0
Nausea and Vomiting	1	0

Table 5. Side Effects

DISCUSSION

According to the epidemiological data, general anaesthesia is used in 60–70%, central neuraxial blocks in 10–20% and local infiltration anaesthesia in 5–10% of cases.[6,7] PVB have been used with success, both as an anaesthetic and analgesic technique, for inguinal herniorrhaphy. Spinal analgesia has the drawback of intraoperative haemodynamic instability, prolonged motor loss, nausea and vomiting, urinary retention, post dural puncture headache, backache, etc.

The technique of paravertebral block is being extensively used now due to the ease of administration, high success rate and fewer complications. The paravertebral technique was a single shot technique till 2003 for perioperative pain management. Continuous paravertebral blocks evolved especially for those with trauma to thorax.[8] The injection of a local anaesthetic in the paravertebral space produces analgesia because of direct contact of LA with the spinal nerve roots before they emerge from the intervertebral foramina. The injection of LA into the paravertebral space avoids the severe autonomic dysfunction seen with neuraxial techniques and allows earlier mobility of the patient.

The paravertebral block has also been used extensively for anaesthesia and analgesia for abdominal surgery, especially for ambulatory inguinal hernia repair.[9,10] The paravertebral approach to analgesia after inguinal herniorrhaphy can provide analgesia that is superior to oral analgesia or local field blocks. Paravertebral blocks have been used less frequently for other abdominal procedures. A series of ten patients undergoing abdominal vascular surgical procedures was reported. Cardiovascular stability was noted upon incision, clamping of the aorta and throughout surgery in all patients.[11] The effect of PVB examined on the pain-relief and perioperative stress response in patients scheduled for open cholecystectomy showed less pain scores and less requirements on supplemental analgesics for three days postoperatively. A significant reduction in circulatory and hormonal response to stress was also seen.[12]

The failure rate associated with PVB is not >9%. Inadvertent vascular puncture (5.2%), hypotension (6%), epidural spread of Local Anaesthetic (LA) (1.8%), inadvertent pleural puncture (1.8%) and pneumothorax (0.5%) were the recorded complications. Complications were higher in bilateral compared to unilateral block. Postoperative nausea and vomiting are significantly lower in patients given PVB compared to GA.[13]

CONCLUSION

Paravertebral block provides better pain relief and requires less analgesic consumption postoperatively compared to spinal analgesia.

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