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ORIGINAL RESEARCH

Spinal Anaesthesia Versus Epidural Anaesthesia for Inguinal Hernioplasty: A Comparative Study

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ABSTRACT

Introduction: Spinal anaesthesia (or spinal anesthesia), also called spinal block, subarachnoid block, intradural block and intrathecal block is a form of neuraxial regional anaesthesia involving the injection of a local anaesthetic or opioid into the subarachnoid space, generally through a fine needle, usually 9 cm (3.5 in) long. Epidural anesthesia is a technique that may be used as a primary surgical anesthetic or as a resource for postoperative pain management. It is safe and relatively easy to learn and perform.A hernia is reducible if it occurs intermittently (such as on straining or standing) and can be pushed back into the.

Material and methods: This is a prospective, comparative and randomized study was conducted in the anaesthesia department of a tertiary medical Hospital. All patients were male, age between 18 to 70 years. The present study included male patients of uncomplicated inguinal hernia with American society of anaesthesiologist (ASA) grade 1 and 2. All patients were admitted for planned surgery; they were examined and preanesthetic check-up done. All patients were explained about the techniques of anaesthesia for hernioplasty and where randomized into two groups. They were operated for inguinal hernioplasty according to recognised surgical guidelines.

Results: Total time taken for performing the procedure was significantly longer with Epidural Anaesthesia than that of Spinal Anaesthesia (8.03±0.84 **Vs** 3.65±0.23 **minutes, p<0.001) but onset of action was comparable in both the groups (**6.84±1.08 **in Spinal Vs** 11.23±1.21**min in Epidural p<0.001 Significant). Intraoperative fluid requirement was statistically higher in Spinal than Epidural (**1612.43±163.3 **ml vs** 1102.54±94.53 **ml) (p<0.0001). Duration of Surgery was significantly shorter in Spinal as compared to Epidural (**91.43±8.64 **vs** 114.53±11.64 **mins.) (p=**0.021**).**

Conclusion: The spinal block induces a faster and more effective analgesia as well as a more severe motor blockage than epidural block. In Spinal Anaesthesia, the haemodynamic fluctuations and adverse effects are larger than in Epidural Anaesthesia. As a result, both spinal and epidural anaesthesia may be utilised safely during day surgery.

Keywords: Epidural anaesthesia, Spinal anaesthesia, Inguinal hernia repair

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INTRODUCTION

Spinal anaesthesia (or spinal anesthesia), also called spinal block, subarachnoid block, intradural block and intrathecal block is a form of neuraxial regional anaesthesia involving the injection of a local anaesthetic or opioid into the subarachnoid space, generally through a fine needle, usually 9 cm (3.5 in) long.[1] It is a safe and effective form of anesthesia usually performed by anesthesiologists that can be used as an alternative to general anesthesia commonly in surgeries involving the lower extremities and surgeries below the umbilicus. [2]

Epidural anesthesia is a technique that may be used as a primary surgical anesthetic or as a resource for postoperative pain management. It is safe and relatively easy to learn and perform. [3] This activity reviews the anatomy, indications, contraindications, and technique necessary to perform this procedure and highlights interprofessional teams' role in providing and improving care for patients who undergo surgery or require multimodal postoperative pain management. [4]

A hernia is reducible if it occurs intermittently (such as on straining or standing) and can be pushed back into the abdominal cavity, and irreducible if it remains permanently outside the abdominal cavity. [5] A reducible hernia is usually a longstanding condition, and diagnosis is made clinically, on the basis of typical symptoms and signs. The condition may be unilateral or bilateral and may recur after treatment (recurrent hernia). [6]

Inguinal hernias are often classified as direct or indirect, depending on whether the hernia sac bulges directly through the posterior wall of the inguinal canal (direct hernia) or passes through the internal inguinal ring alongside the spermatic cord, following the coursing of the inguinal canal (indirect hernia). [7] However, there is no clinical merit in trying to differentiate between direct or indirect hernias. The box outlines important elements in examining patients who have a suspected inguinal hernia. [8]

MATERIAL AND METHODS

This is aprospective, comparative and randomized study was conducted in the anaesthesia department of a tertiary medical Hospital. All patients were male, age between 18 to70 years. The present study included male patients ofuncomplicated inguinal hernia with American societyof anaesthesiologist (ASA) grade 1 and 2. All patientswere admitted for planned surgery; they wereexamined and preanesthetic check-up done. All patientswere explained about the techniques of anaesthesia forhernioplasty and where randomized into two groups. They were operated foringuinal hernioplasty according to recognised surgical guidelines.

The exclusion criteria were negative consent, complex hernias (recurrent, obstructed Hernia, irreducible, incarcerated, bilateral, strangulated), morbid obesity, epilepsy, anticipated problematic intubation and contraindication of Spinal Anaesthesia or Epidural Anaesthesia. Patients with a past history of Coagulopathy and significant cardiovascular, renal, respiratory, hepatic or metabolic disease. Patients with a history of substance abuse, mental dysfunction, active gastrointestinal reflux, chronic analgesic use.

In the operating room patients clarified the technique, monitors were attached and the baseline reading of heart rate (HR), non-invasive blood pressure (NIBP), electrocardiogram, and oxygen saturation (SpO2) were documented. Then, intravenous line was placed and patients were pre-loaded with 15 ml/kg of ringer lactate solution.

Spinal anaesthesia was given under all sterilised precaution, 3 ml of 0.5% bupivacaine heavy using a 25-gaugeQuincke's spinal needle through theL3-L4 intervertebral space in the sitting posture. Before giving thelocal anaesthesia, each patient throughout the techniqueasked to report verbally any timeif he feelsdistress.

Epidural Anaesthesia: Under all aseptic precautions, 18 g Tuohy's epidural needle was employed at L3-L4 intervertebral space in sitting posture by loss of resistance technique. Epidural drug (12ml 0.5 % Bupivacaine) was administered.

All patients were checked for sensory blockade using pin prick technique. Once T6 level of sensory blockade was attained, the surgery was permitted to start. Sensory blockade assessment was done for every 5 min for the first 1 hr and then for every 30 min for the next 3 h. Motor blockade assessment was done by Bromage scale for every 5 min for the first 30 min after drug administration.

We collected the patients´ preoperative, intraoperative andpostoperative information consistof age, gender, site ofhernia, body mass index (BMI), duration of surgery,patients´ pain intensity at the 3, 6, 12, and 24 hours periods after surgery by a visual analogue pain score(VAS), dose of analgesic, any early complicationssuch as hematoma, urinary retention, infection andhospitalization time. To assess pain severity, weasked patients to rate their pain from 1 to 10 andthe results were recorded as VAS values.

0 – nopain,

1-3: mild pain,

4-6: moderate pain,

7-10:severe pain.

Rescue analgesia was given when VAS scale becomes more than 3. Hemodynamic parameters such as HR, systolic blood pressure (SBP) and diastolic blood pressure (DBP), mean arterial blood pressure (MAP), and SpO2 were watched at every 5-min. interval until 120 min then 30 min interval for further 3 h. Intraoperative hypotension and bradycardia was managed with IV fluids and titrated intra venous doses of Mephentermine 6 mg and atropine of 0.6 mg respectively. Any complications like nausea, vomiting, pruritus and hypersensitiveresponses were noted and managed by standard guidlines.

RESULTS

Demographic data and duration of surgery were comparable in both the groups (Table 1).

Table 1: Intraoperative and postoperative comparison of various parameters

	Spinal Anesthesia n=70 (%)	Epidural Anesthesia n=70 (%)	p= value
ASA Grade (%)			
I	44 (62.8%)	48 (68.5%)	0.642
II	26 (37.2%)	22 (31.5%)	0.525
Mean duration for procedure (Min)	3.65±0.23	8.03±0.84	<0.001
Onset of action (Min)	6.84±1.08	11.23±1.21	<0.001
Intravenous fluid requirement (ml)	1612.43±163.3	1102.54±94.53	<0.001
Duration of surgery (min)	91.43±8.64	114.53±11.64	0.021
Block failure (%)	0 (0 %)	3 (4.2 %)	
Intraoperative Hypotension (%)	27 (38.5%)	5 (7.1%)	0.025
Urinary retention	11 (15.7 %)	0	0.003
Nausea and Vomiting	06 (8.5%)	1(1.4 %)	0.025
PDPH	01(1.4%)	0	0.463
Duration of ambulation (hour)	10.03±1.43	4.10±0.83	<0.001
Bromage scores (3/2/1/0) $	41/17/12/0	0/47/13/10	<0.001

Total time taken for performing the procedure was significantly longer with Epidural Anaesthesia than that of Spinal Anaesthesia (8.03±0.84 Vs 3.65±0.23 minutes, p<0.001) but onset of action was comparable in both the groups (6.84±1.08in Spinal Vs 11.23±1.21min in Epidural p<0.001 Significant). Intraoperative fluid requirement was statistically higher in

Spinal than Epidural (1612.43±163.3ml vs 1102.54±94.53 ml) (p<0.0001). Duration of Surgery was significantly shorter in Spinal as compared to Epidural (91.43±8.64 vs 114.53±11.64mins.) (p=0.021). 3 patients had failure of Epidural block whereas no Spinal Anaesthesia failed in patients. Systolic and mean blood pressure showed statistically significant reduction in Spinal as compared to Epidural (27 (38.5%) vs 5 (7.1%)) (p<0.001). Also, Urinary retention and Post Dural puncture headache (PDPH) was seen only in Spinal Anaesthesia. Whereas 6 patients had nausea and vomiting during spinal and only 1 patients during Epidural Anaesthesia. Duration of ambulation was significantly shorter in Epidural as compared to Spinal (4.10±0.83vs 10.03±1.43hours) (p<0.001).

Table 2: Operative condition, intra-operative discomfort and satisfaction with anaesthesia

Variables	Spinal Anesthesia (n=70)	Epidural Anesthesia (n=70)
Operative condition		
Excellent/Good/Poor	70	64/4/2
Intra-operative pain	0	19
Satisfaction with anesthesia	70	61
(Satisfy/Not satisfy) **Surgeon** **Patients**	70/0	63/7

In table 2, the surgeons and patients expressed satisfactory result as satisfy in both the groups. The both group of patients declared of having good comfort during surgery, reduced requirement of postoperative analgesia and thereby experience of less side effects. This difference between the groups are statistically insignificant.

Table 3: Post-operative pain (1st 12 hours)

Grade (Time)	Spinal Anesthesia (n=70)	Epidural Anesthesia (n=70)
0-3 hours	0	0
4-6 hours	34 (48.5%)	36 (51.4%)
7-9 hours	42 (60%)	47 (67.1%)
10-12 hours	58 (82.8%)	61 (87.1%)

In table 3, patients operated under Spinal Anaesthesia had less postoperative pain on day -0 (between 4-6 hours 48.5% patients, 7-9hours 60%, 10-12 hours 82.8%) compared to Epidural Anaesthesia group (between 4-6 hours 51.4% patients, 7-9hours 67.1%, 10-12 hours 87.1%). There was no significant difference in pain score in both the group of the patients.

Table 4: Intraoperative pain

Intraoperative pain (VAS)	Spinal anaesthesia (n=70) (%)	Epidural anaesthesia (n=70) (%)
None (VAS=0)	53 (75.7%)	6 (8.5%)
Mild (VAS 1-3)	8 (11.4%)	13 (18.5%)
Moderate (VAS 4-6)	9 (12.8%)	43 (61.4%)
Severe (VAS>=7)	0	8 (11.4%)

In table 4, spinal anesthesia Group, 53 (75.7%) patients had no pain after inguinal hernioplasty, while 8 (11.4%) patients experienced mild pain and 9 (12.8%) patients experienced moderate pain after surgery. None had severe pain. In the Epidural Anesthesia Group,6 (8.5%)patients had no pain after surgery, while 13 (18.5%) patients experienced mild pain and 43 (61.4%) patients experienced moderate pain after surgery. 8 (11.4%) patient had severe pain. The difference between the two groups was found to be statistically significant. (p<0.001).

Table 5: Recovery times and adverse events

Parameter	Group S (n=70)	Group P (n=70)	P
Time to first analgesic (min)	211±19	339±39	<0.001*
Time to complete sensory regression (min)	241±31	483±48	<0.001*
Total rescue analgesics (tramadol in mg)	77±7.1	79±8.3	0.683
Patients experiencing PONV (%)	05 (7.1%)	1 (1.4%)	<0.001*
Urinary catheterization	8 (11.4%)	0	<0.001*
Recovery room bypass (%)	0	21 (30%)	<0.001*

Table 6:Post-operative observations

Complications	Spinal Anesthesia (n=70)	Epidural Anesthesia (n=70)	P value
Vomiting	6 (8.5%)	1 (1.4%)	<0.001*
Urinary retention	8 (11.4%)	0	-
Headache	2 (2.8%)	0	-

In table 6: Only 6 patients in Spinal Anaesthesia group(8.5%) &1 patients (1.4%) in Epidural Anaesthesia group experienced nausea & vomiting. The difference was statistically significant. ($p<0.001$).In the present study, none of the patients who had urinary retention and headache in Epidural Anaesthesia, while 8 (11.4%) of patients had urinary retention and 1 patient had headache after Spinal Anaesthesia. This was statistically significant.

DISCUSSION

In this research, we found that Spinal Anaesthesia (table 1) had a faster start time than Epidural Anaesthesia. These conclusions are consistent with Davis et alfindings. .'s They estimate that it will take 137 minutes in spinal anaesthesia with 0.5 percent hyperbaric bupivacaine and 214 minutes in epidural anaesthesia with 0.5 percent bupivacaine to achieve maximal cephalad extent. [9]

Spinal Anaesthesia had a considerably larger intraoperative intravenous fluid need than Epidural Anaesthesia (1612.43163.3 ml vs 1102.5494.53 ml). The increased fluid demand in the Spinal Anaesthesia group is due to sympathetic blocking, which causes the intravascular compartment to swell, necessitating rapid intravascular infusion to maintain proper intravascular volume and blood pressure. As a result, in individuals with a low ejection fraction, epidural anaesthesia may be the best option.

During Spinal Anaesthesia, there was no block failure. Three patients (4.2%) had block failure owing to inadequate block in epidural anaesthesia. Using conventional inguinal field block, Sultana A et al [10] and Ruben N Van Veen et al [11] found considerable intraoperative unpleasantness during the dissection of hernia sac in 34 percent and 35 percent of patients, respectively. According to C J Sparks et al [12], the failure rate for local inguinal field block was 3.33 percent, and for local infiltration anaesthesia, it was 3.17 percent, according to Aysun Yilmazlar et al [13], compared to 10% in our research. With greater experience and expertise in this approach, the failure rate may be reduced.

Our findings are consistent with those of Nehme et al, who found that the incidence of intraoperative hypotension was highest in spinal anaesthesia (19 patients), [14], and was only detected in 3 patients with epidural anaesthesia, which was minimal in instances of epidural anaesthesia. Tingwald and Cooperman discovered similar results as well. [15] This is related to the sympathetic blockade caused by spinal anaesthesia, which causes vasodilation, blood pooling in the peripheral venous system, and a reduction in cardiac output. Aysun Yilmazlar et colleagues observed a substantial drop in mean arterial pressure in the spinal anaesthesia

group (pre 70.310.3mmHg and post 52.39.3mmHg), but not in the ilioinguinal and iliohypogastric nerve block groups. [13]

Patients undergoing spinal anaesthesia (15.7 percent) and epidural anaesthesia (0 percent) reported urine retention (i.e. full bladder on palpation and failure to micturition 8 hours postoperatively and concomitant with distress). In a research comparing competitive spinal and epidural anaesthesia, Davis et al [9] found that 7 (out of 32) patients in the spinal group and 14 (out of 30) patients in the epidural group needed catheterization. The lower amount of anaesthetic employed in the spinal group (3 mg) and the use of a single shot approach for epidural anaesthesia resulted in a decreased incidence of urine retention in our trial when compared to this. Furthermore, their mean catheterization duration was 4.21.7 hours in the spinal group and 4.72.3 hours in the epidural group, and we waited at least 8 hours for the patient to micturition freely before doing catheterization.

Despond et al [16] identified 9.3% incidence of Post Dural Puncture Headache (PDPH) in young orthopaedic patients utilising 27 G needles (whittcre and Quincke's) in their investigation. Only one patient in the spinal group experienced PDPH in our trial, and she responded well to intravenous fluids and oral analgesics. In our investigation, the use of tiny gauze (25 number quincke) needles resulted in a lower incidence of PDPH.

In Spinal Anaesthesia, the duration of ambulation was longer than in Epidural Anaesthesia (10.031.43 vs 4.100.83) (0.001). Song D et al observed that epidural block had the quickest time-to-home willingness (13368 min) compared to spinal anaesthesia (28083 min). [17] According to Ding Y and White PF, the ambulation duration in the block group was (86 18 min) and the period from fit to discharge was (11249 min). [18] The mean duration till discharge in the block group was 6.85 hours, according to Goutorbe P et al, who concluded that it must be an appropriate strategy in countries with low Gross National Product (GNP), such as Africa. [19]

When comparing Spinal Anaesthesia to Epidural Anaesthesia, the postoperative VAS score was considerably higher in Spinal Anaesthesia. When comparing Epidural Anaesthesia to Spinal Anaesthesia, the duration of postoperative analgesia was much longer (5.1630.4542 vs 3.8710.4801 hours). Sultana A et al [10] and Tverskoy et al [20] both found similar results.

In Spinal Anaesthesia, 6 patients had nausea and vomiting that responded to IV ondansetron, 8 patients reported urine retention, and 2 patients experienced headache. None of the individuals undergoing epidural anaesthesia had any of these issues. Young at al [21] had similar outcomes (14 percent urine retention) while Sultana A et al [10] experienced wound haematoma or local infection. Because nausea and vomiting during regional anaesthesia are more likely when sympathetic block extends beyond the sixth thoracic segment, our research found that using a low dose reduced nausea and vomiting. [22]

CONCLUSION

The spinal block induces a faster and more effective analgesia as well as a more severe motor blockage than epidural block. In Spinal Anaesthesia, the haemodynamic fluctuations and adverse effects are larger than in Epidural Anaesthesia. As a result, both spinal and epidural anaesthesia may be utilised safely during day surgery. Early onset and total relaxation are added benefits of spinal anaesthesia with 25 gauze quincke's needle and 3ml 0.5 percent hyperbaric bupivacaine. Urinary retention, haemodynamic variability, nausea and vomiting, hypotension, and ambulation are all reduced with epidural anaesthesia. As a result, anaesthesia of choice may be used in elderly and CVD patients.

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