

## Original Research Article

# Comparison of local versus spinal anaesthesia in inguinal hernia repair

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## ABSTRACT

**Background:** Inguinal hernioplasty remain one of the most commonly performed operations worldwide. Local anaesthesia can be a preferred method in day-case hernia surgeries. Present study was thus conducted to determine whether local anaesthetic technique is an acceptable alternative to spinal anaesthesia for hernia repair, especially with regards to operative conditions, postoperative pain relief and complications.

**Methods:** This was a prospective randomized single blinded clinical study consisting of sixty patients conducted after the ethical committee clearance. The patients posted for tension free lichtenstein elective hernioplasty were allocated to either of two groups, group A (n=30) were given local anaesthesia and patients in group B (n=30) were given spinal anaesthesia. The operative and postoperative pain score using visual analogue scale, duration of surgery and any other complications were recorded.

**Results:** There was no demographic difference between the two groups. Time taken in local anaesthesia was higher than spinal anaesthesia. Intraoperative pain was higher in local anaesthesia than spinal anaesthesia. There was no difference in post-operative pain scores ( $p>0.05$ ). Post-operative complications were more in spinal anaesthesia group e.g. urinary retention, headache, etc.

**Conclusions:** Local anaesthesia can be another good choice for inguinal hernia repair owing to its advantages and less complications, but it can't be confirmed that local anaesthesia is better than spinal anaesthesia. It can be reliably concluded that local anaesthesia can be a preferred method in day-case hernia surgeries owing to its advantages of ease of administration and less complications.

**Keywords:** Day-case surgery, Hernioplasty, Inguinal hernia, Local anaesthesia, Pain, Spinal anaesthesia

## INTRODUCTION

Inguinal hernias are one of the most common problems encountered by the surgeon accounting for about 10–12% of all patients. Inguinal hernia repair is one of the most commonly performed operations world-wide, can be done under general anaesthesia, spinal or epidural anaesthesia and local anaesthesia depending upon a variety of factors viz. surgeon's wish, patient's acceptance, safety, feasibility and cost.<sup>1-3</sup> Recently

there has been revival in the use of local anaesthetic technique for hernioplasty.<sup>4-6</sup> Patient safety should be the paramount factor in choosing the type of anaesthesia. General or spinal anaesthesia are still the most common types of anaesthesia being used in India.<sup>7,8</sup> Studies comparing the recovery profiles of local, general and regional anaesthesia show that local anaesthesia is ideal for day care surgery.<sup>9</sup> The present study was designed to determine whether local anaesthetic technique is an acceptable alternative to spinal anaesthesia for hernia repair, especially with regard to operative conditions,

patient's and surgeon's satisfaction, postoperative pain relief as well as complications.

## METHODS

After approval by the institutional ethical committee present study was carried out as a single blind prospective randomized trial. We included sixty patients of either sex with ASA physical status I-II with age of more than 10 years having uncomplicated inguinal hernia admitted in surgical ward in Shri Lal Bahadur Shastri Government Medical College and Hospital, Mandi, Himachal Pradesh, w.e.f. October 2017 to March 2019. Patients with recurrent, bilateral, irreducible, strangulated, incarcerated, obstructed hernia, obese patients were excluded in this study. By simple randomization, patients were divided into two groups;

Group A-Receiving local anaesthesia (LA) with 2% xylocaine with adrenaline 4-6 mg/kg (n=30)

Group B-Receiving spinal anaesthesia (SA) with 0.3 mg/kg in adults and 0.4 mg/kg in children of 0.5% bupivacaine (n=30)

A written informed consent was obtained from patients and data was collected on printed proforma including age, gender, and occupation, history of swelling in inguinal region, COPD, jaundice, previous abdominal surgery, obesity and concomitant diseases. All patients were evaluated medically and surgically and all routine medical tests were done. Patients aged more than 50 years underwent digital rectal examination and ultrasonography for evaluation of the prostate.

All the patients who were finally enlisted for surgery were tested for sensitivity to lignocaine and bupivacaine by an intradermal skin test after the preanesthetic assessment one day prior to surgery. In group A patients, anaesthetic solution was 2% xylocaine with adrenaline, 30 ml diluted with 30ml distilled water to make it 60 ml was given. From a point approximately two centimeters medial to the anterior superior iliac spine, 10 ml of local anesthetic was given under the external oblique in a fanwise fashion. Another 10 ml of the drug was injected at the same site in the subcutaneous tissue, more towards the pubic tubercle along the proposed line of incision. Then the pubic tubercle was located by palpation. 10 ml of the drug was injected at the pubic tubercle and towards the umbilicus along the rectus sheath to counteract the innervation from the contralateral side. A further 10 ml of the drug was injected in a fan-like pattern both superficially and deeply in the supra-pubic region, more towards the proposed line of incision. The block was completed by infiltration of 10 ml of the drug deep at the mid-inguinal point and another 10 ml injected subcutaneously in the line of the proposed skin crease incision. Some solution is kept and used as necessary, for infiltration of the spermatic cord and around the neck of the hernial sac, or for top up of the wound area at the end

of the procedure. A short time was allowed for the anesthetic to take effect before starting the operation. In group B patients, under all aseptic conditions subarachnoid puncture was performed using a mid-line lumbar approach with patient in sitting or lateral position. Using 26-gauge spinal needle in L3-L4 interspace 0.3 mg/kg in adults and 0.4 mg/kg in children 0.5% bupivacaine was injected in subarachnoid space after getting free flow of cerebrospinal fluid (CSF). Patient was turned supine. Administration of the anesthetic and intra-operative monitoring was done by an anesthesiologist. Pre-medication was given with injection glycopyrrolate, ranitidine and perinorm. For the LA group, administration of the anaesthetic regimen and intra-operative monitoring was done by the non-operating surgeon (who was blinded to the method of anaesthesia and the group of the patient) used without the attendance of an anaesthetist.

Intraoperatively, patients were asked (in both groups by non-operating surgeon who was blinded to the method of anaesthesia) about the pain using 100 mm visual analog scale (VAS) score or discomfort (none, mild, moderate or severe) during operation. Tension free lichenstein hernioplasty was done by surgeon in all the patients except for the 11 years old child in whom herniotomy was done. Material used for hernioplasty was Polypropylene Prosthetic mesh with dimensions of 15x7.5 cm. Immediately post-operatively injection diclofenac 75 mgIM was given to patients of both groups, subsequently putting them on oral diclofenac potassium (50 mg) TDS. Post-operative pain assessment was done using a visual analog scale (VAS) after 12, 24 and 48 hours in the surgical ward. On a VAS score of more than 6 (60 mm), patient was given injection diclofenac 75 mg. Complications such as micturition difficulties, headache, wound infections, respiratory problems, etc along with length of stay in hospital were noted.

The primary objective of our study was to determine whether local anaesthetic technique is an acceptable alternative to spinal anaesthesia for hernia repair, especially with regards to operative condition in form of pain scores using VAS, patient's comfort level (any discomfort during surgery due to handling of hernia sac or pulling of cord), duration of surgery and postoperative pain relief and time taken to become ambulatory. The secondary objective was to note any intra-operative or post-operative complications and length of hospital stay.

Surgeon's satisfaction in terms of intra-operative ease, total operating time and patient's response was noted in both the groups.

The data was analyzed with the help of computer software MS EXCEL and SPSS12.0 for windows. Outcomes were reported as percentages for qualitative variables and mean and standard deviation for quantitative variables. Unpaired t test/chi square tests were employed for evaluating any statistical significance

between the two groups. A p value of <0.05 was considered as statistically significant.

## RESULTS

This randomized comparative study was carried out in sixty patients (each group n=30) after checking inclusion and exclusion criteria. The two groups were comparable pertaining to the demographic data. The youngest patient was 11 years of age and oldest was 81 years of age. Mean age in group A was 46±2.06 years and 49±2.13 years in group B (p value >0.05).

**Table 1: Duration of surgery.**

Duration of surgery	Local anaesthesia (n=30)	Spinal anaesthesia (n=30)
16-30 minutes	0	4
31-45 minutes	3	7
46-60 minutes	7	11
61-75 minutes	14	6
76-90 minutes	5	2

In the present study the mean operative time was 67 minutes in group A and 59 minutes in group B. The difference between the time taken to complete operation under LA group was not statistically significant to the time taken in SA group as shown in Table 1 (p value >0.05).

**Table 2: Intraoperative pain.**

Intraoperative pain (VAS)	Local anaesthesia (n=30)	Spinal anaesthesia (n=30)
None (VAS=0)	6	30
Mild (VAS=1-3)	8	0
Moderate (VAS=4-6)	12	0
Severe (VAS≥7)	4	0

**Table 3: Post-operative pain scores using visual analog scale.**

Time after surgery	Group A (n=30)	Group B (n=30)
12 hours	4.3	4.4
24 hours	3.4	3.6
48 hours	1.2	1.3

Intraoperative pain was assessed by using Visual Analog Scale (VAS). In spinal anaesthesia group none of the patients had pain (VAS=0) during surgery. In local anaesthesia 6 cases had no pain (VAS=0), 8 cases had mild pain (VAS=1-3), 12 cases had moderate pain (VAS=4-6) and 4 had severe pain (VAS≥7) (p value <0.05). This was probably caused by touch or pressure on the surrounding non-anesthetized areas or by pulling of the spermatic cord or by the handling of the hernia sac, which was easily manageable by reassurance and additional injection of local anesthetic solution. Post

operatively pain was assessed at 12 hours, 24 hours and 48 hours and no significant statistical difference was found (p value >0.05). The mean pain visual analog score is slightly lower in group A than in group B (Table 3). Postoperative complications (Table 4) were also assessed and urinary retention was noted in 4 patients while headache was noted in 3 patients in group B.

**Table 4: Post-operative complications.**

Post-operative complications	Group A (n=30)	Group B (n=30)
Wound hematoma	1	2
SSI	2	2
Testicular swelling	1	0
Urinary retention	0	4
Headache	0	3
Respiratory problem	0	0
DVT	0	0
Mesh infection	0	0
Recurrence (after 4wks)	0	0
Pain after 1wk	3	4

**Table 5: Mean time taken by patient to become ambulatory.**

Group	Mean time (hours)
Local anaesthesia group	0.0 (immediate)
Spinal anaesthesia group	6.4 hours

Patients in local anaesthesia group were ambulatory immediately after surgery as no sedation was given to the patients while patients in the spinal anaesthesia group were ambulatory after almost 6 hours after surgery (mean time= 6.4 hours). Recovery from anaesthesia was significantly faster (p value <0.05) for patients in the local anaesthesia group than those in the spinal anaesthesia group (Table 5).

## DISCUSSION

Local anaesthesia can be the choice of anaesthesia for all reducible adult inguinal hernia repairs. It is safe, simple, effective, and economical, without post-anaesthesia side effects.<sup>10,11</sup> The inguinal region, which includes the inguinal canal, the spermatic cord and the surrounding soft tissue structures, receives its sensory innervation from three nerves—iliohypogastric nerve, ilioinguinal nerve, and genitofemoral nerve. The ilioinguinal nerve passes through the external inguinal ring, usually in close association with the spermatic cord. The genitofemoral nerve (L1,2) supplies inguinal cord structures and the anterior scrotum via its genital branch and supplies the skin and subcutaneous tissues of the femoral triangle via the femoral branch. These nerves, and other adjacent nerves providing overlapping sensory supply, are the targets of the inguinal regional block. The local anaesthesia produces skin anaesthesia in the line of the

incision. It also produces anaesthesia of the parietal peritoneum of the hernia and especially the neck of the sac which is very sensitive. Additionally, local anaesthesia administered before the incision produces longer postoperative analgesia. It is because local infiltration, theoretically, inhibits build-up of local nociceptive molecules and, therefore, there is better pain control in the postoperative period.<sup>12</sup>

In the present study, patients with LA had more pain intraoperatively as compared to group who received SA. This can be attributed to the fact that pain during operation is felt in case of large hernia operated under local anaesthesia, if dissection is difficult due to adhesions of the sac.<sup>12</sup> Studies done by Song et al and Amid et al demonstrated that conversion of local anaesthesia to general anaesthesia was because of pain during dissection or reposition of the hernia sac supporting our study.<sup>13,14</sup> In the present study, post-operative pain was recorded at 12, 24 and 48 hours after operation by using VAS and was slightly lower in LA group. These results were comparable to other studies conducted by Song et al which showed that VAS scores were lower in patients operated under local anaesthesia compared to patients operated under spinal anaesthesia.<sup>13</sup> O'Dwyer et al also observed that the patients in the LA group had significantly less pain on movement at 6 hours postoperatively.<sup>4</sup> Callesen et al derived from their study that LA provides a safe alternative to other anaesthetic techniques with an acceptable rate of satisfaction, but intra-operative pain relief needs improvement.<sup>11</sup>

In the present study the mean operative time was 67 minutes in group A and 59 minutes in group B. The results of our study were similar to the studies conducted by Song et al and Young as in local anaesthesia planes got distorted.<sup>13,15</sup> While in contrast, Van Veen et al observed that the total operating time is significantly shorter in the local anaesthesia group.<sup>10</sup>

The only notable complication observed during this study was of urinary retention, which was experienced by 4 patients in the SA group compared to none in the LA group. Van Veen et al also found that significantly more urinary retention occurred after spinal anaesthesia than local anaesthesia.<sup>10</sup> Studies done by Ozgun et al and Young et al also concluded the same.<sup>5,15</sup>

In our study, the recovery from anaesthesia, in terms of ambulation after surgery, was significantly faster for the patients in the LA group than those in the SA group. While Van Veen et al found no significant differences between the two groups with respect to the post-operative ambulation.<sup>10</sup>

In our study, the post-operative hospital stay was similar for both the groups of patients. This can be explained by the fact that duration of hospital stay is governed by the social factors and not by the choice of anaesthesia.<sup>17</sup>

The choice of anaesthesia and surgical technique depend on low complication rates. In our study 2 patients each in both the groups had skin infection. There was no case of mesh infection. The study done by Kark et al reported no case of mortality, over all sepsis rate was 0.9%.<sup>6</sup> The study conducted by Gianetta et al showed that inguinal hernia repair in elderly under local anaesthesia had 3 (1%) wound infections.<sup>18</sup> The results of our study were comparable to the other studies. Accumulated data from other hernia literature suggest that incidence of urinary retention is lowest with local anaesthesia compared with both regional and spinal anaesthesia and is comparable with present study.<sup>19-21</sup> In the present study we found that Lichtenstein's hernioplasty under local anaesthesia is safe, simple, effective, economical, with no mortality but had long intraoperative period and more intraoperative pain. This was due to case selection of long duration of hernia. LA can be particularly useful for patients with cardiovascular or respiratory disease who could tolerate other types of anaesthesia but would be at reduced risk if given only LA.<sup>22</sup> As the abdominal muscles are not paralysed in case of LA, the patient can be asked to cough intra-operatively which can help in identifying a thin sac or a sliding hernia. The absence of postoperative sedation or drowsiness allows early ambulation and diminishes the requirement for recovery facilities.<sup>23,24</sup>

## CONCLUSION

It can be reliably concluded that local anaesthesia is a feasible and effective method for inguinal hernia repair in adults comparable to spinal anaesthesia as far as patient satisfaction in terms of duration of surgery, post-operative pain, complications related to spinal anaesthesia, recovery from anaesthesia (early post-operative ambulation), length of hospital stay are concerned. Therefore, local anaesthesia can be another good choice for inguinal hernia repair, but it can't be confirmed that local anaesthesia is better than spinal anaesthesia. We also recommend further studies with larger groups to authenticate our study results.

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