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Spinal Anaesthesia Versus Local Anaesthesia for Inguinal Hernia Repair: A Comparative Study

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Abstract:

Introduction: Inguinal hernioplasty is one of the most commonly performed operations worldwide. Local anaesthesia can be a preferred method in day-care surgeries as alternative to spinal anaesthesia for hernia repair, especially with regards to operative conditions, postoperative pain relief and complications as well as the less economic burden This study aims to determine the advantage of local anaesthesia as compared to the spinal anaesthesia.

Materials and Methods: This was a prospective follow up study consisting of hundred and ten 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=55) were given local anaesthesia and patients in group B (n=55) were given spinal anaesthesia. The operative and postoperative pain score using visual analogue scale, duration of surgery and any other complications were recorded.

Results: Time taken in local anaesthesia was similar with spinal anaesthesia. Intraoperative pain was higher in local anaesthesia than spinal anaesthesia. Post operatively pain was less in the local anaesthesia than in spinal anaesthesia. Post operative complications were more in spinal anaesthesia group such as urinary retention, headache, etc.

Conclusions: Local anaesthesia can be another good choice for inguinal hernia repair owing to its advantages and less complications. It can be reliably concluded that local anaesthesia can be a preferred method in day-care surgeries owing to its advantages of ease of administration, less complications and low economic burden.

Keywords:

Inguinal hernia, Local Anaesthesia, Spinal anaesthesia



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INTRODUCTION

Hernia is a protrusion of a viscous or part of viscous through a normal or abnormal opening in the wall of its containing cavity. Hernia word derived from Greek meaning an offshoot, a budding, or bulg [1]. Hernia is a common surgical problem which needs surgical treatment. Anterior abdominal wall hernia is the most common form among which the inguinal, femoral and the umbilical, accounting for 75% of cases [2]. Inguinal hernioplasty remain one of the most commonly performed operations worldwide. Local anaesthesia can be a preferred method of choice in day-care 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 postoperative pain relief and complications. Inguinal hernia repair is one of the most commonly performed surgery all over the world, which can be done under general anaesthesia, spinal or epidural anaesthesia and local anaesthesia [3].

General or spinal anesthesia (SA) are still the most common types of anesthesia being used in many settings for hernia repair surgery [4]. Local anesthesia (LA) is ideal for day care surgery based on studies comparing the recovery profiles of local, general and regional anesthesia[5].The present study was designed to determine the advantage of local anaesthetic over spinal anaesthesia for hernia repair with regard to post-operative pain, cost effectiveness, length of hospital stay and related complications.

MATERIALS AND METHODS

Study Design and Settings:

The prospective follow up study was conducted Janaki Medical College and Teaching Hospital (JMCTH) from July 2020 to July 2022. The study was conducted at Department of surgery, Janaki Medical College and Teaching Hospital, at Madhesh province, Nepal.

Participants, sample size and sampling techniques:

We included 110 patients of inguinal hernia of either sex. Patients visited surgery department during study period were included in the study. Patients were included for the study on the basis of the classification system of American Society of Anesthesiologist physical status I-II prior to undergoing anesthesia and surgery. Patients with recurrent, bilateral, irreducible, strangulated, incarcerated, obstructed hernia, obese patients were excluded in this study. Patients were randomly divided into two groups of 55 each and classified as Group A and Group B. Patients in group A (n=55) were underwent inguinal hernia repair under local anesthesia whereas

patients in group B (n=55) were underwent inguinal hernia repair under spinal anesthesia.

Procedure

Detailed history from the patient was taken and clinical examination in both supine and erect position was done. Any significant medical or surgical history were noted. Surgery for patients with chronic constipation, features of lower urinary tract syndrome and chronic cough was delayed until such symptoms were recovered. Ultrasonography of the inguinoscrotal region was done to confirm the diagnosis. Preanaesthetic investigations were sent and preanaesthetic checkup of all the patient was done to confirm the fitness of the patient for surgery. Group A-received local anaesthesia (LA) as 2% xylocaine with adrenaline <7 mg/kg, Group B-received spinal anaesthesia (SA) with 0.3 mg/kg of 0.5% bupivacaine. In group A patient was placed in supine position. Anaesthetic solution was prepared by mixing 15 ml of 2% xylocaine with adrenaline with 15ml distilled water to make it 30 ml. From a point approximately two centimeters medial to the anterior superior iliac spine, 5 ml of local anesthetic was given under the external oblique in a fanwise fashion.

Another 5 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 identified by palpation. 5 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 5 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. Finally, the block was completed by infiltration of 5 ml of the drug deep at the mid-inguinal point and another 5 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.

A short time of around 5-10 minutes was allowed for the anesthetic to take effect before starting the operation. In group B, the patient was placed in sitting or lateral position. Under all aseptic conditions subarachnoid puncture was performed using a mid-line lumbar approach with 26-gauge spinal needle in L3-L4 interspace. 0.5% bupivacaine was injected in subarachnoid space after getting free flow of cerebrospinal fluid (CSF) at dose of 0.3 mg/kg in adults and 0.4 mg/kg in children. The patient was then turned supine. Intraoperatively, patients were asked about the

pain using visual analog scale (VAS) score from 0 to 10 and duration of surgery was assessed from time of anaesthesia to the closure of the skin. Tension free lichenstein hernioplasty was done in all the patients above 12 years of age and herniotomy was done for the patients below 12 years of age. Postoperatively all patients were given analgesic in form ketorolac i.v. TDS and tramadolol when patient asked for additional analgesics for pain. In follow up, post-operative pain assessment was done using a visual analog scale (VAS) from 0 to 10 after 4, 24 and 48 hours in the surgical ward. Any complications such as micturition difficulties, headache, wound infections, respiratory problems, etc were recorded. Time of start of mobilization of the patient, start of enteral feeding and length of stay in hospital were noted. Total cost of the surgery was calculated by the hospital billing system and was recorded. All data was collected on printed proforma including age, gender and affected side.

Statistical analysis and data Management:

Data was entered in excel sheet then transferred to SPSS version 24 for the analysis. Frequency and percentage were presented for qualitative data whereas mean and median with standard deviation and range were presented for quantitative data. Box and Wisker plot was presented to compare the cost incurred between Local anaesthesia and Spinal anaesthesia. Chi square test was performed to show the independence of patients with regard to age, gender and affected sides and postoperative complications. Similarly, Mann Whitney U test was applied to compare outcome parameters between Local anaesthesia and Spinal anaesthesia. A p-value < 0.05 is considered as significant.

Ethical considerations:

Approval for the study was obtained by the institutional ethical committee of Janaki Medical College (Ref. Number: 15/IRC/2076/77). A written informed consent

was obtained from all patients. In case of children, consent was taken from their guardian. Confidentially was maintained.

RESULTS

A total of 110 patients with inguinal hernia undergoing hernia repairs were enrolled in the study. Among 110 patients undergoing hernia repairs, 55 patients underwent surgery under local anaesthesia (LA) and remaining 55 patients underwent surgery under spinal anaesthesia (SA). Two groups were comparable pertaining to the demographic data such as age (p=0.964), gender (p=0.751) and affected side (p=0.438) (Table 1).

In the present study, the median operative time was 87 minutes in Local anaesthesia group whereas 89 minutes in Spinal anaesthesia group. The difference between the time taken to complete operation under LA group was not statistically significant to the time taken in SA group (p=0.985). Mobilization and enteral feeding in LA were one hour and four hours respectively in case of Local anaesthesia but these were started Late in case of the spinal anaesthesia where they were started in 24 hours respectively. This is found to be significantly difference between Local anaesthesia and spinal anaesthesia (p<0.05) (Table 2).

Intraoperative pain was assessed by using Visual Analog Scale (VAS) in both groups. In spinal anaesthesia group, none of the patients had pain (VAS=0) during surgery whereas in local anaesthesia there was pain (VAS=1) 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 4 hours, 24 hours and 48 hours and significant statistical difference was found between LA and SA group (p <0.0001).

Table 1 | Demographic characteristics of the patients by types of anaesthesia (n=110)

Variables	Local anaesthesia (n = 55)		Spinal anaesthesia (n = 55)		p-value
	Number	%	Number	%	
Age					
Teenagers (12-19 years)	7	46.7	8	53.3	0.964
Adult (20-39 years)	12	54.5	10	45.5	
Middle aged (40-59 years)	17	48.6	18	51.4	
Elderly (60 and above)	19	50.0	19	50.0	
Gender					
Female	6	54.5	5	45.5	0.751
Male	49	49.5	50	50.5	
Affected Side					
Left	24	54.5	20	45.5	0.438
Right	31	47.0	35	53.0	

Table 2 | Procedure and patients characteristics after surgery by types of anesthesia (n=110)

Characteristics	Local anaesthesia (n = 55)		Spinal anaesthesia (n = 55)		p-value
	Median	Range	Median	Range	
Days of hospital stay	2	1-4	2	2-3	0.985
Duration of surgery (in minutes)	87	24-124	89	35-120	0.213
Mobilization (in hours)	1	0-24	24	1-26	<0.0001
Enteral feeding (in hours)	4	1-18	24	8-26	<0.0001

Table 3 | Pain score by visual analog scale (VAS) among patients and types of anesthesia (n=110)

Pain Score by VAS	Local anaesthesia (n = 55)		Spinal anaesthesia (n = 55)		p-value
	Median	Range	Median	Range	
Pain at time of surgery	1.0	0-2	0.0	0-2	<0.0001
Pain at 4 hours	2.0	0-3	3.0	1-7	<0.0001
Pain at 24 hours	1.0	0-3	2.0	0-5	<0.0001
Pain at 48 hours	0.0	0-2	1.0	0-3	<0.0001

Table 4 | Urinary condition among patients after surgery by types of anesthesia (n=110)

Variables	Local anaesthesia (n = 55)		Spinal anaesthesia (n = 55)		p-value
	Number	%	Number	%	
Urinary retention					
Yes	2	3.6	19	34.5	<0.0001
No	53	96.4	36	65.5	
Seroma					
Yes	4	7.3	6	10.9	0.507
No	51	92.7	49	89.1	

The median pain visual analog score (VAS) is slightly lower in LA group than in SA group after surgery (Table 3). Postoperative complications after surgery are shown in Table 4. Urinary retention in spinal anesthesia patients was found more as compared to patients in local anesthesia which is statistically significant ($p < 0.0001$). Similarly, Seroma formation was found in 6 (10.9%) individuals among spinal anesthesia group while in 4 (7.3%) people among local anesthesia group. However, the difference is not statistically significant ($p = 0.507$). Figure 1 presents the cost incurred for surgery among patients under local anaesthesia as well as among spinal anaesthesia group. The patient receiving local anesthesia have less economic burden compared to the patient receiving spinal anaesthesia ($p < 0.0001$).

DISCUSSION

Local anaesthesia can be the choice of anaesthesia for all reducible inguinal hernia repairs. It is safe, simple, effective, economical as well as without post-anesthesia side effects [6,7]. 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

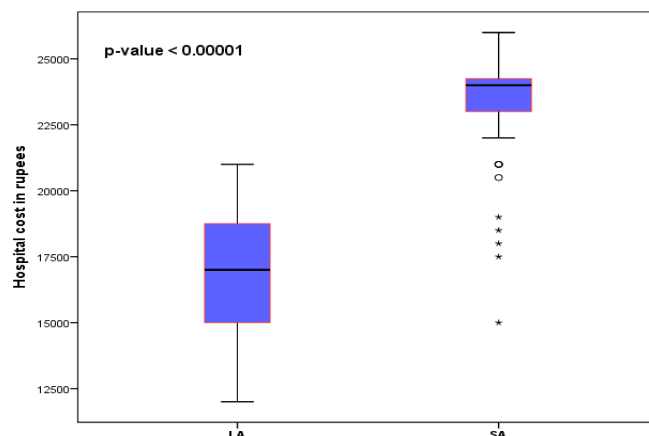


Figure 1| Box and Whisker plot showing cost of surgery by types of anaesthesia

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 initially produces skin anaesthesia in the line of the incision over the inguinal ligament after that it produces anaesthesia of the parietal peritoneum of the

hernia and especially the neck of the sac which is very sensitive. Infact, local anesthesia 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 [8]. 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 anesthesia [7]. Studies done by Song et al and Amid et al demonstrated that conversion of local anesthesia to spinal anesthesia was because of pain during dissection or reposition of the hernia sac supporting our study [8,9].

In the present study, post-operative pain was recorded at 4, 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 anesthesia compared to patients operated under spinal anesthesia [9]. Similar studies observed that the patients in the LA group had significantly less pain on movement at 12 hours postoperatively [10-12]. In the present study the median operative time was 87 minutes in group A and 89 minutes in group B. The results of our study were higher than the studies conducted by Song et al and Young as in local anesthesia planes got distorted [13-15]. While in contrast, Van Veen et al observed that the total operating time is significantly shorter in the local anesthesia group [6]. The only notable complication observed during this study was of urinary retention, which was experienced by 19 patients in the SA group compared to 2 in the LA group. Van Veen et al also found that significantly more urinary retention occurred after spinal anesthesia than local anesthesia [6]. Studies done by Ozgun et al and

Young et al also concluded the same [5,15]. In our study, the recovery from anesthesia, 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 [6]. 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 anesthesia [17].

In the present study we found that Lichtenstein's hernioplasty under local anaesthesia is safe, simple, effective, economical, with no mortality 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 not tolerate other types of anaesthesia but would be at reduced risk if given only LA [18]. 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 [17,18].

CONCLUSION

It can be a day care surgery as inguinal hernia operation under local anaesthesia is an effective measure. Inguinal hernia repair under Local anesthesia compared to spinal anaesthesia has better patient advantaged 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 and economic burden. Therefore, local anaesthesia can be another good choice for inguinal hernia repair.

ADDITIONAL INFORMATION AND DECLARATIONS

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manuscript. All authors have read and agreed with the contents of the final manuscript towards publications.

Conflict of interest: The authors declare no conflict of interest.

Data Availability: Data will be available upon request to corresponding authors after valid reason.

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