

Local Anaesthesia Versus Spinal Anaesthesia in Inguinal Hernia Surgery- An Evidence Based Approach

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ABSTRACT

Introduction: This article outlines comparative analytical data obtained by inguinal surgeries performed under local and spinal anaesthesia to develop a precise opinion regarding both techniques.

Aim: To formulate an ideal, safe combination of anaesthesia (local versus spinal) for inguinal hernia surgeries in terms of minimizing pain, hospital stay and recovery period.

Materials and Methods: This prospective analytical study was conducted on 140 patients of uncomplicated unilateral inguinal hernia which were operated after dividing them in two groups on the basis of type of anaesthesia (Local anaesthesia or Spinal anaesthesia) received. Outcome of study was compiled and statistically analysed for cost benefit, patient satisfaction levels, intra and postoperative complications.

Results: The mean age of patients under study was 44.36 ± 23.31 years in group A and 40.44 ± 18.36 years in group B. Difference in the median time taken for surgery in both groups (70.26 vs 72.46 min) was not statistically significant (p -value > 0.05). Postoperative complications were comparable in both groups except spinal anaesthesia related complications. Pain relief was better in local anaesthesia group in the initial 24 hours. Median postoperative hospital stay was less (2.36 days versus 3.56 days) in local anaesthesia group. Median time for returning to work in group A was less as compared to group B (8 days vs 11 days).

Conclusion: Inguinal hernia repair under local anaesthesia is a reliable, safe and cost effective technique. In India, where patients load out numbers available resources and expertise, use of this technique will increase performance of surgery both in quantity and quality.

Keywords: Bupivacaine, Inguinal block, Lichtenstein tension free repair, Lidocaine

INTRODUCTION

Inguinal hernias out-number other varieties of hernia accounting for almost 78% of all hernias. Almost 90% are seen in male patients with rising incidence observed with advancing age. Studies suggest incidence of 11/10,000 in the age 16-24 years while 200/10,000 in older age group (75 years and above) causing morbidity in patients [1,2].

Despite of improvised techniques for hernia surgeries, morbidity in hernia patients continues as wrath of emergency surgeries fall on planned hernia surgeries, which are usually postponed and pushed back in queue for later available date. Pending operation list for routine hernia cases not only decrease availability of in-patient beds for planned major surgeries but also delay in procedure markedly effect quality of life of patients, increases risk of complications and possibility of emergency surgery later on [3-5].

The choice of surgery and anaesthetic technique for a given surgical procedure should satisfy criteria's of patient safety and the provision of optimum operating conditions for the surgeon. Lichtenstein tension free mesh repair technique for adult open hernia repair is widely accepted as standard procedure for hernia repair worldwide. However, there is a dilemma regarding choice for better feasible anaesthetic technique (local anaesthesia versus spinal anaesthesia) for a set-up where number of patients out number availability of expertise and resources.

Many studies have been conducted to set a standard combination for limited resource set-ups but majority were conducted in a tertiary care set-up where availability of anaesthetist and supporting staff is usually not an issue [6-8]. We have tried to validate results obtained by similar studies in a hospital set-up where operation theatre is maintained by a single or two anaesthetists with multiple surgical specialities functioning at a same point of time.

This study was done to compare safety and effectiveness of Lichtenstein repair under local anaesthesia versus spinal anaesthesia in relation to postoperative pain, complications, hospital stay and cost effectiveness.

MATERIALS AND METHODS

This prospective analytical study was conducted at Padhar Hospital, Betul, Madhya Pradesh, India. Present study included 140 patients of unilateral uncomplicated inguinal hernia with age above 20 years. Time period of study was from February 2013 to November 2014. Detailed written information regarding the procedure was given to all the patients and written consent was obtained from them. Ethical clearance was obtained from institutional ethical committee. Following cases were excluded from study:

1. Recurrent hernias
2. Bilateral hernias
3. Patient less than 20 years
4. Patients with active skin infections
5. History of hypersensitivity with lignocaine or bupivacaine
6. Irreducible/incarcerated, obstructed, strangulated hernias
7. Femoral hernias
8. ASA grade 4 and above
9. When consent for surgery under suggested anaesthesia was not given by patient.

Software used for sample size calculation was sample size calculator by Creative Research Systems survey software version 12.0 with value for confidence level as 95% and confidence interval of 85-95 on a population (1,575,362) of Betul district where the study hospital is located [9]. Sample size came out to be 96 but for more accuracy and convenience of calculation we have included sample size of 140.

Simple random sampling technique was used by dividing patients in odd and even number groups named group A and Group B of 70 patients each, respectively. Group A patients were subjected to inguinal hernia repair under local anaesthesia and group B patients under spinal anaesthesia.

Lichtenstein tension free hernioplasty was offered to all patients. Surgeries were performed by same surgeon with two scrub nursing staff. Anaesthesia fitness was assessed according to American society of anaesthesiology scale. One gram cefotaxim intravenous was given half hour before surgery. Drugs for local anaesthesia were lidocaine, and bupivacaine and sedatives used, if required were midazolam, diazepam, propafol. Local anaesthetic solution used was 50:50 mixture of 1% lidocaine and 0.5% bupivacaine with 1:200,000 adrenaline solution which was diluted by adding equal amount of distilled water.

Marking of incision was done 1.25 cm above and parallel to the medial two third of inguinal ligament. Local anaesthesia was given using 26 gauge needle. A 5 mL of solution was infiltrated subcutaneously along incision line. When external oblique aponeurosis was exposed, 5 mL was again infiltrated just below aponeurosis. A 5 mL of solution was infiltrated just above the pubic tubercle to block the ilio-inguinal nerve which leaves the canal through superficial ring carrying sensory stimulus from the inguinal region. External oblique aponeurosis was divided opening inguinal canal. Ilio-hypogastric nerve and ilioinguinal nerve were identified. A 2 mL of local anaesthesia was infiltrated around each nerve. At deep inguinal ring, 3 mL was infiltrated to block the genital branch of genito-femoral nerve and neck of hernial sac. The sac was dissected. After dissection of sac, 5 mL of solution was infiltrated into conjoint tendon before initiating posterior wall repair [10]. Onlay prolene mesh (Lichtenstein repair) was used for posterior wall repair. External oblique aponeurosis was closed with prolene 3-0. Skin was closed by interrupted mattress sutures and dressing done.

In group B patients, spinal anaesthesia was given by anaesthetist using 0.5% bupivacaine. Patients were kept in sitting position and inter-space between L3-L4 lumbar vertebra identified. Then under all aseptic conditions subarachnoid puncture was performed, using 26 gauge spinal needle and 12.5 mg (2.5cc) of 0.5% bupivacaine was injected in subarachnoid space after getting free flow of Cerebrospinal Fluid (CSF). Finally patient was turned supine [11].

After surgery, patient was assessed for: Complaints during surgery, Postoperative incision site pain using Visual Analogue Scale (VAS) pain scoring system, urinary retention, postural hypotension, headache, nausea/vomiting, wound haematoma, wound infection, testicular pain/Swelling (epididymo-orchitis). Patients were discharged with detailed instructions for postoperative care, precautions, dressings, suture removal and follow-up timings. Follow-up of the patients postoperatively was as outpatient, initially at day 7 then at day 15 and later on at 6 weekly intervals, for both groups, for a mean duration of 24.6±1.3 weeks. All patients returned to follow-up on specified dates. Assessment was done for any surgical site infection, postoperative pain, recurrence and any other complication. VAS (a 10 cm horizontal line without gradations) was used for assessing pain.

STATISTICAL ANALYSIS

Statistical analysis was performed using SPSS statistical software, version 16.0 (SPSS Inc., Chicago, IL). The numerical data was expressed as mean, median and standard deviation. Student's t-tests for parametric continuous variables, Mann-Whitney U test for ordinal independent data and chi-square analysis for categorical variables were used. The p-value of less than 0.05 was considered statistically significant.

RESULTS

Age group of patients (n=140) observed in this study ranged from 20-76 years. Mean age for group A was 44.36±23.31 years and

for group B mean age was 40.44±18.36 years. The incidence of indirect inguinal hernia was high as compared to direct hernia in both groups. In group A, 48 (68.57%) patients had indirect inguinal hernia and 22 (31.43%) patients had direct hernia. In group B, 40 (57.14%) patients had indirect inguinal hernia and 30 (42.86%) patients had direct inguinal hernia

Incidence of indirect inguinal hernia was common in the age group of 21 to 45 years in group A and 22 to 47 years in group B. Direct hernia incidence was common in the age group of 51 to 71 years in group A and 51 to 76 in group B. Incidence of right sided inguinal hernia was 75% (n=54) patients in group A and 64% (n=45) patients in group B. Most commonly noticed complication intra operatively in both groups was tachycardia [Table/Fig-1].

Complications	Group A (LA)		Group B (SA)	
	No.	%	No.	%
Arrhythmias	2	2.86%	3	4.28%
Anaphylaxis	0	0.00%	0	0.00%
Pain needing sedation (subjective)*	5	7.14%	4	5.71%
Hypotension	1	1.43%	2	2.86%
Bowel injury	0	0.00%	0	0.00%
Bradycardia*	1	1.43%	1	1.43%
Tachycardia*	10	14.28%	8	11.43%

[Table/Fig-1]: Complications during procedure.

*Intra venous midazolam was used for sedation; *tachycardia-heart rate >100 beats per minute; *bradycardia-heart rate<60 beats per minute

The time taken to complete the surgery was calculated from the time of draping for anaesthesia till dressing. Median time taken to finish hernioplasty under local anaesthesia was 70.26 minutes (range 40-90 minutes) and median time taken to finish under spinal anaesthesia was 72.46 minutes ranging from 46 to 94 minutes difference was not statistically significant (p-value>0.05) [Table/Fig-2].

Time taken (in minutes)	Group A (local anaesthesia)		Group B (spinal anaesthesia)	
	No of cases	Percentage	No of cases	Percentage
30-40	0	0	0	0
41-50	7	10	4	5.71
51-60	26	37.14	24	34.28
61-70	33	47.14	29	41.43
71-80	3	4.28	7	10
81-90	1	1.43	5	7.14
91-100	0	0	1	1.43

[Table/Fig-2]: Time taken for surgery.

The median postoperative recovery room stay was 1.3 hours (range 1-2 hours) in group A and 3.6 hours (2-6 hours) in group B

Post-operative pain was recorded at 6, 12, 24 and 48 hours after surgery by using VAS pain scoring system in both the groups. Mean VAS score at 6, 12, 24 hours and 48 hours for group A was 2.34, 2.54, 3.46 and 2.86 and for group B was 4.92, 4.97, 3.62 and 2.95 respectively which was statistically significant for first postoperative day, means within 24 hours postoperatively (p-value <0.05). However, after 24 hours there was no significant statistical difference between two groups (p>0.05) [Table/Fig-3].

Time interval (in hours)	Group A (local anaesthesia)		Group B (spinal anaesthesia)		p-value
	Mean	S.D	Mean	S.D	
6	2.34	0.8	4.92	0.93	p<0.05
12	2.54	0.7	4.97	0.87	p<0.05
24	3.46	0.7	3.62	0.92	p>0.05
48	2.86	0.4	2.95	0.95	p>0.05

[Table/Fig-3]: Postoperative pain (VAS).

Post-operative complications were comparable in both groups but complications like urinary retention and postoperative headache were seen more among patients who received spinal anaesthesia [Table/Fig-4].

Postoperative complications	Group A (local anaesthesia)		Group B (spinal anaesthesia)	
	Number of cases	percentage	Number of cases	percentage
Wound infection	15	21.43	13	18.57
Wound haematoma	3	4.28	2	2.86
Seroma	16	22.86	18	25.71
Testicular pain/swelling (epididymo-orchitis)	3	4.28	4	5.71
Nausea/Vomiting	3	4.28	4	5.71
Urinary retention	2	2.86	31	44.28
Headache	0	0	15	21.43
Respiratory complication	0	0	0	0
Thromboembolism	0	0	0	0
Recurrence	0	0	0	0

[Table/Fig-4]: Incidence of postoperative complications.

*for recurrence-mean follow up duration was 24.6±1.3 weeks; *urinary retention was considered as failure to void till 8 hour postoperatively and distended bladder/patient discomfort

Median time for ambulation after surgery was 46 minutes (15-160 minutes) in group A and in group B was 306 minutes (290-370 minutes) (p-value <0.05). Median postoperative hospital stay was 2.36 days (2-4 days) in group A and 3.56 days (3-5 days) in group B (p-value <0.05) [Table/Fig-5].

Number of days of hospital stay	Group A (local anaesthesia)		Group B (Spinal anaesthesia)	
	Number of cases	percentage	Number of cases	percentage
1-2	0	0	0	0
2-3	25	35.71	0	0
3-4	45	64.28	20	28.57
4-5	0	0	50	71.43
5-6	0	0	0	0

[Table/Fig-5]: Number of days of postoperative stay.

DISCUSSION

Results of present study are more or less same regarding age, sex, type and side of inguinal hernia with the available literature [12-19]. Pain relief was significantly better for the local anaesthesia group at 6 hours after surgery than the spinal anaesthesia group. However, there was no significant difference in the pain status for both the groups at 24 hours after surgery. Similar results were obtained by Nordin P et al., they concluded that in the early postoperative period, local anaesthesia was superior to general and regional anaesthesia with respect to postoperative pain because of local nociceptive receptors blockage [18]. Similar results of less pain on movement in initial hours after surgery were drawn by O'Dwyer PJ et al., Van Veen RN et al., and Prakash D et al., in their study [12,19,20]. This reduced pain sensation can dramatically enhance patients psychological satisfaction.

Regarding duration of surgery and intraoperative complications results of our study were comparable to other studies [21-23].

However, relaxation at operative site is more in spinal anaesthesia, but time spent in the procedure of spinal anaesthesia have resulted in increased duration of operative room stay as compared to local anaesthesia; which is administered concomitantly along with the procedure.

In the present study, among group A, 67 (95.71%) of our patients reported no intraoperative pain and 3 (4.29%) patients who complained

of pain intraoperatively were managed by sedation with midazolam. Our results are comparable to Baskerville PA et al., and Prakash D et al., who have reported in their study of 129 patients operated under local anaesthesia that 93% patients felt no pain during surgery and 7% reported pain during surgery [2,20]. Pain during operation is felt in cases of large hernia operated under local anaesthesia, if dissection is difficult due to adhesions of the sac, and this may lead to conversion of local anaesthesia to general anaesthesia. Studies done by Song D et al., and Amid PK et al., demonstrated that conversion of local anaesthesia to general anaesthesia was because of pain during dissection or reposition of the hernia sac [22,24].

Notable complication observed during this study was of micturition difficulties, which were experienced by 31 patients in the spinal anaesthesia group compared to 2 in the local anaesthesia group (p <0.05). Similar reports of high incidence of urinary retention after spinal anaesthesia were observed by some other authors [7,19-21]. It is thought to be secondary to prolonged block of bladder autonomic innervations. It may be also related to age of the patient and volume of fluid received. Kark AE et al., in their study of 3175 primary inguinal hernia repairs using local anaesthesia, observed that there were no postoperative cases of urinary retention [14]. From this data we can infer that cost and complications related to catheterization can be minimized using local anaesthesia.

In our study, the recovery from anaesthesia, in terms of ambulation after surgery, was significantly faster (p <0.05) for the patients in the local anaesthesia group than those in the spinal anaesthesia group; however return to usual social and physical activities were similar in both groups after 24 hours. Our results are in accordance to conclusions drawn by O Dwyer PJ et al., and Van Veen RN et al., [12,19]. However duration of return to work is a subjective parameter which may vary with patients socio-cultural, environment and economic condition.

In present study, mean postoperative hospital stay was less in local anaesthesia group which is in accordance to results obtained by Subramaniam P et al., Nordin P et al., and Goel A et al., [8,18,25].

We on the basis of our observations, support interpretation drawn by O'Dwyer PJ et al., Kark AE et al., and Bernia R et al., regarding economic benefits which are enhanced by low morbidity, minimal need for catheter and lesser duration of recovery room and postoperative ward stay under local anaesthesia [12,14,26].

Additional benefit in local anaesthesia is, as the abdominal muscles are not paralysed, the patient can be asked to cough intraoperatively which can help surgeon to identify a thin sac or a sliding hernia. Although pain sensation is blocked by the local anaesthesia, traction on peritoneum may be uncomfortable to patient. Large incarcerated hernias may prove unsuitable for local anaesthesia [12]. Anxious patients may require some sedation [6] still other benefits out weight this demerit of sedation.

LIMITATION

Since paediatric population was not included in the study, opinion regarding feasibility of local anaesthesia in this age group could not be assessed. Mean follow-up time was short so it is not possible to comment on long term complications especially related to recurrence.

CONCLUSION

It can be concluded that inguinal hernia repair under local anaesthesia is as safe as spinal anaesthesia with benefits of less post-operative pain, lesser duration of recovery room and post-operative ward stay with no spinal anaesthesia related complications.

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