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Bashir Ahmed Gorsi
Consultant, General Surgery, SDH Tangdar, Directorate of Health Services, Kashmir, Jammu and Kashmir, India

Showkat Ali Bhat
Medical Officer, SDH Tangdar, Directorate of Health Services, Kashmir, Jammu and Kashmir, India

Javid Ahmad Peer
MCh (DrNB), Surgical Gastroenterology, Sir Ganga Ram Hospital, New Delhi, India

Corresponding Author:
Javid Ahmad Peer
MCh (DrNB), Surgical Gastroenterology, Sir Ganga Ram Hospital, New Delhi, India

Hernioplasty for uncomplicated inguinal hernia done under local anaesthesia versus spinal anaesthesia

Bashir Ahmed Gorsi, Showkat Ali Bhat and Javid Ahmad Peer

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Abstract
Background: Measurement of postoperative pain and postoperative complications will be used to compare the efficiency of a local anesthetic to regional anesthesia in treating simple inguinal hernias, as well as to determine if local anesthesia may be used for short-stay surgery.
Material & Methods: Randomization into the study and control groups was done for 120 patients with primary, uncomplicated inguinal hernias who were hospitalised to the Department of General Surgery. Hernioplasty was performed under local anesthesia in the study group and spinal anesthesia in the control group. The intraoperative, immediate postoperative, and delayed postoperative complications were compared between the two groups.
Results: Hernia repair can be performed under local or spinal anesthesia on a short-stay basis, however, spinal anesthesia has more complications than local anesthesia While local consequences like seroma, hematoma, scrotal edema, and recurrence were similar in both groups, there is a considerable rise in general complications including hypotension, urine retention, and headache under spinal anesthesia.
Conclusion: Local anesthesia is with less immediate post-operative complication, best suitable for short stay surgery when compared to spinal anesthesia. When short stay service is implemented there will be considerable savings to hospital service and to the patients.

Keywords: Local anesthesia, hernia, open, laparoscopic

Introduction
Worldwide, one of the most common surgical procedure done is inguinal hernia repair. Most common hernia in both males and females are inguinal hernias. However, the number of males presenting with hernias is more compared to females for hernia repair surgery. Inguinal hernia repair can be performed using various anesthesia techniques such as general anesthesia, regional anesthesia, and local anesthesia depending upon multiple factors including safety, patient and surgeon satisfaction, early ambulation and discharge and pain. With the introduction of daycare surgeries, nowadays local anesthesia is preferred more than general and regional anesthesia. Local anaesthetic adjuvant agents are used to improve the speed of onset and duration of the nerve blocks and analgesia and reduces the use of analgesics post operatively.
"Protrusion of the viscous, or portion of the viscous, through an irregular hole in the walls of its enclosing chamber," is what a hernia is [1-3]. The most frequent type of hernia is an inguinal hernia, and adult inguinal herniorrhaphy makes up 15% of all operations in general surgery [2, 3]. The only effective therapy for a hernia is surgery. Inguinal hernias can be treated in two different ways: as an outpatient operation or the old-fashioned manner, which involves hospitalization and elective surgery on the patient. Nevertheless, they may be released after a brief hospital stay (short-stay surgery) or when fully recovered [4-6]. It has been standard practice for more than a century to admit patients for all types of procedures and keep them there until they are ambulant and self-sufficient and until the sutures are taken out. As a result, there is a growing need for hospital beds and a growing waitlist for hernia surgery. It raises the financial burden on the patient, the government, and the hospital. In hospitals, prolonged relaxation frequently results in complications. As a result, groin hernia repair performed as an outpatient procedure has proven to be economical, improve surgical treatment quality, and shorten waiting times [7-9]. Our public hospitals are unable to use this method. Since the majority of the patients admitted to our hospital have substandard living conditions.

The majority of patients are uneducated and come from semi-urban and rural areas with inadequate primary facilities for daycare surgery [9-12]. Therefore, it is common practise these days to discharge patients from the hospital early. Short-stay surgery has been made more widely available, which not only reduces hospital waiting lines but also helps patients economically and socially. Hernia repair can be performed while the patient is under local, spinal, or general anesthetic. Both spinal anesthesia and general anesthesia have problems of their own. The operating surgeon is capable of handling prerequisites including physical fitness, post-operative care, trained personnel, and field block method for hernia repair. In comparison to standard spinal or general anesthesia, local anesthesia has far fewer complications and requires far less post-anesthesia care.
Local anesthetic plays a part in the advent of day surgery for the treatment of inguinal hernias since it lowers the cost and length of hospital stay. In places with a shortage of qualified personnel and anaesthesiology facilities, local anesthesia may be an option for hernial repair procedures [12-16]. Hernia repair operations have a long waiting list, and studies show that local anesthetic shortens hospital stays, lowers costs, and results in fewer problems. The purpose of this research is to determine whether an operating surgeon can execute a hernioplasty without the assistance of professional anesthesiologists and to investigate if traditional hernioplasty performed under spinal anesthesia is superior than hernioplasty performed under local anesthetic. The goal of this study is to determine the optimal treatment option for the patients who visit our hospital (the majority of whom are from poor socioeconomic backgrounds), as well as to examine the costs and safety from the perspectives of the hospital and the patients.

Aims and Objectives

1. To study complications of inguinal hernia repair under local anesthesia during the time of surgery like bradycardia, hypotension, pain during surgery, hemorrhage, and any cardiorespiratory complication and also to compare with spinal anesthesia.
2. To study the post operative complications like urinary retention, post operative pain, headache, seroma, haemotoma, scrotal edema, infection, recurrence, time at ambulation and post operative hospital stay.
3. To study the feasibility of inguinal hernia repair using local anesthesia when compared to spinal anesthesia for short stay surgery.
4. To study whether “short stay surgery” for inguinal hernia is suitable for patients coming to our hospital and the number of days required for ambulation and resumption to work after surgery.

Methodology

Source of data: Patients attending out patient department (OPD) at SKIMS Medical College and hospital who were admitted in the hospital for uncomplicated inguinal hernia repair.

Method of collection of data

Patients admitted with inguinal hernia in surgical wards, satisfying inclusion and exclusion criteria are considered into study.

- A thorough history and clinical examination of the cases are done.
- Patient underwent necessary preoperative investigations.
- Randomization of the cases done by lottery method and grouped into A and B.
- Patients with inguinal hernia repair done under local anesthesia are given anaesthetic mixture of 2% xylocaine (15 ml)+0.5% Bupivacaine(15ml)+Distilled water(30ml).
- Intraoperative observations like bradycardia, hypotension and pain during surgery are assessed.
- Post-operative recovery was assessed including complications like urinary retention, post-operative pain, headache, seroma, hematoma, scrotal edema, wound infection, ambulation time, recurrence, and duration of hospital stay.
- Post operative pain was assessed using visual analogue scale at 30,60,120 and 240minutes.
- Further patients were followed up in surgery out patient department (OPD) for 6 months.
- Final outcome was evaluated.

Inclusion criteria

1. All patients admitted and operated in surgical wards with a primary uncomplicated inguinal hernia on an elective basis
2. Patients aged above 18 years
3. Patients with unilateral hernia

Exclusion criteria

1. Complicated and irreducible hernia
2. Patients with recurrent hernia
3. Patients with bilateral hernia
4. Patients with psychiatric problems, pregnancy
5. Patients with a medical illness like uncontrolled DM, HTN, COPD, Obesity, BPH, Bleeding disorders.
6. Patients below 18 years
7. Anxious and apprehensive patients

Details of cases were recorded including history, clinical examination, and investigations done. All patients were operated for hernioplasty. Patients were randomized either to control group (where regional anesthesia used) or study group (where local anesthesia) in the operating room by lottery method. Investigations required are standard protocol. These investigations are required as routine for diagnosis and to test the sensitivity to the local anesthesia.

1. Routine blood and urine tests
2. RBS, Blood Urea, Serum Creatinine, Chest X-ray. (when age of patient is >35yrs or if necessary)
3. USG if required
4. Routine test dose of local anesthesia.

Patients were explained about the type of anesthesia and surgery. Also, about advantage and disadvantage of each type of anesthesia. Explained about benefits from early mobilization, early discharge. Local anesthestia was given by surgeon himself and spinal by anesthesiologist. Then hernioplasty was performed irrespective of type of anesthesia.

Technique of administration of local anesthesia (GROUP A)

Step 1: A skin wheal is raised 2 cm medial to the anterior superior spine of the ilium. Before the needle is extracted, approximately 10 ml of solution is injected, the needle traverses the parietal muscles, first in the direction of the iliac spine to block the ilio-hypogastric and ilioinguinal nerves, and then toward the umbilicus to block the last two intercostal nerves.

Step 2: Approximately 5 ml of solution is used to infiltrate the epidermis at the exact site of the incision.

Step 3: An additional 5 ml of solution is utilized to inject the subcutaneous tissue beneath the incision before the surgery is begun. This serves to block the overlapping branches of the external femoral cutaneous and the femoral branch of the genito-femoral nerves. This step is essential or the patient will feel discomfort as the superficial vessels and nerves are divided.

Step 4: After the skin incision, dissection is carried out down through Scarpa's fascia. A small window is dissected in the lateral aspect of the incision, through the deep subcutaneous fat, until the classic transverse fibers of the external oblique aponeurosis are visualized. 5 ml of solution is deposited in the subaponeurotic space prior to clearing this layer. This is a key step if pain is to be avoided, since the aponeurosis is sensitive on its external surface. When the external oblique is incised down to include external ring the entire cord and its sensory nerves will be surrounded by the anesthetic solution.

Step 5: Several milliliters of solution is deposited beneath the transversalis fascia near the public tubercle and the internal abdominal ring. This blocks the sympathetic fibers in the cord and the genital branch of the genitor femoral nerve. This step is essential if a deep ache is to be avoided when traction is applied to the cord.

Step 6: If the hernia is indirect, 1-2ml of solution is injected about the neck of the hernial sac before it is opened. If the hernia is direct, 1-2ml of solution is placed in the rectus fascia at the site of relaxing incision since this is invariably supplied by a sensory nerve twig.

Group B: 3 ml of 0.5% Bupivacaine heavy is used for spinal anesthesia (done in L3-L4 space). The following parameters are studied in both local anesthetic and spinal anesthetic group

1. Time taken for the procedure: this included time taken from giving anesthesia to completion of surgery.
2. Complications during time of surgery
   a. Bradycardia: in our study heart rate of <60 beats/min
   b. Hypotension: if systolic BP falls less than 90 mm of Hg in supine position
   c. Pain during surgery: patient complaining of intolerable pain needing sedation and analgesic after the initial anesthesia
   d. Any hemorrhage & cardiorespiratory complication during surgery
3. Immediate postoperative ambulation and complications
   a. Ambulation after 1 hr of surgery
   b. Nausea and vomiting
   c. Difficulty in voiding and urinary retention
   d. Headache
   e. Postoperative pain
4. Length of post operative stay in hospital and complications like
   a. Seroma
   b. Hematoma
   c. Scrotal edema
   d. Ischemic orchitis
   e. Infection
   f. Recurrence
   g. Others like Testicular atropy, chronic groin pain and paraesthesia or hyperesthesia if any.

Early discharge option given to the patients and encouraged, convenience of the patient. Maximum post operative stay of 7 day was fixed for all patients, excepts for the conditions, which necessitates hospital stay like infection, hematoma & other complications. Stitches were removed on 7th post operative day. All patients were followed up for 6 months to study late complications.

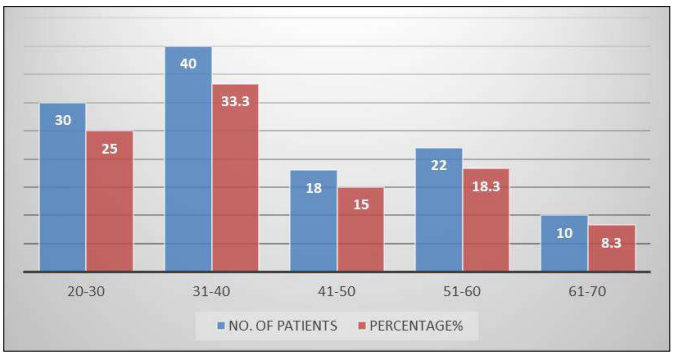
Results

In the present study age of the patient varied from 20 to 70 years with the highest prevalence noted in the age group of 31-40 years.

Table 1: Age distribution

Age in years	No. Of patients	Percentage%
20-30	30	25
31-40	40	33.3
41-50	18	15
51-60	22	18.3
61-70	10	8.3
Total	120	100

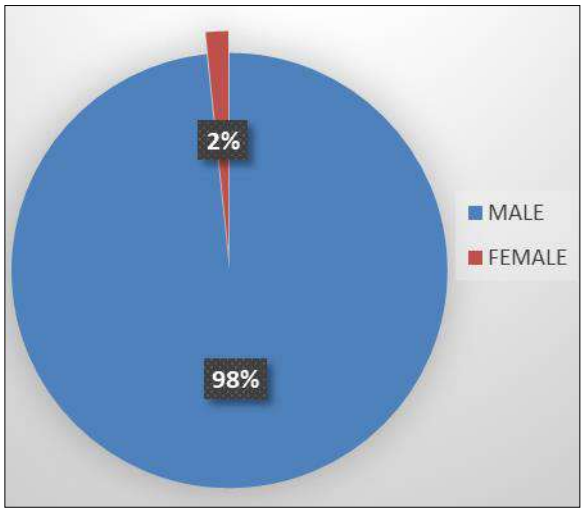
Present study shows more than 98.3% are male with only 1.7% of female presenting with inguinal hernia75% of inguinal hernia in this study was indirect type and the remaining 25% was direct type. Out of 120 patients 66.7% had right sided inguinal hernia compared to left side which accounted for 33.3%.



Graph 1: Age distribution

Table 2: Sex Ditribution

Sex	Number of patients	Perecentage(%)
Male	118	98.3
Female	2	1.7



Graph 2: Sex ditribution

Table 3: Location and types of hernia

Type and Location	Indirect	Direct	Total
Right	70	10	80
Left	20	20	40
Total	90	30	120

Table 4: Time Taken For Surgery

Time taken for Surgery (in mins)	No of patients in la	No of patients in sab
35	0	4
40	8	10
45	36	32
50	6	6
55	10	4
60		4

Table 5: Observations during Surgery

Complications	La	Sab
Bradycardia	2	10
Hypotension	2	20
Pain during surgery	16	0

In the LA group the time taken for procedure is in the range of 40-55 min, with maximum number of patients (36) requiring 45 min.

In the SAB group the time taken for procedure is in the range of 35-60 min, with maximum number of patients (32) requiring 45 min.

The following parameters are studied during the surgery

Bradycardia: heart rate <60 beats/min Hypotension: systolic BP<90 mm of Hg

Pain during surgery: by questioning the patient during procedure.

Bradycardia was noted in 2 patient of LA group and 10 patients of SA group. They are treated with injection atropine 1 mg IV and heart rate was converted into normal rhythm in 6 patients.

Hypotension was observed in 20 patients of SA group and were treated with crystalloids and vasopressors. Two patients in LA group experienced hypotension. In LA group 16 patients experienced severe pain and needed sedation and analgesia during surgery, none of the patients experienced pain in SA group

Table 6: Post operative observations

Post operative Observation	Sab	La
Nausea/vomiting	16	4
Urinary retention	12	0
Ambulation 1 hr after surgery	0	56
Post operative pain 2hr after Surgery	2	4
Post operative headache	2	0

16 patients in SAB group and 4 patients (10%) in LA group experienced nausea and vomiting 12 patients in SAB group and none in LA group experienced retention of urine which required catheterization. 56 patients in LA group were ambulant at the end of 1hr and none in SAB group.

2 Hours after surgery patients were questioned about pain and need for analgesia noted. 2 patients in SAB group and 2 patients in LA group experienced pain and needed analgesia.

Post operative headache seen in 2 patients in SAB group and none in patient of LA group.

Table 7: Complications of hernia repair

Complications	La	Sab	Total
Seroma	6	12	18
Scrotal oedema	6	8	14
Hematoma	8	4	12
Wound infection	4	8	12

10% patients in LA group and 20% patients in SAB group developed seroma. In total 15% patients developed seroma. 10% patients of LA group and 13.33% patients of SAB group developed scrotal edema. In total 11.6% patients developed scrotal edema 13.33% patients of LA group and 6.67% patients of SAB group developed hematoma. In total 10% patients developed hematoma. 6.67% patients of LA group and 13.33% patients of SAB group developed wound infection. In total 10% patients developed wound infection.

Table 8: Duration of post operative hospital stay

Day of discharge	Discharges in la	Discharges in sab
2	4	0
3	32	0
4	8	12
5	6	12
6	2	10
7	4	16
8	2	2
9	0	0
10	2	4
11	0	2
12	0	2

Table 9: Duration of post operative hospital stay

Day of discharge	No of discharges In la	No of discharges In sab
2-3	36	0
4-5	14	24
6-7	6	26
>7	4	10

Most of the patients, 60% in LA group were discharged on 2-3 days while in SAB group 43.33% patients were discharged on 6-7days postoperatively. 20% patients in LA group and 16.67% patients in SAB group were discharged >7days post operatively.

Recurrence: No patients in study or control group developed recurrence during follow up period of six months.

Discussion

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. 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. 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 anesthesia versus spinal anesthesia) 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 anesthetist and supporting staff is usually not an issue. 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 anesthetists with multiple surgical specialities functioning at a same point of time.

Age at presentation

In a study by Ira 18% of cases were <15% yrs of age, 20% were 24-44 yrs, 23% were 45-65 yrs and 30% were >65 yrs; group with maximum number of cases between 25-65 yrs of age. (Ira M Rutkow 1998) [9].

The incidence of age at presentation of inguinal hernia was maximum between 30-60 years of life (Louies and Wendell, Delvin, Bhollasingh sidhu) [12, 5, 1]. These results are comparable with the present study.

Sex distribution

In a research by Ira [9], 90% of patients with inguinal hernias were men, while just 10% were women. In a research by Liechenstein [10], 94% of the patients were men and 6% were women. Males are more frequently afflicted than females when it happens at any age. In the current study, 95% of participants were men and 5% were women. Compared to previous research, this study has a lower percentage of female participants. This could be because women are less likely to know about hernias. In our study, fewer female patients with inguinal hernias initially presented to the hospital due to socioeconomic and educational factors.

Type of hernia

Right-sided inguinal hernia is common type in both direct and indirect type of hernia. This is due to the later descent of right testis and higher incidence of failure of closure of processes vaginalis.

Comparison between SA & LA group

1. **Duration of procedure:** In SA group the mean operating time was 48+/-5.18 minutes and in LA group same procedure to 46+/- 4.62 minutes. There was no much difference between the time taken for the procedure in both groups.
2. **Anaesthesia:** In our study, both local and spinal anesthesia was used in equal number of cases

Complications

In the present study, none of the patients experienced pain while under spinal anesthesia. This could be because of a higher level of spinal anesthesia that is >T9 level as attained in the present study, than in the previous study (David V Young 1987) [4].

The present study can be compared with previous studies. Limitations of the present study are small size, and 100% matching not done between the study groups. In our study people operated under local anesthesia had significantly overall less complications except for mild pain during surgery. In patients operated under spinal there were significant general complications like intraoperative hypotension, postoperative urinary retention and headache. Most of the patients in LA group (>80%) were ambulant after 1 hour of the surgery but none of the patients were in SA group. In addition to the above general complications, there were local complications like seroma, hematoma, scrotal edema, wound infection and recurrence occurred in both the groups. When compared there was no significant difference between the two groups. In the present study, the type of anesthesia had no significant influence on local complications. Only the skills, technique, gentleness and experience of the surgeons have influence on these complications.

Complications of hernia repair

The local complications like seroma, hematoma, scrotal edema, taken together from both the groups, 15 % had seroma, 11.6% had scortal edema, 10% had hematoma, 10% had infection. All complications treated conservatively with scrotal support and analgesics. They resolved in 15-20 days. Infections eventually resolved after drainage of the pus in 4 patients and change of antimicrobial treatment in rest of the cases. None of the cases developed chronic groin pain, testicular atrophy and paraesthesia. In previous studies infection occurred in 7.8% cases (T.B Burke, 1978) [2], 5.9% of cases (MaxemoDeysine, 1991) [13], 1.2% of cases (B Millant 1993) [14], upto 8% of cases (Allen E Kark 1998) [11] and 2% cases (T Faish 2000) [7]. These are similar to the present study and are comparable with the previous studies.

Duration of hospital stay

In our study, only post-operative period was calculated, because of delay in pre-operative investigation. In the present study 80% of the LA group discharged by 5th day and more than 40% of patients in SA group by the 5th day. The previous study shows that post-operative stay for short stay surgery was 3-4 days (Sven Kornhale 1976) [15], 2.2 days (Makuria 1979) [16], 3.8 days (S R Canon 1982) [3], 2-3 days (Glassow 1984) [6].

David Young's [4] study shows that 4.4 days for LA group & 6 days for SAB group (present study LA 4.7 +/- 2.2 days and SAB 6.7+/-2 days). This is comparable with the previous study which shows that short-stay surgery can very well be practiced in our hospital.

Recurrence

In the present study, the recurrence rate is nil even though it cannot be compared because of study group is small & follow-up period was less. It is very difficult to project accurate incidence of recurrence, it will depend on the length of follow-up. In ideal surgeries the recurrence rate would be <1%. This is possible only in hernia specialization centers [8].

Conclusion

1. The commonest age group affected is in 4th to 6th decade
2. Most of them were males with right sided hernias
3. Indirect hernia were common with all patients presenting with swelling in the groin
4. Both local and spinal anesthesia can be used for hernia repair on short stay basis, but spinal anesthesia has higher complication rates compared to local anesthesia
5. There is significant increase in general complications like hypotension, urinary retention, headache, bradycardia, headache and local complications like seroma, hematoma in

spinal anesthesia and recurrence were similar in both groups.
6. Local anesthesia is with less immediate post operative complication, best suitable for short stay surgery when compared to spinal anesthesia.
7. When short stay service is implemented there will be considerable savings to hospital service and to the patients.

Conflict of Interest
Not available

Financial Support
Not available

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