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A Comparative Study Of Repair Of Inguinal Hernia Under Local Anesthesia Vs Spinal Anesthesia At RIMS, Ranchi.

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Abstract:
Introduction: Inguinal hernia repair remains one of the most commonly performed operations worldwide. Today, local anesthesia is the most preferred type over spinal and general anesthesia in day-case hernia surgeries. Advantages being postoperative pain relief, early ambulation, shorter hospital stay and lesser costs. The condition of patient, surgeon's experience and technical factors also play a role in this. Hence, this study will help us to discuss the factors that can help us to decide the effectiveness of local anesthesia in day-case hernia surgeries.
Aim: To evaluate the safety and effectiveness of inguinal hernia repair under local anesthesia. Also to compare the inguinal hernia repair under ultrasound guided local anesthesia versus spinal anesthesia in relation with inter operative pain postoperative pain, complications, hospital stay and cost effectiveness.
Materials and methods: Data was collected by meticulous history taking, careful clinical examination, appropriate radiological, hematological investigation, operative findings and follow-up of the cases.
Result: The mean duration of hospital stay in patients with spinal anesthesia was significantly more than patients with local anesthesia. The postoperative pain was recorded at 12 hours, 24 hours and 48 hours after operation by using visual analog scale. The mean visual scores at 12 hours interval, 24 hours interval and 48 hours interval were 3.32 ± 1.14, 2.00 ± 1.00 and 0.76 ± 0.72 in local anesthesia and 4.32 ± 1.18, 2.72 ± 1.13 and 1.04 ± 0.84 in spinal anesthesia. The post operative pain in visual analog score was significantly less in local anesthesia than in spinal anesthesia. The mean dose of postoperative analgesic received in local anesthesia was 2 ± 1.22 and in spinal anesthesia was 3.48 ± 1.53. Complications in case of local anesthesia was none while in spinal anesthesia was 56% with urinary retention in 28% to be the most common complication.
Conclusion: It can be reliably concluded that local anesthesia can be a preferred method in day-case hernia surgeries owing to its advantages. However, the experience of the surgeon and proper participation by the patient should also be looked upon in such cases.
Keywords: *Inguinal hernia, Local anesthesia, Spinal anesthesia, Hernioplasty.*

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I. Introduction

Inguinal hernia is a common condition occurring in both the sexes at all the ages. The lifetime risk for inguinal hernia in men his 27% and for women is 3%. The presence of hernia is of itself was an indication for surgical intervention to avoid the potential complications of obstruction and strangulation in the past century. Recently this view has been changed to immediate elective repair versus a wait and watch approach for asymptomatic groin hernia.

The goal of hernia repair should be restoration of the normal and anatomical relationship in the area with elimination of fascial defects which could serve as a focal point for incarceration of abdominal content. The preoperative workup for a patient undergoing herniorrhaphy depends not only upon the patient's medical condition and risk factor but also on the type of anesthesia to be used. The type of anesthesia to be used should be chosen after discussion among the surgeon and an anaesthetist and the patient. The surgeon's and the patient's preference for a particular type of anesthesia plays a major role in the decision.

In this study we have chosen hernia repair under local anesthesia because of all the technique it has the least impact on the function of other organs system simplifying the task of patient selection and preoperative evaluation. The reason for using field block in groin hernia repair is in addition to simplicity and safety is the great advantage of local anesthesia, it's ability to produce relatively long lasting pain relief, low risk of cardiovascular instability and urinary retention in the postoperative period as well as prompt resumption of unrestricted physical activity by the patient. The two essential criteria for the choice of anesthesia technique for a given surgical operations are patient safety and the provision of optimum operating conditions for the surgeon.

II. Materials and methods

The study was conducted on the patients admitted in the General Surgery department of Rajendra Institute of Medical Sciences, Ranchi, Jharkhand during the period of November 2019 to November 2021. During this period 50 cases of inguinal hernia were studied based on the following plans. Patients were divided randomly into two groups 25 each named as group A and group B. Group A underwent inguinal hernia mesh repair surgery under local anesthesia and group B underwent the surgery under spinal anesthesia.

Inclusion criteria:

1. Diagnosed case of inguinal hernia.

Exclusion criteria:

1. Patients who refused the consent for the study.
2. Patients with complicated hernia like irreducible hernia, obstructed hernia and strangulates hernia.
3. Patients having recurrent hernia.
4. Patient with the huge hernia and obesity.
5. Patient with various concomitant co-morbid conditions.

Technique of Anesthesia:

For the spinal anesthesia group, administration of the anesthetic and intra-operative monitoring was done by an anesthesiologist. Pre-medication was given with Glycopyrolate, Ranitidine and Perinorm. Sedation was not utilized.

For the local anesthesia group, administration of the anesthetic regimen and intra-operative monitoring was done by the surgeon without the attendance of an anesthesiologist. Pre-medication or sedation was not utilized.

The local anesthetic drug was prepared as follows –

2% lignocaine hydrochloride IP	17.5 ml
0.5% bupivacaine hydrochloride IP	17 ml
Sterile Water for Injection IP	35ml
7.5% w/v Sodium Bicarbonate BP	4ml
Adrenaline Tartarate (1:1000) IP	0.2ml
Total volume of drug	75 ml

From a point approximately two centimetres 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. About 15 ml of the solution remains, which can be 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. Standard Lictenstein mesh repair was done for all the cases. Intraoperatively, in local anesthesia group, patients were asked about the pain or discomfort during operation (none, some or severe). If needed, the pain was treated by local injection of the drug solution subject to the maximum permissible dosage at the operation site. Conversion to general anesthesia was to be done if pain persisted in significant levels. Immediately post-operatively injection Diclofenac 75 mg IM was given to patients of both groups, subsequently putting them on oral Ibuprofen (400 mg) TDS. Post-operative pain assessment was done using a visual analog scale(VAS) immediately post-operatively, after 6 hours and after 24 hours. On a VAS score of more than 6 (60mm), patient was given injection Diclofenac 75 mg IM as rescue medication and was recorded. Complications such as micturition difficulties and time taken for the patient to become ambulatory was noted.

III. Result

This comparative study of repair of inguinal hernia under two types of anesthesia was conducted on 50 patients of inguinal hernia admitted and operated in the General Surgery department of Rajendra Institute of Medical Sciences, Ranchi. Different parameters were compared.

Table no. 01: Distribution of patients according to the type of anesthesia.

Type of anesthesia	Number	%
Local anesthesia	25	50%
Spinal anesthesia	25	50%
Total	50	100%

Table no. 01 shows that out of the 50 patients admitted 25 (50%) patients underwent inguinal hernia repair under local anesthesia and 25 (50%) underwent under spinal anesthesia. Patients were divides in 2 groups randomly.

Table no. 02: Age distribution of the patients.

Age	Local anesthesia	Spinal anesthesia	Total
<20	1	1	2
20 - 34	7	2	8
35 - 49	7	6	13
50 - 69	9	13	22
≥ 70	2	4	5
Total	25	25	50
Mean ± s.d.	49.66 ± 15.42	55.48 ± 14.13	
Median	51.5	57.0	
Range	19 - 84	19 - 84	

Table no. 2 shows that in this study the age of the patients in local anesthesia was in the range of 22 - 77 years and in spinal anesthesia was 18 - 76 years. The mean age was 49.66 ± 15.42 years in local anesthesia and 55.48 ± 14.13 years in spinal anesthesia. The age of the patient ranged from 11 years to 61 years, the youngest being 19 years and eldest being 79 years old. Maximum number of cases were observed in the age group of 50 - 69 years (44%). Thus according to Chi-square (x^2) ($x^2 = 7.10$) test there was no significant association between the age of the patient of the two groups (p=0.13). The t- test showed that there was no significant difference in mean age of the patients of the two groups ($t_{48} = 0.63$; $p = 0.53$).

Table no. 03: Distribution of the patients according to sex.

Gender	Local anesthesia (n=25)	Spinal anesthesia (n=25)	Total
Male	25	24	49
Female	0	1	1
Total	25	25	50

Table no. 3 shows that out of 50 patients 49 were males and 01 was female (49:1). Since one of the cell frequency was 0, Chi -square (x^2) test could not be applied. Fisher Exact showed that there was no significant difference between gender of the patients of the two groups ($p = 0.50$).

Table no. 04: Distribution of the patients according to socio-economic status.

Socio-economic status	Local anesthesia (n=25)	Spinal anesthesia (n=25)	Total
Lower	19 (76%)	19 (76%)	38 (76%)
Lower middle	0 (0.00%)	1 (4%)	1 (2%)
Upper lower	2 (8%)	2 (8%)	4 (8%)
Upper middle	4 (16%)	3 (12%)	7 (14%)
Total	25	25	50

Table no. 4 shows that 76 % of the patients belonged to lower socio-economic status where as 14% belonged to upper middle class. Thus according to the Chi square (x^2) ($x^2 = 1.14$) test there was no significant association between social-economic status of the patients of the two groups ($p = 0.76$).

Table no. 05: Risk factors in the patients of the two groups.

Risk factor	Local anesthesia	Spinal anesthesia	Total
BPH	3 (12%)	5 (20%)	8 (16%)

Chronic constipation	0 (0.005)	2 (8%)	2 (4%)
Chronic cough	3 (12%)	0 (0.00%)	3 (6%)
Smoking	0 (0.00%)	1 (4%)	1 (2%)
Farmer	6 (24%)	5 (20%)	11 (22%)
Labourer	11 (44%)	11 (44%)	22 (44%)
Weight lifting	2 (8%)	1 (4%)	3 (6%)
Total	25	25	50

Table no. 5 shows that out of the 50 patients 44% were labourer, 22% were farmer and 2% have the history of smoking. Thus according to the Chi-square (x^2) ($x^2 = 6.92$) tests there was no significant association between risk factors in the patients of the two groups ($p = 0.32$) and the risk factor where more or less equally distributed among the patients of the two groups.

Table no. 06 : Laterality of inguinal hernia in the patients of both the groups.

Laterality of inguinal hernia	Local anesthesia (n=25)	Spinal anesthesia (n=25)	Total
Left	12 (48%)	7 (28%)	19 (38%)
Right	13 (52%)	18 (72%)	31 (62%)
Total	25	25	50

Table no. 6 shows that out of the 50 patients, 62% patients presented with hernia on the right side and 38% on left side. Thus according to the Chi square (x^2) ($x^2 = 2.12$) test there was no significant association between the laterality of inguinal hernia in the patience of the two groups ($p = 0.14$). Thus the laterality of inguinal hernia was more or less equally distributed among both the groups.

Table no. 07: Types of inguinal hernia in the patients of both the groups.

Type of inguinal hernia	Local anesthesia (n=25)	Spinal anesthesia (n=25)	Total
Direct	3 (12%)	7 (28%)	10 (20%)
Indirect	22 (88%)	18 (72%)	40 (80%)
Total	25	25	50

Table no. 07 shows that out of the 50 patients 80% had direct inguinal hernia where as 20% had indirect inguinal hernia. Thus according to the Chi-square (x^2) ($x^2 = 2.00$) test there was no significant association between the types of inguinal hernia in the patients of the two groups ($p = 0.15$).

Table n0. 08: Surgical procedure in the patients of both the groups.

Surgical procedure	Local anesthesia (n=25)	Spinal anesthesia (n=25)	Total
Darning	3 (12%)	7 (28%)	10 (20%)
Hernioplasty	22 (88%)	18 (72%)	40 (80%)
Total	25	25	50

Table no. 08 shows that in 80 % patients mesh hernioplasty was performed. Thus according to Chi-square (x^2) ($x^2 = 2.00$) test there was no significant association between the surgical procedure among the patients of the two groups ($p = 0.15$).

Table no. 09: Duration of hospital stay of patients of both the groups.

Duration of hospital stay (in days)	Local anesthesia (n=25)	Spinal anesthesia (n=25)	Total
1	25	7	32
2	0	10	10
3	0	6	6
6	0	1	1
7	0	1	1
Total	25	25	50
Mean ± s.d.	1.00 ± 0.01	2.32 ± 1.46	
Median	1	2	
Range	1 - 1	1 - 7	

Table no. 09 shows that according to the Chi-square (x^2) (x^2 = 2.28.12) test there was significant association between the duration of the hospital stay among the patients of the two group ($p <= 0.001$). The t- test showed that the mean duration of hospital stay with the spinal anesthesia was significantly higher than that of the patients with local anesthesia (t_{48} - 4.51: $p < 0.0001$).

Table no. 10: Intraoperative pain in the patients of both the groups.

Intra-operative pain	Local anesthesia	Spinal anesthesia	Total	p-value	Significance
Mild	4 (16%)	0 (0.00%)	4.17	<0.0001	Significant
Severe	2 (8%)	1 (4%)	1.19	0.23	Not significant

Table no. 10 shows that the overall intraoperative pain was observed in 6 (24%) of the patients with local anesthesia which was significantly higher than the patients with spinal anesthesia 1 (4%) ($Z = 4.0$; $p < 0.0001$). Mild pain was significantly higher in the patients with local anesthesia 4 (16%) as compared to the patients with spinal anesthesia (0.0%) ($Z = 4.17$; $p < 0.001$). Severe pain was higher in the patients with local anesthesia 2 (8%) as compared to the patients with spinal anesthesia 1 (4%) but it was not significant ($Z = 1.19$; $p = 0.23$).

Table no. 11: VAS in the patients of both the groups.

Visual analog scale	Local anesthesia	Spinal anesthesia	p value	Significance
S 12	3.32	4.36	0.004	Significant
S 24	2.12	2.86	0.022	Significant
S 48	0.78	1.08	0.213	Not significant

Table no.11 shows that postoperative pain was recorded at 12 hours, 24 hours and 48 hours after operation by using visual analog scale. The mean visual scores at 12 hours interval, 24 hours interval and 48 hours interval were 3.32 + 1.14, 2.00 ± 1.00 and 0.76 ± 0.72 in local anesthesia and 4.32 ± 1.18, 2.72 ± 1.13 and 1.04 ± 0.84 in spinal anesthesia. The mean pain visual analog score was statistically significantly less in local anesthesia as compared to spinal anesthesia.

Table no. 12: Number of post operative analgesic doses required in both the groups.

No. of analgesic doses post operatively	Local anesthesia	Spinal anesthesia
0	0	0
1	12	1
2	4	5
3	8	11
4	0	0
5	0	4
6	1	4
Total	25	25
Mean	02	3.52
SD	1.25	1.503
p	<0.001	Significant

Table no. 12 shows that 24 (96%) patients in local anesthesia received 1 - 3 analgesic doses postoperatively as compared to 16 (64%) patients in spinal anesthesia. 5 or more doses were received only by 1 (4%) patient in local anesthesia and 8 (32%) patients in spinal anesthesia. The mean dose received in local anesthesia was 2 ± 1.22 and in spinal anesthesia was 48 ± 1.53. Thus the mean doses of analgesics received by local anesthesia and spinal anesthesia was statistically significant.

Table no. 13: Post operative complications in patients of both the groups.

Operation	Complications (n=25)				Total
	Urinary retention	Headache	Sepsis	Testicular pain	

Spinal anesthesia	7 (28%)	4 (16%)	2 (8%)	1 (4%)	14 (56%)
Local anesthesia	0	0	0	0	0

Table no. 13 shows that no complication occurred among the patients with local anesthesia (0.00%). However, complications were observed in 14 (56.0%) of the patients with spinal anesthesia. Thus proportion of patients with complications under spinal anesthesia (56.0%) was significantly higher than the patients under local anesthesia (0.00%) ($Z = 8.81$: $p < 0.0001$). Among the patients with spinal anesthesia urinary retention (28.0%) was the most common complication ($Z = 2.04$; $p = 0.04$).

IV. Discussion

The preferred choice of anesthesia world wide for all reducible adult inguinal hernia repairs is local. It is safe, simple, effective, and economical, without post-anesthesia side effects. 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 anesthesia produces skin anesthesia in the line of the incision. This is best achieved by injecting local anesthetic subcutaneously in the line of the incision. It blocks the nerve supply to the deeper tissues which are to be dissected and manipulated. It produces anesthesia of the parietal peritoneum of the hernia and especially the neck of the sac which is very sensitive. Additionally, 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. In our study, pain relief was significantly better for the local anesthesia group at 6 hrs after surgery than the spinal anesthesia group. However, there was no significant difference in the pain status for both the groups at 24 hrs after surgery. Thus less analgesic doses required in patients operated under local anesthesia is due to the long postoperative analgesic effect of local anesthesia.

Use of two different anesthetic agents decreases the likelihood of exceeding the therapeutic maximum dose of each individual agent. The addition of sodium bicarbonate – 1 mEq/10 mL of lignocaine reportedly causes reduction in onset time by increasing the local pH and thereby facilitating the binding of the local anesthetic to the target tissue. Adrenaline, when added to the anesthetic mixture, can prolong the anesthetic time by causing local vasoconstriction and delaying the clearance of the drug from the site of action.

In our study, the duration of hospital stay was higher in case of spinal anesthesia as compared to local anesthesia. The residual effects of spinal anesthesia like nausea, vomiting, sedation and urinary retention results in increased hospital stay. The lower incidence of major complications attributes to early motility following local anesthesia. The choice of anesthesia did not have a bearing on the costs incurred due to indoor hospital stay of the patient and the costs incurred in the operation theatre as ours is a government funded hospital. But, the operations performed under spinal anesthesia required the services of an anesthetist. The remuneration of the anesthetist was thus an added expenditure for the patients in the spinal anesthesia group.

Among the patients with spinal anesthesia urinary retention (28.0%) was most common among the complications (Z -2.04; p - 0.04). The inguinal hernia repair is a common surgery with almost no mortality. The emphasis is on low rates of recurrence and other complications like wound hematoma, wound sepsis, testicular pain swelling, urinary retention, headache and respiratory complications. The choice of anesthesia and surgical technique depend on low complication rates. Accumulated data from other hernia literature suggest that incidence of urinary retention is lowest with local anesthesia compared to spinal anesthesia. Although the exact cause of high frequency of urinary retention in spinal anesthesia group patients is not known, it is thought to be secondary to prolonged block of bladder autonomic innervation. It may be also be related to age of the patient and volume of fluid received. Fluids restriction during operation can reduce the risk of urinary retention.

In the present study we found that repair of inguinal hernia under local anesthesia is safe, simple, effective, economical, with no mortality, less postoperative complications and long postoperative analgesia. Inguinal hernia repair under local anesthesia provides better analgesia as compared to spinal anesthesia reflected by fewer doses of analgesics required by patients operated under local anesthesia.

V. Conclusion

This study includes 50 diagnosed case of inguinal hernia who were admitted in General Surgery department of Rajendra Institute of Medical Sciences, Ranchi and underwent hernia repair between November 2019 to November 2021.

This study includes comparison of inguinal hernia under spinal versus local anesthesia. The result are as follows:

1. Inguinal hernia was more common in males than in females (49:1).
2. Inguinal hernia was more common in males of low socio-economic status belonging to age group of 35-69 years.
3. The incidence of inguinal hernia in our study was more on the right side.
4. In our study it was noticed that person with strenuous activity were more affected.
5. Majority of patient had indirect inguinal hernia.
6. The inguinal hernia repair under local anesthesia has opened a new era in hernia surgery without the risk of serious morbidity. This procedure offers an extremely safe day care operation for the adults and very old with disabling disease. It is an inexpensive and effective procedure and the economic benefits are enhanced by the low morbidity, low recurrence rate, and early return to normal activities. It results in faster short term recovery, speedier discharge and less anesthesia related complications. In times to come it may be considered as the gold standard procedure for the groin hernia repair.

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