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A Prospective Comparative Study of Invagination of Indirect Inguinal Hernial Sac with Excision of Indirect Inguinal Hernial Sac

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Abstract: ***Background: Lichtenstein tension free meshplasty is the preferred method of hernia repair by majority of surgeons. Recently it is believed that ligature and excision of richly innervated and vascularized peritoneal sac leads to postoperative pain and discomfort due to miniature peritonitis. Aim of this study is to compare postoperative pain, complications and recurrence in both groups of patients. Methods: This study is single centered, prospective, comparative, randomized study, carried out in PDU Medical college and hospital, Rajkot between June 2018 to June 2020. A total 50 patients were enrolled which were randomized in two groups, A- excision of sac, B- invagination of sac. All Patient with indirect inguinal hernia were included and congenital hernia, complicated hernia, complete indirect hernia excluded. All the cases were followed up for 6 months. Visual Analogue Scale (VAS) used to assess postoperative pain. Results: Most common Age was between 21-30 yrs. Mean postoperative pain in group A was 4.53±0.28, group B was 3.72±0.54 with p value <0.001. Postoperative pain on 6th hour, 24th hour, Post-operative day 1, 3, 7, 15 was recorded which was found less in group B i.e. Invagination of sac. Post-operative complications like Seroma, Scrotal edema, Urinary retention, Hematoma was comparable though the difference was not statistically significant, No seroma, induration and Recurrence found in both groups on follow up on 1 month, 3 month, 6 month. Chronic groin pain in 3 patients in group A and 1 patient in group B was found. Conclusion: Invagination of sac results in less postoperative pain compared with excision with no significant difference is found in postoperative complications and recurrence in both surgical techniques.***

Keywords: Excision of sac, Invagination of sac, Indirect inguinal hernia, Post-operative pain

1. Introduction

Surgery is one of the big incidence if happens in any persons life. Anybody who is undergoing any surgery wants the best procedure with least postoperative pain, complications and recurrence. As surgeon we need to assess all the merits and demerits of any surgical technique so that our patient gets the best surgical treatment with less postoperative complications and better results and surgeon also get gratification for the efforts he takes.

It has been said that the history of groin hernias is the history of surgery itself.[1] A great evolution has been seen in treatment of inguinal hernia and we have reached to this era of verymuch modern and successful techniques. Inguinal hernia is very much commonly encountered disease. It is most common hernia in men and women but much more common in men. There is continuous research going on for the ideal technique of inguinal hernia repair.

Herni are pair is one of the most commonly performed general surgical procedures world wide.[2] If it is not treated on proper time it may lead to many complications like irreducibility, obstruction, strangulation. Recurrence is also very much frustrating for both patient and surgeons.

Edorado Bassini in 1887 recommended excision and high ligation of indirect inguinal hernia sac. Ideally inguinal hernia repair should be tension free, with no damage to chord structures, without post-operative complication, with least evidence of post-operative chronic groin pain and recurrence rate. Recently it is believed that ligation of peritoneal sac which is richly innervated is responsible for increased post-operative pain and also the vascularized peritoneum produces a miniature peritonitis which leads to post-operative discomfort and other complications.

The purpose of this study is to compare effects of invagination of hernia sac with excision of hernia sac on post-operative pain, complications and recurrence rate.

2. Objectives

To evaluate the incidence of early recurrence and chronic groin pain and postoperative pain and complications in the two groups of patients.

3. Methods and Materials

The present study was a single-center, prospective, comparative, randomized, controlled two group study. It compares the effects of invaginating the hernia sac with

ligation and excision on post-operative pain, complications, incidence of chronic groin pain and recurrence. It was conducted on patients admitted with the diagnosis of indirect inguinal hernia. The present study was done at PDU Medical college and Civil Hospital Rajkot, between January 2019 to June 2020. A total of 50 patients were enrolled in this study. They were randomized into two groups –
Group A: included 25 patients in whom ligation and excision of inguinal hernial sac done.
Group B: included 25 patients in whom invagination of hernial sac done.

Inclusion Criteria
All patients with indirect inguinal hernia planned for open Lichtenstein tension free inguinal meshplasty.

Exclusion Criteria
- Congenital inguinal hernia.
- Complicated Inguinal Hernia like irreducible, obstructed or strangulated hernias.
- Complete indirect inguinal hernia.
- Patient with local skin infection.

Operation was performed by Lichtenstein tension free meshplasty using prolene mesh. Post-operative pain was recorded by Visual Analogue Scale (VAS) on 6th hour, 24th hour, post-operative day 1, 3, 7, 15. Post-operative complications like seroma, scrotal edema, hematoma, wound infection, urinary retention within first 24 hr. then on post-operative day 1, day 3, day 7, day 15.The patients were followed up at one month, three month and six-month intervals on OPD basis to see any chronic groin pain, complication or recurrence. Descriptive statistics were elaborated in the form of means/ standard deviations. Group comparison for continuously distributed data were done by 't-test' , if data were found to be non-normally distributed non parametric test 'Wilcoxon Mann whitney u test' were used. Chi square test was used for group comparisons for categorical data, in case the expected frequency in the contingency table found to be less than 5 or more than 25 of the cells, Fisher's Exact test was used instead. Statistical significance was kept at $p<0.05$.

4. Results and Analysis

This study revealed that most common age group with indirect inguinal hernia is between 21-30 years.

Table 1: Early Complications in two groups of patients

Early Complication	Group A (n=25)		Group B (n=25)		P value
	N	%	N	%	
Seroma	2	8%	1	4%	1.000[2]
Scrotal edema	3	12%	2	8%	1.000[2]
Wound infection	0	0%	0	0%	1.000[3]
Urinary retention	1	4%	0	0%	1.000[3]
Hematoma	0	0%	1	4%	1.000[2]

Following table shows post-operative complications in both group of patients. Commonly observed complications were seroma formation, scrotal edema, urinary retention, hematoma formation but the difference in both group was not statistically significant.

Table 2: Incidence of early recurrence

Method	Recurrence
Group A	0
Group B	0

There was no recurrence in both the groups on follow up till six months.

Table 3: Comparison of post-operative Mean Pain (VAS) (n = 50)

Mean Pain Score (VAS)	Group		
	A	B	p value
Mean (SD)	4.53 (0.28)	3.72 (0.54)	<0.001

The mean post-operative pain was found to be less in group B where invagination of sac was done.

Table 4: Comparison of the Two Groups in Terms of Post-operative pain (n = 50)

Pain (VAS)	Group		P value
	A	B	
	Mean (SD)	Mean (SD)	
6 Hours	6.96(0.20)	6.04(0.68)	<0.001
24 Hours	6.96 (0.20)	5.80 (0.50)	<0.001
POD 1	5.76 (0.44)	5.12 (0.78)	<0.001
POD 3	4.16 (0.85)	3.16 (0.75)	<0.001
POD 7	2.28 (0.46)	1.56 (0.58)	<0.001
POD 15	1.04 (0.45)	0.64 (0.76)	0.007
1 month	0.24 (0.66)	0.08 (0.40)	0.312
3 month	0.16 (0.47)	0.08 (0.40)	0.332
6 month	0.08 (0.28)	0.04 (0.20)	0.571

The table shows comparison of pain in two groups by Visual Analogue Score at different point of time. The postoperative pain was less in group B i.e. invagination of sac, on post operatively at 6th hour, 24th hour, post-operative day 1, 3, 7, 15 and the difference statistically significant. So, the post-operative pain felt was less in group B with invagination of sac as compared to group A with excision of sac. The difference in pain was not statistically significant on follow up on 1 month, 3-month, 6 months.

Table 5: Chronic groin Pain

Group	1 month	3 months	6 months
A	3	3	2
B	1	1	1
P value	0.312	0.332	0.571

Above table shows that there were only 3 patients in group A and 1 patient in group B had chronic groin pain though the difference was not statistically significant. There was no seroma & in duration of edges on both the study group on follow up on 1 month, 3 months & 6 months interval.

5. Discussion

Inguinal hernia is the most common surgical abdominal entity in adults.[1] Surgeons have long undertaken the burden of the 'sac' in inguinal hernia repair. Thus, the sac got pride of place in hernia surgery at the expense of the 'defect'. It is long held belief that ligating the sac is an important adjunct to groin hernia operations.

Various reports discussing recurrence considered excision and high ligation of the indirect inguinal hernia sac an essential part of the repair, and if not performed properly, recurrence is more common. Studies reporting of open hernia technique still describe ligating the sac, the sac ligation was either quoted in passing or it was over-emphasized as an essential part of the repair. There was however very little support for this step and no further clinical or experimental analysis provided.

Recurrence rates have fallen markedly following the introduction of mesh and its current widespread use. In the original description of the Lichtenstein technique, the indirect hernia sac is dissected from the cord to a point beyond the neck of the sac, opened and then returned into the preperitoneal cavity without excision. The sheet of mesh should protect against and hold back any indirect hernia bulge.

The sac is not ligated in Rutkow's mesh plug repair but inverted. Rutkow recommended that hernia sac should not be opened for visual inspection because it simply involutes without any problem in few days. He thinks that because peritoneum is highly sensitive structure ligating the sac does nothing producing miniature 'peritonitis'. This iatrogenic peritonitis is one of the factors contributing to the post-operative discomfort, pain and malaise that accompany suture hernia repair[35]

Table 6: Post Operative Pain (VAS Scores)

Studies	Group A	Group B	P Value
Othman et al	4.06±2.43	3.04±2.11	0.049
PJ Vincent et al	3.5±0.97	2.86±0.70	0.001
Hansraj Ranga et al	2.8±0.764	2.68±0.69	0.568
S. delikoukos	2.8± 1, 4	2.3± 1.2	<0.05
Present study	4.53±0.28	3.72±0.54	<0.001

Othman et al[33]found that the Mean Post-Operative Pain Score in Group A was 4.06±2.43 and in Group B it was 3.04±2.11 with P = 0.049, which is statistically significant. In pj Vincent et al[2]study Mean Post Operative Pain Score in Group A was 3.5±0.97 and in Group B it was 2.86±0.70 with P = 0.001, which was statistically significant with less pain in group B. Hansraj Ranga et al[4] study mean post operative pain score in group A was 2.8±0.764 while in group B was 2.68±0.69 with p value = 0.568 , which was not statistically significant. S. Delikoukos et al[4] study mean post-operative pain score in group a was 2.8± 1, 4 while in group b 2.3± 1.2 was with p value < 0.05 , which was statistically significant. The Present study has a Mean Post-Operative Pain score of 4.53±0.28 in group A and 3.72±0.54 in group B with P =< 0.001, which is statistically significant. Lower pain scores are reported among patients in group B (invaginating group).

Table 7: Early Complication

Studies	Early Complications									
	Seroma		Scrotal Edema		Wound Infection		Urinary Retension		Recurrence	
	A	B	A	B	A	B	A	B	A	B
Othman et al	0.60%	0%	--	--	1.2%	0.60%	--	--	0%	0%
Hansraj Ranga et al	8%	4%	4%	8%	0%	0%	16%	8%	0%	0%
Present study	8%	4%	12%	8%	0%	0%	4%	0%	0%	0%

Group A, B- group B

In these studies, most of early complications like seroma, scrotal edema, wound infection was there but no statistically significant difference found.

Late Complication: Chronic Pain and Recurrence

Table 8: Chronic Pain and Recurrence

Studies	Chronic Pain			Local swelling (Recurrence)		
	Group A	Group B	P Value	Group A	Group B	P value
OTHMAN et al	1.8%	1.8%	---	0.6%	1.8%	0.429
Present study	12%	4%	0.332	0%	0%	---

Othman et al[33] found the incidence of chronic pain in Group A was 1.8% and in Group B it was 1.8 % and recurrence in 0.6% in group A and 1.8% in group B which was not statistically difference.

In the Present study incidence of chronic pain in group A was 12% and 4 % in group B with P value 0.332 and it is found to be of no statistical significance. In the present study, an internationally accepted standard definition of pain (pain beyond 3 months) was used. There was no recurrence found.

6. Conclusion

The post-operative pain was significantly less in case of invagination of indirect inguinal hernia sac as compared to excision and ligation of sac. Incidence of chronic groin pain was found to be less in Invagination of sac compared with Excision of sac though it was not statistically significant. Difference between post-operative complications like seroma, scrotal edema, wound infection, hematoma, urinary retention was comparable but not statistically significant in both the surgical technique. There was no recurrence found at the end of 6 month in any group, however longer follow up is required for recurrence.

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