# Comparison of Early Postoperative Pain After Hernial Sac Ligation Versus Non-Ligation In Inguinal Hernioplasty

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ABSTRACT

*Objective* — To compare the mean early postoperative pain scores in patients undergoing Inguinal hernioplasty with and without hernia sac ligation.

*Study design* — Randomised controlled trial.

*Place & Duration of study* — Department of General Surgery, Dr. Ruth K. M. Pfau Civil Hospital Karachi, from October 2019 to July 2021.

*Methodology* — Patients undergoing inguinal hernioplasty for indirect incomplete inguinal hernia were randomly distributed in two arms. Patients in Group A had high ligation of hernia sacs whereas non-ligation and invagination of hernia sac was done in Group B. Similar postoperative management and pain relief was provided to both the groups. Postoperative pain score was recorded at 12, 24, 36 and 48 hours, using visual analogue scale (VAS).

*Results* — Total of 70 patients were enrolled. Males constituted majority (n=77 - 95.7%) of the study population with similar distribution of gender in both the groups. The postoperative pain score at 12, 24 and 36 hours as well as overall mean pain score were less in Group B which was statistically significant. However, pain score at 48 hours was statistically insignificant between the groups.

*Conclusion* — Invagination of indirect inguinal hernia sac causes less postoperative pain in comparison to ligation/tansfixation of sac while being equally safe and time efficient.


*Key words* — Inguinal Hernia, Herniotomy, Sac Invagination, Postoperative pain.

**INTRODUCTION:**

Hernioplasty is the most common elective general surgical procedure.[1,2] The standard surgical procedure for treating inguinal hernias, the tension-free intervention done through anterior approach, as a daycare procedure, carries minimal morbidity.[3] However, postoperative pain of variable intensity is frequently reported, in some studies up to 30%, which is of concern.[4] Multiple factors are implicated as cause of post hernia repair pain. Mesh that is fixed to pubic tubercle periosteum and inadvertently entrapped nerve are usually implicated.[5] This pain may continue for months after mesh repair.[6,7] Other factors causing pain in early postoperative period are probably different. There is an ongoing search to explore these factors that include ligation of indirect inguinal hernia sac.[5,8]

According to Shulman et al pain is produced when parietal peritoneum is divided and ligated.[9] In few studies it is inferred that hernial sac ligation is an important cause of pain in early postoperative period.[7,10] In a study significantly higher pain scores were recorded on day one in high sac ligation group.[5] However, same observations are not reported in

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another study.[7] Pain in early postoperative period may affect recovery of the patient and quality of life.[6,11] This study aimed to compare the intensity of early postoperative pain after hernia surgery in patients where hernial sac was ligated or invaginated as such so as to find out which of the two techniques was better.

**METHODOLOGY:**

This randomized controlled trial (RCT) was conducted from October 2019 to July 2021 in the Department of General Surgery, Dow University of Health Sciences & Dr. Ruth K. M. Pfau Civil Hospital Karachi, with the approval of Institutional review board. This RCT was registered with ClinicalTrials.gov having ClinicalTrials.gov ID. # NCT04079504. Sample size was calculated using Open Epi calculator by accounting 5% level of significance and 95% confidence interval. Non-probability consecutive sampling was used. A total of 70 patients of inguinal hernia diagnosed with sacs limited to inguinal region and positive ring occlusion tests of both genders, above 15 years of age, scheduled for inguinal hernioplasty, were included. Patients with recurrent hernias, those that were irreducible, obstructed and /or strangulated, were excluded. Patients with synchronous ipsilateral inguinoscrotal pathologies like hydrocele, testicular malignancy, and hematocele were also not enrolled. Informed consent and assent were taken.

Patients were divided into two groups: A and B, with 35 patients each by randomizer software. Patients of group A (control group) were subjected to opening of hernial sac followed by reduction of the content and high ligation of sac at deep ring, whereas in group B (study group), the sac along with its content reduced in the abdominal cavity without opening. A standard Lichtenstein mesh hernioplasty was performed in both the groups. Operative time from the making of incision to closure of skin was recorded in all operations.

Postoperatively, all patients received standard dose of parenteral analgesic (ketorolac 30mg IV x 12 hourly) for 48-hours. Patients were requested to mark on the 10 centimeters line in ascending numerical order, where Zero on the line indicated “no pain” while ten meant “worst pain”. The pain scores were noted at 12, 24, 36, and 48 hours after surgery. Patients with a pain score of =4 on VAS, were given additional dose of parenteral analgesic (intravenous nalbuphine 4 mg). Final outcome (mean postoperative pain on VAS) was determined 48-hours after surgery.

Findings were recorded on a predesigned proforma. The variables entered included age, gender, hernia site (right sided or left sided), hernia type (indirect alone or with direct sac), operative time, postoperative pain according to VAS at 12 hours, 24 hours, 36 hours, and 48 hours, and mean pain score 48 hours after surgery. Patients were followed on 7$^{th}$ and 15$^{th}$ postoperative day for development of early complications.

SPSS version 21 was used to analyze the data. Numerical variables were presented as mean and standard deviation whereas categorical variables as frequencies and percentages. Unpaired (independent sample) student t test was used for comparison of the mean pain scores 48 hours after surgery and mean operative time between the groups. Chi-square test was applied to compare categorical variables. Statistically significant difference was taken at $p<0.05$.

**RESULTS:**

This study included total of 70 patients, 35 in each group. The mean age of the study patients was 38.81±11.71 year. There were 95.7% males and 4.3% females. Most (n=43 - 61.42%) were on right side. In 64 (91.42%) patients only indirect hernia was noted while 6 (8.57%) had direct hernia as well. No statistical difference existed amongst the groups with regard to age, gender, type of hernia ($p>0.05$). Mean operative time was 40.94±8.43 minutes. It was more in group A (42.51±8.73 minutes) as compared to group B (39.37±7.94 minutes) which was statistically insignificant. Details are given in table I.

Pain scores assessed on VAS at 12 hours, 24 hours and 36 hours after surgery were significantly lower in group B whereas no difference was observed at 48 hours after surgery. Table II shows the details. Seven (10%) patients required additional dose of analgesics out of which 6 (17.14%) were from group A and 1 (2.85%) in group B. This was statistically significantly ($p=0.025$). Mean dose of rescue analgesic nalbuphine administered to 6 patients was 0.68±1.52 mg whereas in group B 0.22±0.94 mg ($p=0.125$). No patient had bleeding, bowel / bladder / nerve injury, urinary retention, hematoma, scrotal abscess, and recurrence in both groups. The rate of seroma formation and scrotal edema were not statistically different in both the groups (table III).

**DISCUSSION:**

Results of this study showed statistically significant reduced postoperative pain in inguinal hernioplasty patients where sac was not ligated. The mean age

**Table I: Demographic and Clinical Detail**

| Characteristics | | Group A | Group B | P-value |
|---|---|---|---|---|
| Mean age in year | | 38.09±10.64 | 39.54±12.81 | 0.304 |
| Male (%) | | 34 (97.14%) | 33 (94.28%) | 0.278 |
| Female (%) | | 1 (2.85%) | 2 (5.71%) | 0.278 |
| Type of Hernia | Right | 20 (57.14) | 23 (65.71%) | 0.231 |
| | Left | 15 (42.85%) | 12 (34.28%) | 0.231 |
| | Indirect only | 33 (94.28%) | 31 (88.57%) | 0.198 |
| | Pantaloon Hernia | 2 (5.71%) | 4 (11.42%) | 0.198 |
| | Mean Operative Time (Minutes) | 42.51±8.73 | 39.37±7.94 | 0.060 |

**Table II: Postoperative Pain Score**

| | Group A | Group B | P-value |
|---|---|---|---|
| Pain VAS Score (12 hours) | 4.25 ±0.56 | 2.69 ±0.84 | 0.000* |
| Pain VAS score (24 Hours) | 3.59 ±0.18 | 3.82 ±0.76 | 0.042* |
| Pain VAS score (36 Hours) | 3.38 ±0.33 | 3.20 ±0.45 | 0.030* |
| Pain VAS score (48 Hours) | 3.35 ±0.71 | 3.61 ±0.87 | 0.087 |
| Mean Pain Score | 3.64 ±0.60 | 3.33 ±0.85 | 0.036* |

***p-value <0.05 denoting statistical significance**

**Table III: Comparison of Complications**

| Complications | Total (n) | Group A (n %) | Group B (n %) | P-value |
|---|---|---|---|---|
| Seroma | 03 | 2 (5.71%) | 1 (2.85%) | 0.278 |
| Scrotal edema | 02 | 1 (2.85%) | 1 (2.85%) | 0.50 |

of the study patients was 38.81±11.71 year which is similar to that reported in an aticle.[12] However, this is not the observation in another study where elderly patients were more frequently operated.[13] Right sided hernias were observed more frequently in the index study as reported by others as well.[12,13]

Early postoperative pain delays recovery of the patient and return to normal activity. This adds to the financial burden on patient and health care system. In a randomized controlled trial including 152 patients of inguinal hernia divided into three groups, the non-ligation and invagination of sac procedure was found to be associated with low mean postoperative score as found in our study.[14] In a study on pediatric population with inguinal hernia low postoperative pain after non-ligation of hernia sac was reported.[15] A meta-analysis also revealed similar data.[16]

An interesting observation in our study was no difference in pain scores at 48 hours after surgery although it was still on a lower side in study group. Postoperative pain may be more marked due sac ligation leading to peritoneal ischemia, mesh placement/suture and or metal tacks (foreign body reaction) that tends to abate with time. The mean operative time in both study groups showed no statistical difference. The operative steps are almost were similar with addition of high ligation after transection as compared to simple invagination, requiring minimal effort.

The postoperative complications include seroma formation and scrotal edema. A systematic review showed more seroma formation due to higher sac ligation as compared to non-ligation group.[17] All complications were managed conservatively. Long term follow-up was not performed in this study. However, no early recurrence was noted in this study. A long-term outcome of the two procedures performed is warranted so as to report more comprehensive outcome of the intervention performed.

**CONCLUSION:**

Non-ligation and sac invagination was found equally safe, time-efficient and leads to lower postoperative

pain as compared to the ligation or transfixation of hernia sac.

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Wardah Jabeen: data collection, analysis and interpretation of results, manuscript drafting and revising, final approval, agreement to be accountable.

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