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ORIGINAL ARTICLE

Comparison of Surgical Site Infection (SSI) in Mesh vs Non-mesh repair of obstructed inguinal hernia in emergency setting.

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ABSTRACT… Objective: To compare the frequency of infection with and without mesh repair of obstructed inguinal hernia in Emergency Surgery. **Study Design:** Randomized Controlled Trial. **Setting:** Department of Surgery, Sahiwal Teaching Hospital, Sahiwal. **Period:** 1st Jan 2024 to 30th June 2024. **Results:** In group A, the average operating time was 62.20±11.35 minutes, whereas in group B, the average operative time was 57.54±11.84 minutes. There was no notable correlation between wound infection and study groups since the p-value did not reach statistical significance. The p-value is 0.29. There was no statistically significant difference in the average length of full healing between group A and group B, as shown by the non-significant p-value. The p-value is 0.238. **Conclusion:** This research concludes that there was no difference in the incidence of wound infection between those who had emergency surgery to treat an obstructed inguinal hernia with mesh and those who did not.

Key words: Emergency, Hernia, Infection, Inguinal, Mesh Repair, Obstructed, Surgery.

INTRODUCTION

An organ or portion of an organ that protrudes through the body wall that ordinarily surrounds it is known as a hernia; in this study, we are referring to the colon or the fatty tissues around it that protrude through the abdominal wall in the groin area.[1] This is a somewhat frequent medical condition that affects 27 males out of every 100. These hernias may be very uncomfortable, and in rare occasions they might get trapped so firmly that the blood supply is severed (strangulation), necessitating immediate surgery.[2,3]

Surgical repair is the only effective therapy for all hernias, with inguinal hernia repair being among the most often carried out surgical operations. In high-income nations, mesh repairs are becoming less prevalent and Lichtenstein Tension Free Mesh (hernioplasty) and classic non-mesh repairs (herniorrhaphy like Darn's Shouldice Repairs) are often employed.[4] The best strangulated inguinal hernia treatment is debated. Mesh for strangulated hernias is controversial owing to infection risk.[5,6]

One trial found that the frequency of infection was 22.9% with mesh repair and 2.9% without mesh repair in patients with obstructed inguinal hernia ($p<0.05$).[7] Another study reported that the frequency of infection was 6.7% with mesh repair and 1.9% without mesh repair in patients with obstructed inguinal hernia ($p<0.05$).[8] But one study reported that the frequency of infection was 4.4% with mesh repair and 0% without mesh repair in patients with obstructed inguinal hernia ($p>0.05$).[9] While one study showed conflicting results i.e. infection in 5.9% with mesh repair while in 10.3% cases without mesh repair ($p>0.05$).[10]

Therefore, this study aimed to compare the outcome either with or without of mesh. Literature showed that the chances of infection after hernia repair are significantly higher with mesh use, however, without mesh, the results are better. A conflicting rate of infection has been presented in the literature[7-10], showing that whether the mesh is applied or not, the infection rate will be the same.

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Moreover, there was no local evidence found in the literature that could help us implement a more effective method for inguinal hernia repair. So, we wanted to conduct this study to find which method has a better outcome and is safe for the management of obstructed inguinal hernia.

METHODS

This Randomized Controlled Trial was conducted by the Department of Surgery, Sahiwal Teaching Hospital, Sahiwal for 6 months i.e. 01-01-2024 to 30-06-2024. A sample size of 70 cases (35 cases in each group) is calculated with a 5% significance level, 80% power of the study, and taking an expected percentage of infection i.e. 22.9% with mesh repair and 2.9% without mesh repair in patients with obstructed inguinal hernia. Following formula was used:

$$n = \frac{\{z_{1-\alpha}\sqrt{2\bar{P}(1-\bar{P})} + z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}\}^2}{(P_1-P_2)^2}$$

Non-Probability consecutive sampling was used as sampling technique.

Inclusion

Male patients of the age range 18-75 years, presenting with obstructed inguinal hernia were enrolled. The obstructed inguinal hernia is defined as a protrusion of part of the intestine in the inguinal region and obstructed is defined as a herniated intestine that gets stuck in the muscle layer it's protruding through, bowel is trapped and obstructed but viable (on clinical examination and ultrasound).

Exclusion

Patients with ASA status III and IV, with recurrent inguinal hernia, surgeries taking >120 minutes, patients with a history of Steroid Intake, BMI > 30 kg/m^{2,} or with Gangrenous Gut on Operation were excluded from the study.

Data Collection Method

This research included 70 surgical ward patients from Sahiwal Teaching Hospital, Sahiwal who met the inclusion criteria after ethics committee permission (177/IRB/SLMC/SWL-23/12/23). With informed consent, patient demographics (name, age, BMI, and symptom duration) were recorded. The patients were split into two equal groups using a random number system. Group A patients had hernia repair with herniotomy and Lichtenstein Mesh between the conjoint tendon and inguinal ligament. In group B, mesh-free hernia surgery was performed. A single surgical team with researcher support performed both procedures under general anesthesia. Operational time was recorded. Within surgery, patients were sent to post-surgical wards and released within 16 hours if eligible. Patients were advised to take Penicillin or 1st, 2nd Generation Cephalosporins for 5 days. Then patients were followed up in OPD Weekly until complete healing of the surgical site. Surgical site infection was labeled if the patient presented with fever and pain at the wound site within 10 days of surgery and the presence of redness, tenderness, swelling, and purulent discharge at the wound site on clinical examination according to the Southampton Grading system. A grade of Equal or More than 2 will be considered an infection. Patients were evaluated as per Southampton Wound scoring for Surgical Site Infection. Patients with infection was managed accordingly. Data was recorded on a patient's proforma. Other Variables i.e.: Duration of Wound Healing was also recorded.

Statistical Analysis

Data was analyzed in SPSS v. 25.0. Qualitative variables were calculated as percentage frequencies while quantitative variables were calculated as mean and standard deviations. Normality was checked by using Shapiro-Wilk test. The Chi-square test evaluated infection between research groups and independent samples t-test was applied to compare operative time and duration of wound healing in both groups. P-value < 0.05 was deemed significant.

RESULTS

In group A, the mean age of the patients was 53.23±16.57 years. In group B, the mean age of the patients was 45.77±17.64 years. The average BMI of patients in group A was 20.97±2.503, and in group B was 21.03±2.905. In group A, the average length of symptoms was 6.57±4.024, and in group B was 4.97±3.51. Table-I

In group A, the average operating time was 62.20±11.35 minutes. In group B was 57.54±11.84 minutes. In group A there were 2(5.7%) patients with Southampton grade Ia, 8(22.9%) with Grade IA, 9(25.7%) with grade IC, 1(2.9%) with grade IIA, 2(5.7%) with grade IIC, 1 (2.9%) with grade III and 12(34.3%) with grade O on the other side in group B there were 2(5.7%) patients with Southampton grade Ia, 8(22.9%) with grade IA,2(5.7%) with grade IB, 4(11.4%) with grade IC, 2(5.7%) with grade IIA, 1(2.9%) with grade IIC, 4 (11.4%) with grade III and 12(34.3%) with grade O. There was no statistically significant correlation between wound infection and study groups since the p-value did not reach statistical significance. The p-value is 0.29. The mean values of duration of full healing did not vary significantly between group A and group B, as shown by the non-significant p-value. The p-value is 0.238.

	Group A	Group B
n	35	35
Age (years)	53.23 ± 16.57	45.77 ± 17.64
BMI	20.97 ± 2.50	21.03 ± 2.91
Duration of symptoms	6.57 ± 4.02	4.97 ± 3.51

Table-I. Baseline information of patients enrolled in the trial

	Group A	Group B	P-Value
Operative time (min)	62.20±11.35	57.54±11.84	0.0974!
Southampton grade			
Ia	2 (5.7%)	2 (5.7%)	0.5009*
IA	8 (22.9%)	8 (22.9%)	
IB	0 (0%)	2 (5.7%)	
IC	9 (25.7%)	4 (11.4%)	
IIA	1 (2.9%)	2 (5.7%)	
IIC	2 (5.7%)	1 (2.9%)	
III	1 (2.9%)	4 (11.4%)	
O	12 (34.3%)	12 (34.3%)	
Wound infection	4 (11.4%)	8 (22.9%)	0.290*
Duration of complete healing (days)	11.89±3.06	13.06±4.96	0.238!

Table-II. Outcome of procedure in both groups

Independent samples t-test! / Chi-square test*

DISCUSSION

Inguinal hernia obstruction is a frequent urgent surgical problem. Ten percent of inguinal hernia patients are incarcerated and need emergency surgery. Inguinal hernia strangulation risk is 0.29–2.9%. Relapses occur in 15% of inguinal hernia repairs after previous, non-mesh-repair surgeries. Modern inguinal hernioplasty reduces recurrence but not death after imprisonment.[11] The most prevalent prosthetic materials for tension-free mesh repair are polymers, polypropylene, and polyester. As the best prosthesis for fibroblast activation, polypropylene is suggested. Also crucial is mesh pore size. Macrophages may permeate tissue more easily with hole diameters above 75 µm, reducing infection risk.[12]

Tension-free mesh surgery is the gold standard for elective inguinal hernia repair, although it may increase wound infection risk for strangulated hernias. Strangulation no longer precludes tension-free mesh repair, according to recent investigations.[13,14] Other research suggest that mesh removal may reduce the incidence of wound infection.[15,16] Papaziogas et al. examined 75 incarcerated hernia surgery patients. Group A included 33 tension-free mesh repair patients, whereas Group B had 42 Bassini patients. The results of both groups were compared. We examined mesh vs non-mesh infection in blocked inguinal hernia. We studied 35 patients in groups A (mesh repair) and B (meshless repair).[17]

Khan et al. (2018) showed no statistically significant difference between Group A and Group B wound infections among two and four patients, respectively. As in our research, four patients in Group A (11.4%) and eight in Group B (22.9%) had wound infections. The number of cases with infection was low in both groups and the difference was calculated to be insignificant (p-value:0.29).[7]

Hentati et al. (2014) found contradictory results in their research, suggesting that mesh repair is a better alternative than non-mesh procedures for treating adult strangulated inguinal hernias, with superior outcomes in terms of SSI and recurrence.[18] According to Khan et al., Group B's

hospital stay was noticeably longer than Group A's, however, our study's results showed that Group A and Group B's length of full healing was not substantially different from one another.

Another study found two relapses in Group B and one in Group A.[19] The study showed polypropylene mesh instrangulated hernias safe. Similar findings from our research. Dahlstrand et al. found that older age affected wound infection, bowel resection, and death in 8208 Swedish patients between 1992 and 2006. In older age groups (46-76 years), wound infection was significantly associated with study groups.[20] Regardless of mesh type, bowel resection increases postoperative complications in incarcerated inguinal hernias, according to many studies.[21,22]

CONCLUSION

This research concludes that there was no difference in the incidence of wound infection between those who had emergency surgery to treat an occluded inguinal hernia with mesh and those who did not.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Zahid Sattar:** Conceived the idea, drafting, writing of manuscript.
2	**Muhammad Saad Iqbal:** Statistical analysis, interpretation of data.
3	**Waqas Qureshi:** Revision of manuscript, editing of manuscript.