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Comparison between Polypropylene Suture and Skin Staples for Securing Mesh in Lichtenstein Inguinal Hernioplasty

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ABSTRACT

Objective: To compare Polypropylene suture versus skin Staples for securing the mesh in patients undergoing Lichtenstein inguinal hernioplasty in terms of operative time, post-operative wound infections and pain.
Study Design: Comparative cross-sectional study.
Place and Duration of Study: Surgical Department, Combined Military Hospital, Quetta Pakistan, from Dec 2018 to Jun 2020.
Methodology: A total of 220 patients with unilateral inguinal hernia were included in the study and divided into two equal groups of 110 patients each and were assigned either to the Polypropylene-Group or the Staples-Group. All the patients underwent Lichtenstein hernioplasty on the elective operation list. Both groups were compared regarding operative time, post-operative pain and wound infections.
Results: The mean operative time was 58.8±3.31 minutes in the Polypropylene-Group vs. 49.87±2.67 minutes in the Staples-Group. The mean post-operative pain score was 2.73±2.07 in the Polypropylene-Group and 1.95±2.18 in the Staples-Group. Wound infection was observed in 26 patients (23.64%) of the Polypropylene-Group vs. eight patients (7.27%) of the Staples-Group, respectively, (p<0.001).
Conclusion: In patients undergoing Lichtenstein inguinal hernioplasty, skin staples are better than Polypropylene sutures for securing mesh. Staple application is a swift and painless procedure with lesser post-operative pain and less frequency of wound infections.

Keywords: Inguinal hernioplasty, Polypropylene suture, Skin staples.

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INTRODUCTION

Inguinal hernia is a relatively common clinical entity constituting 73% of external hernias. Surgical management is the modality of choice as the natural history of hernia is progressive, and complications may occur.[1,2] Hernioplasty is a common surgical procedure, with an estimated 20 million yearly procedures performed worldwide. Approximately 100,000 inguinal hernia repairs are performed annually in the UK.[3] The lifetime risk for an inguinal hernia to develop in males is 27%, and for females, it is 3%.[4]

Lichtenstein hernia repair involves reducing the herniated viscus back into the peritoneal cavity and then reinforcing the inguinal canal floor with a Polypropylene mesh. The internal ring is renewed.[5] The standard mesh fixation technique to the posterior wall of the inguinal canal is via Polypropylene stitches. Quite recently, the hernioplasty technique has been modified by using skin staples to fix mesh.[6] It has been proposed to reduce the operation time and decrease post-operative wound infection and post-operative pain.[7,8]

Inguinal hernia patients are routinely received in surgical practice. Newer innovations aim to reduce surgical time and decrease the morbidity associated with surgery.[9,10] There are limited studies comparing sutures versus staples regarding the frequency of post-operative wound infections and post-operative pain in Lichtenstein hernioplasty. The rationale of this study was to find a better option for mesh securing during inguinal hernia repair in terms of procedure time, post-operative pain and wound infections. This will help formulate an institutional protocol for inguinal hernia repair in hospital patients.

METHODOLOGY

The comparative cross-sectional study was conducted at the Surgery Department of Combined Military Hospital, Quetta Pakistan, from December 2018 to June 2020 after Ethical Review Committee approval and written consent from patients. The sample size was determined by the WHO sample size

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calculator keeping the anticipated wound infection proportion 1(P1) at 24% and anticipated wound infection proportion 2(P2) as 11%.[11] Non-probability consecutive sampling was employed.

Inclusion Criteria: All male patients aged 18-60 years, having uncomplicated (reducible, non-tender), direct or indirect inguinal hernia and ASA Grade I-III were included in the study.

Exclusion Criteria: Patients with complicated (irreducible, strangulated, obstructed or recurrent) inguinal hernia, Immuno-compromised patients and patients with diabetes mellitus, hypertension, chronic renal failure and bleeding disorders were excluded from the study.

Patients having inguinoscrotal swelling (reducible, non-tender and we cannot get above the swelling) were labelled as having an inguinal hernia and admitted to the surgical ward of CMH Quetta for hernioplasty. Group-1 underwent mesh fixation with sutures, while Group-2 underwent mesh fixation with staples. All the patients underwent Lichtenstein tension-free inguinal hernioplasty under spinal anaesthesia on the elective list.

In Group-1, after skin incision, external oblique aponeurosis was opened, cord was lifted, and hernia was identified. The Hernia sac was excised in case of indirect hernia after reducing contents while in direct hernia sac was reduced into the peritoneal cavity. Prolene mesh 6×11 cm was fashioned, and the mesh was sutured from the periosteum of the pubic tubercle up to 2 cm lateral to the deep inguinal ring with Prolene 2.0. The skin was closed with a sub-cuticular 2/0 Polypropylene suture removed on the seventh post-operative day. In Group-2, after the skin incision, the same steps were followed as in Group-1, and then the mesh was placed and anchored with staples. Staples were applied at a point 1cm medial to the pubic tubercle and above with conjoint tendon and below with inguinal ligament and laterally 2 cm lateral to deep ring. The skin was closed with staples from the same stapler and removed on the seventh post-operative day. To accommodate the cord gap was created in mesh in both groups.

The operative time (minutes) was recorded for every surgery. Time was recorded in minutes from start to beginning of mesh repair, the beginning of mesh repair to end and total time for operation. All patients were discharged on the first post-operative day and followed for wound infection on the 1st,7th and 14th day. All patients were followed for wound discharge, gaping, abscess and seroma formation. All patients were discharged on the first post-op day and reviewed on the third day postoperatively to record the pain. Post-operative pain perception was measured using a visual analogue score (VAS) card on the third post-operative day with a score of 1-10.

Statistical Package for Social Sciences (SPSS) version 22.0 was used for the data analysis. Quantitative variables were expressed as Mean±SD and qualitative variables were expressed as frequency and percentages. Independent sample t-test and Chi-square test were applied to explore the inferential statistics. The *p*-value lower than or up to 0.05 was considered as significant.

RESULTS

A total of 220 patients were included in the study. The mean age of patients in Group-1 was 38.81±7.25 years, and 39.86±7.38 years in Group-2. The mean BMI of the patients was calculated as 27.97±3.00 Kg/m^2 in Group-1 and 27.89±2.95 Kg/m^2 in Group-2, which was non-significant (p=0.83). The distribution of patients according to mean operative time and mean post-operative pain according to VAS is given in Table-I. The comparison of the frequency of post-operative wound infections is given in Table-II.

Table-I: Distribution of patients according to Mean Operative Time and Mean Post-Operative Pain (n=220)

Variables	Group-1(n=110)	Group-2(n=110)	*p*-value
	Mean±SD	Mean±SD	
Mean operative time (minutes)	58.8±3.31	49.87±2.67	0.001
Mean pain (VAS)	2.73±2.07	1.95±2.18	<0.001

Table-II: Distribution of patients according to Post-Operative Wound Infection (n=220)

Wound Infection	Group-1 (n=110)	Group-2 (n=110)	*p*-value
	n (%)	n (%)	
Yes	26(23.64%)	8(7.27%)	0.008
No	84(76.36%)	102(92.73%)	

DISCUSSION

This study was conducted with the view that by anchoring mesh with skin staples in Lichtenstein inguinal hernioplasty, the operating time, the frequency of post-operative wound infections, and post-operative pain may be reduced, which is an important beneficial outcome for our patients and may also decrease the workload in the hospital. Our findings reveal that mean post-operative time, mean post-operative pain and frequency of post-operative wound infections were significantly low in the Staples-Group.

A study by Khan *et al*. compared similar modalities in terms of post-operative pain and reported that moderate to severe pain was experienced more in the Prolene-Group than in the Staples-Group. Their study results align with our results in favour of the use of staples in mesh fixation during hernia repair.[11] The findings of our study are comparable to results reported by Shaikh *et al*. who found that the medium operative time was 90 minutes in the Sutures-Group vs. 60 minutes in the Staples-Group, the difference being significant (p=0.004).[12] Another El Atrebi *et al*. study reported that the mean operative time was significantly reduced with skin staples compared to polypropylene sutures for securing mesh. The mean operative time was 50±14.4 minutes vs 65±16.2 minutes, respectively, with p-value=0.001.[13] Similarly, Munghate *et al*. found that wound infection and seroma formation were more frequent in the Polypropylene Suture-Group compared to in Staples- Group.[14]

Shaukat *et al*. studied chronic pain and operative time in prolene vs staples mesh repair in inguinal hernia. Contrary to our findings, they found more chronic pain in the Staples-Group than in the Prolene-Group. However, operative time in their study was also less in the staple group, like our study findings.[15] Haider *et al*. studied a comparison of Staples and Prolene in mesh securing in Lichtenstein mesh repair in terms of operative time and early post-operative complications. They found no difference in early post-operative complications. However, operative time was significantly less in the Staple Group, as was observed in our study.[16]

In a multi-centre randomised controlled trial, Khursheed *et al*. studied the difference in long and short-term outcomes in inguinal hernia repair in Prolene and Staples groups. Contrary to our study results, they found no statistically significant difference between groups.[17] Khulique *et al*. compared prolene and staples in inguinal hernia repair in terms of surgical site infection, urinary retention and seroma formation. Like our study, they found staples to be better regarding post-op surgical site infection. However, seroma formation and urinary retention had a similar incidence in both groups.[18] Wani *et al*. compared the same modalities in Lichtenstein mesh fixation to see post-operative complications like pain, infection and recurrence. They found no statistically significant difference in any group. However, they concluded that using staples significantly reduces the surgery time, as is evident in our study.[19]

All patients in our study developed superficial wound infections and were effectively managed with Inj Co-amoxiclav 625 mg IV thrice daily and Inj Amikacin 500 mg IV twice daily. None of the patients required the removal of the mesh. The results of our study are comparable to the findings in the national and international literature. We recommend using staples to fix the mesh in all patients undergoing elective inguinal hernia repair.

LIMITATIONS OF STUDY

The study needed to assess the finances involved in comparing the two techniques. The follow-up was short-term. Thus we recommend further studies with longer follow-ups to compare the two techniques.

CONCLUSION

Skin staples are better than conventional propylene sutures for securing mesh in Lichtenstein Inguinal Hernioplasty. Staples offer a swift and painless procedure with the added advantage of lesser post-operative pain and decreased frequency of post-operative wound infection.

Conflict of Interest: None.

Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

USB: & AA: Data acquisition, data analysis, drafting the manuscript, critical review, approval of the final version to be published.

SI: & HKP: Data acquisition, concept, critical review, approval of the final version to be published.

FS: & KD: Study design, drafting the manuscript, data interpretation, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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