

A Randomized Clinical Study to Compare the Outcomes of Bilateral Inguinal Hernia Repair using Two Different Methods

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Abstract

Aim: The aim of the present study was to compare the outcomes of bilateral inguinal hernia repair between patients who underwent the Stoppa's repair and those who underwent Lichtenstein tension free mesh hernioplasty repair.

Methods: A prospective, open, randomized, comparative study was undertaken in the Department of General Surgery for the period of 1 year. Before being included in the study, informed written consent was obtained from all patients. Total 70 patients-30 patients in each group-were included in the study who were fulfilled the selection criteria.

Results: Majority of the patients were males. Other preoperative variables-age, BMI, comorbidities, and smoking-did not show a statistically significant difference between the two groups. The operative time was significantly shorter in group 2 patients (45.35±7.23 min), whereas it was 78.42±8.62 min in group A. In both groups, there were no intraoperative complications. Group 2 patients had significantly lower postoperative pain scores measured by the visual analogue scale at 12 hours postoperatively, but there was no statistically significant difference in pain at 24 hours or 7 days postoperatively. In terms of postoperative complications, postoperative hospital stays, return to normal daily activities, and chronic groin pain, there was no statistically significant difference between the two groups.

Conclusion: The present study was unable to show that either technique was superior in the treatment of bilateral inguinal hernias. Both procedures, on the other hand, were capable of achieving favourable post-operative outcomes and had similar problems. The majority of the patients were receptive to both approaches. The time it took for all groups to return to normal activity and work without pain was longer, most likely because the hernia procedures were bilateral.

Keywords: Bilateral inguinal hernia, Surgical management, Stoppa's repair, Lichtenstein technique, Tension free hernioplasty

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Introduction

Inguinal hernias represent a prevalent surgical condition encountered globally, affecting millions of individuals annually. These hernias occur when abdominal organs, such as the intestines or fatty tissue, protrude through weakened or torn areas in the inguinal canal - a crucial passage in the lower abdomen. [1] The causes of inguinal hernias vary, including congenital predisposition, age-related weakening of abdominal tissues, heavy lifting, chronic coughing, or obesity. They can manifest

unilaterally, affecting one side of the groin or bilaterally, involving both sides. Moreover, their incidence tends to rise with age and is notably more common in males. Left untreated, inguinal hernias can lead to severe complications such as bowel obstruction or strangulation, which necessitate emergency surgical intervention to prevent life-threatening consequences. [2]

Effective management of inguinal hernias hinges upon selecting appropriate hernia repair techniques. The choice of surgical approach plays a pivotal role in determining patient outcomes, encompassing factors such as postoperative pain levels, recovery duration, and the risk of hernia recurrence. [3] Surgeons have various options, including open repair techniques like traditional tension-free mesh repair, the Rives-Stoppa technique, and minimally invasive approaches such as laparoscopic hernia repair. Each technique boasts its own advantages and disadvantages, with selection contingent on factors like hernia size, patient comorbidities, surgeon expertise, and patient preferences. The optimal choice of technique is paramount for achieving successful outcomes and ensuring patient satisfaction. [4]

The surgical approach for open inguinal hernia repair encompasses several techniques, including herniotomy, herniorrhaphy, and hernioplasty. One prominent example of hernioplasty is the Lichtenstein tension-free mesh repair, which reinforces the weakened posterior wall with mesh without directly repairing it. [5] In open anterior repair methods such as Bassini, McVay, and Shouldice repairs, the external oblique aponeurosis is incised to release the spermatic cord and reconstruct the inguinal canal floor using permanent sutures. Conversely, posterior repair techniques like iliopubic tract repair and the Nyhus technique involve dissection behind and deep into the inguinal region to reconstruct from the inside. [6]

Notably, hernia repair codes are not contingent on the size of the hernia repaired. This implies that regardless of operative time and effort variations, repairs of different hernia sizes receive the same payment. Moreover, when multiple hernias are repaired during the same operative session and through the same incision, they cannot be coded separately. [7] Alternatively, laparoscopic repair presents another option for inguinal hernia repair, where specialized instruments are inserted through small abdominal incisions, and mesh is used for reinforcement. Compared to open surgery, laparoscopic repair offers a lower recurrence rate and faster recovery. [8,9] The choice between open and laparoscopic techniques depends on factors such as overall health status, surgeon expertise, and specific hernia characteristics. [9]

The aim of the present study was to compare the outcomes of bilateral inguinal hernia repair between patients who underwent the Stoppa's repair and those who underwent Lichtenstein tension free mesh hernioplasty repair.

Materials and Methods

A prospective, open, randomized, comparative study was undertaken in the Department of General

surgery IGIMS, Patna, Bihar, India for the period of 1 year. Before being included in the study, informed written consent was obtained from all patients. Total 70 patients-30 patients in each group-were included in the study who were fulfilled the selection criteria.

This study included all patients of both genders with age of 18 years and above visiting the department of general surgery of the institute with bilateral inguinal hernias. Patients with following any condition-a complicated inguinal hernia; an obstructed or strangulated inguinal hernia; a recurrent inguinal hernia; previous abdominal surgery; a local skin infection-were excluded from the study. Patients were randomised into two groups based on simple randomization-group 1: patients underwent Lichtenstein tension free mesh hernioplasty; and group 2: patient underwent Stoppa's repair. Age, chief complaints and duration of inguinal hernia, other concomitant conditions such as chronic cough, chronic constipation, urinary complaints, etc., history of previous abdominal surgeries, family history, occupation, marital status, and etc. were all taken into account. A thorough physical examination was also carried out.

In Lichtenstein tension-free hernioplasty, a skin incision was made parallel to the inguinal ligament from about 1/2 inch above and lateral to the pubic tubercle to about 1/2 inch below and medial to the anterior superior iliac spine. [10] Vicryl 0 was used to dissect the indirect hernia sac, ligate it, and section it. Vicryl 2/0 was used to plicate and invaginate the large direct sacs. In all cases, a 6x11 cm heavy prolene mesh was used. Using interrupted polypropylene 2/0, the mesh was secured in place. Starting from the pubic tubercle and extending beyond the orifice of the internal ring, the mesh was fixed to the inguinal ligament and conjoint tendon.

In another group, Stoppa procedure which was developed by Stoppa was used, with some modifications. [11-14] The standard incision for all patients was a Pfannenstiel incision, followed by vertical separation of both recti to enter the preperitoneal space. The preperitoneal space was dissected with a blunt dissection. Retzius' retropubic space was dissected, and the rectus abdominis muscle and epigastric vessels were reached laterally, extending to the retro inguinal space. It was possible to see the spermatic cord and gonadal vessels. The iliac vessels, the superior pubic ramus, and the obturator foramen were all exposed. The presence of direct hernias was discovered and the size of the hernias was reduced. Large sacs were removed and a purse-string suture was used to bind them. The distal peritoneum was left attached to the cord, the indirect sacs were divided, and the proximal peritoneum was sutured. If the indirect hernia was sliding, the sac was separated from the cord structures. Dissection of the spermatic cord and gonadal vessels' peritoneal attachment was used to

partialize them. In the preperitoneal space, a prolene mesh (polypropylene nonabsorbable synthetic mesh; single (60×60 cm) or two (30×30 cm) was placed. The mesh did not need to be fixed because the intraabdominal pressure forces it to lay flat between the peritoneum and fascial layers.

Each patient's operative data was recorded in case record form, with a focus on operative time and intraoperative complications. Assessment of postoperative pain, postoperative complications, hospital stay, time to return to normal daily activities, chronic groyne pain, and recurrence were all included in the postoperative data collection. The visual analogue scale was used to assess postoperative pain in each patient at 12 hours, 24

hours, and 7 days after surgery. After the operation, all patients were monitored for one month to assess complications, pain, return to normal daily activities, chronic groin pain, and recurrence.

The statistical package for the social sciences, version 20 software (SPSS v.20.0) was used to conduct the analysis. P=0.05 was considered as the significance level. Number and percent were used to describe qualitative data. Range, mean, SD, and median were used to describe quantitative data. The χ^2 -test was used to compare different groups in terms of categorical variables.

Results

Table 1: Characteristics of the patients

Characteristics		Group1	Group2	P value
Age (years); Mean ± SD		45.85± 11.23	48.52± 13.77	0.644
Male/Female		28/7	30/5	0.565
BMI (kg/m ²); Mean ± SD		26.54±6.44	27.93± 3.14	0.780
Comorbidities	Hypertension	7	4	0.854
	Diabetes	4	6	
	COPD	7	8	
Smoking		9	8	0.773

Majority of the patients were males. Other preoperative variables-age, BMI, comorbidities, and smoking-did not show a statistically significant difference between the two groups.

Table 2: Operative and postoperative parameters of the patients

Variables		Group1	Group2	P value
Operation time (min); Mean ± SD		78.42±8.62	45.35±7.23	<0.001
Post-op complications	Wound hematoma	5	4	0.424
	Urine retention	3	2	
	Wound infection	1	0	
	Scrotal hematoma	1	1	
	Groin pain	13	14	
Post-op hospital stays (days); Mean ± SD		1.08±0.22	1.07±0.22	0.644
Return to work (days); Mean ± SD		17.33±3.03	19.03±3.83	0.940

The operative time was significantly shorter in group 2 patients (45.35±7.23 min), whereas it was 78.42±8.62 min in group A. In both groups, there were no intraoperative complications.

Table 3: Comparison of post-operative pain in both groups

Groups	Post-operative pain		
	12 hours	24 hours	7 days
Group 1; Mean ± SD	6.24±1.52	4.86±1.64	1.86±1.08
Group 2; Mean ± SD	6.36±1.06	4.56±1.26	1.59±0.81
P value	0.020	0.650	0.902

Group 2 patients had significantly lower postoperative pain scores measured by the visual analogue scale at 12 hours postoperatively, but there was no statistically significant difference in pain at 24 hours or 7 days postoperatively. In terms of

postoperative complications, postoperative hospital stays, return to normal daily activities, and chronic groin pain, there was no statistically significant difference between the two groups.

Discussion

An inguinal hernia is an out-pouching of the peritoneum, with or without its contents, that occurs at the level of the inguinal canal in the groin through the muscles of the anterior abdominal wall. [15] Because of the inherent weakness of the abdominal wall where the spermatic cord passes through the inguinal canal, it almost always affects men. A lump in the groin can result from a portion of bowel becoming caught in the peritoneal pouch. The hernia can extend into the scrotum, causing pain and discomfort. Primary hernias are distinct from recurrent hernias in that they occur for the first time. [16] The problem can occur in one groin (unilateral hernia) or both groin at the same time (bilateral hernia), and it can come recur after surgical treatment (recurrent hernia). The hernia sac bulges directly through the posterior wall of the inguinal canal (direct hernia) or passes through the internal inguinal ring alongside the spermatic cord as well as follows the course of the inguinal canal (indirect hernia) (indirect hernia). [17]

Inguinal hernia is the most common surgical abdominal entity in adults. [18] In the past decade Lichtenstein repair has become the gold standard for treatment of inguinal hernias mainly due to the reduction in recurrences noted and due to the reproducibility of the procedure. [19] It is used as a gold standard surgery for all types and sizes of bilateral inguinal hernia with very few exceptions but with two separate inguinal incisions. Several other complications of mesh repair include hematoma, seroma, ischemic orchitis, testicular atrophy, mesh infection and sinus formation. [20] Young patients especially those undergoing mesh repair for Indirect Hernias are affected mostly with a risk of infertility in future. [21]

Majority of the patients were males. Other preoperative variables-age, BMI, comorbidities, and smoking-did not show a statistically significant difference between the two groups. The operative time was significantly shorter in group 2 patients (45.35 ± 7.23 min), whereas it was 78.42 ± 8.62 min in group A. In both groups, there were no intraoperative complications. Group 2 patients had significantly lower postoperative pain scores measured by the visual analogue scale at 12 hours postoperatively, but there was no statistically significant difference in pain at 24 hours or 7 days postoperatively. Malazgirt et al studied 45 patients with bilateral inguinal hernias-22 patients underwent Stoppa procedures and 23 patients underwent bilateral Lichtenstein procedures-and found that Stoppa procedures took significantly less time than bilateral Lichtenstein procedures.²² Stoppa repair was done under spinal anaesthesia, and Lichtenstein repair was done under spinal or local anaesthesia. In terms of postoperative complications, postoperative hospital stays, return to

normal daily activities, and chronic groin pain, there was no statistically significant difference between the two groups which was consistent with Malazgirt et al findings. [22] For bilateral Lichtenstein repair, Maciel et al found a mean postoperative hospital stay of 1.55 ± 0.83 days (most of their patients were admitted for 1 day). [23] For bilateral Lichtenstein repair, Miller et al reported a mean hospital stay of 6.4 days, and Serpell et al reported a hospital stay ranging from 2 to 12 days. [24,25] In these two investigations, we were unable to provide an adequate reason for the relatively protracted postoperative hospital stay following bilateral Lichtenstein repair. The length of stay in the hospital after bilateral Lichtenstein surgery was similar to that reported in the literature. [26] During their study in 2003, Fernandez-Lobato et al. found that the average postoperative hospital stay following Stoppa repair was 1.2 days; this result was also similar to the present study. [27] Li et al carried out a meta-analysis. The results of 2860 patients enrolled in 10 randomized-controlled trials and two comparative studies for comparison between preperitoneal and Lichtenstein repair for unilateral inguinal hernia were pooled in this meta-analysis, which found no significant difference in postoperative complications between the 2 groups. [28] Hence a search for ideal hernia repair is still underway and Stoppa procedure through pfannensteil incision might be the procedure satisfying the criteria for an ideal bilateral hernia repair as it is tension free. Also it requires only single incision for the repair of bilateral inguinal hernia so patient satisfaction is achieved too.

Conclusion

The present study was unable to show that either technique was superior in the treatment of bilateral inguinal hernias. Both procedures, on the other hand, were capable of achieving favourable post-operative outcomes and had similar problems. The majority of the patients were receptive to both approaches. The time it took for all groups to return to normal activity and work without pain was longer, most likely because the hernia procedures were bilateral.

References

1. Hammoud M, Gerken J: Inguinal Hernia. StatPearls , Treasure Island, FL; 2024.
2. Melwani R, Malik SJ, Arijia D, Sial I, Bajaj AK, Anwar A, Hashmi AA. Body mass index and inguinal hernia: An observational study focusing on the association of inguinal hernia with body mass index. Cureus. 2020 Nov 10; 12(11).
3. International guidelines for groin hernia management. Hernia. 2018, 22:1-165.
4. Kulacoglu H. Current options in inguinal hernia repair in adult patients. Hippokratia. 2011 Jul;15(3):223.

5. Extensive Changes for Reporting Anterior Abdominal Hernia Repair. (2023).
6. Muysoms FE, Miserez M, Berrevoet F, Campanelli G, Champault GG, Chelala E, Dietz UA, Eker HH, El Nakadi I, Hauters P, Hidalgo Pascual M. Classification of primary and incisional abdominal wall hernias. *hernia*. 2009 Aug;13:407-14.
7. Hassler KR, Saxena P, Baltazar-Ford KS. Open inguinal hernia repair.
8. Bax T, Sheppard BC, Crass RA. Surgical options in the management of groin hernias. *American family physician*. 1999 Jan 1;59 (1): 143-56.
9. Medtronic: Inguinal Hernia Surgery Procedure. (2024).
10. Zollinger R, Ellison E. Repair of Inguinal Hernia with Mesh (Lichtenstein). In: Zollinger's Atlas of Surgical Operations, 9th Edition. The McGraw Hill Companies Inc. 2010;458.
11. Stoppa RE, Rives JL, Warlaumont CR, Palot JP, Verhaeghe PJ, Delattre JF. The use of Dacron in the repair of hernias of the groin. *Surgical Clinics of North America*. 1984 Apr 1;64(2):269-85.
12. Wantz GE. Giant prosthetic reinforcement of the visceral sac. *Surgery, gynecology & obstetrics*. 1989 Nov 1;169(5):408-17.
13. Stoppa RE, Warlaumont CR, Verhaeghe PJ, Romero ER. Prosthetic repair in the treatment of groin hernias. *International surgery*. 1986 Jul 1;71(3):154-8.
14. Lerut J, Luder PJ. Giant prosthetic reinforcement of the visceral sac in inguinal hernia repair: the Stoppa operation.
15. Tuma F, Lopez RA, Varacallo M. Anatomy, abdomen and pelvis, inguinal region (inguinal canal).
16. Purkayastha MS, Chow MA, Athanasiou MT, Tekkis PP, Darzi A. Inguinal hernia. *BMJ clinical evidence*. 2008;2008.
17. Jenkins JT, O'dwyer PJ. Inguinal hernias. *Bmj*. 2008 Jan 31;336(7638):269-72.
18. Abbas Z, Bhat SK, Koul M, Bhat R. Desarda's no mesh repair versus lichtenstein's open mesh repair of inguinal hernia: a comparative study. *Journal of Evolution of Medical and Dental Sciences*. 2015 Sep 24;4(77):13279-86.
19. Nordin P, Bartelmess P, Jansson C, Svensson C, Edlund G. Randomized trial of Lichtenstein versus Shouldice hernia repair in general surgical practice.
20. Bay-Nielsen M, Nordin P, Nilsson E, Kehlet H. Operative findings in recurrent hernia after a Lichtenstein procedure. *The American journal of surgery*. 2001 Aug 1;182(2):134-6.
21. Szopinski J, Dabrowiecki S, Pierscinski S, Jackowski M, Jaworski M, Szuflet Z. Desarda versus Lichtenstein technique for primary inguinal hernia treatment: 3-year results of a randomized clinical trial. *World journal of surgery*. 2012 May;36:984-92.
22. Malazgirt Z, Ozkan K, Dervisoglu A, Kaya E. Comparison of Stoppa and Lichtenstein techniques in the repair of bilateral inguinal hernias. *Hernia*. 2000 Dec;4:264-7.
23. Maciel GS, Simões RL, Do Carmo FP, Garcia JW, Paulo DN. Results of the simultaneous bilateral inguinal hernia repair by the Lichtenstein technique. *Rev Col Bras Cir*. 2013;40(5):370-3.
24. Serpell JW, Johnson CD, Jarrett PE. A prospective study of bilateral inguinal hernia repair. *Annals of the Royal College of Surgeons of England*. 1990 Sep;72(5):299.
25. Miller AR, Van Heerden JA, Naessens JM, O'Brien PC. Simultaneous bilateral hernia repair. A case against conventional wisdom. *Annals of surgery*. 1991 Mar;213(3):272.
26. Feliu X, Clavería R, Besora P, Camps J, Fernández-Sallent E, Viñas X, Abad JM. Bilateral inguinal hernia repair: laparoscopic or open approach?. *Hernia*. 2011 Feb;15:15-8.
27. Fernández-Lobato R, Tartas-Ruiz A, Jiménez-Miramón FJ, Marín-Lucas FJ, de Adana-Belbel JC, Esteban ML. Stoppa procedure in bilateral inguinal hernia. *Hernia*. 2006 Apr; 10 :179-83.
28. Li J, Ji Z, Cheng T. Comparison of open preperitoneal and Lichtenstein repair for inguinal hernia repair: a meta-analysis of randomized controlled trials. *The American journal of surgery*. 2012 Nov 1;204(5):769-78.