

Determining the Outcomes of Laparoscopic Inguinal Hernia Repair versus Open Incisional Inguinal Hernia Repair Surgeries**Shashank Gaurav¹, Harneet Kaur Khurana², P.K. Sachan³**¹Senior Resident, Department of General Surgery, Himalayan Institute of Medical Sciences, Dehradun, India²Senior Resident, Department of General Surgery, Himalayan Institute of Medical Sciences, Dehradun, India³Professor, Department of General Surgery, Himalayan Institute of Medical Sciences, Dehradun, India

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Corresponding author: Dr. Harneet Kaur Khurana

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Abstract**Aim:** The present study evaluates and compare the outcome of laparoscopic inguinal hernia repair and open incisional inguinal hernia repair surgery.**Methods:** The present study was conducted in the Department of General Surgery, Himalayan Institute of Medical Sciences, Dehradun, India for 7 months. A total of 200 patients with uncomplicated inguinal small or medium sized, direct or indirect, unilateral or bilateral hernias undergoing elective inguinal hernia surgery, who are fit for laparoscopy and open surgery were included in the study. The study consisted of 200 patients, of which 100 were in the open surgery group and 100 were in the laparoscopic group.**Results:** The open surgery group consisted of patients with a mean age of 45.18±14.32 years, including 82 men and 18 females. The laparoscopic cohort included individuals with a mean age of 46.52±16.34 years, consisting of 85 men and 15 females. Out of the total instances seen, 80 individuals were diagnosed with unilateral hernia. Among these cases, 55 individuals exhibited right laterality, whereas 25 individuals had left laterality in the open surgery group. Bilateral representation was seen in 14 instances. In the open surgery group, there were a total of 200 cases, with 50 classified as direct type, 108 as indirect type, and 42 as direct/indirect type. There was no observed statistical link between age, gender, laterality, type, and the surgical method used. The Visual Analog Scale (VAS) scores for the laparoscopic group consistently exhibited lower values compared to the open group at corresponding time intervals, and this disparity was shown to have statistical significance. Following the procedure, there was a decreased need for post-operative analgesics with the laparoscopic approach, with just two patients need analgesic medication. The occurrence of seroma, particularly in laparoscopic procedures, was often seen as a post-operative complication.**Conclusion:** Laparoscopic hernia repair is considered to be a safe surgical procedure that results in reduced postoperative morbidity when performed by skilled surgeons, in comparison to open hernia repair.**Keywords:** Inguinal hernia repair, Laparoscopic hernioplasty, Open hernioplasty.

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Introduction

The most prevalent kind of abdominal wall hernia is the inguinal hernia. The primary therapeutic approach for inguinal hernias is surgical intervention. The surgical approaches used for the treatment of inguinal hernias include standard main open repair, open tension-free repair using mesh, and laparoscopic repair incorporating mesh. While there have been notable advancements in managing postoperative pain, reducing hospital stays, and enhancing overall surgical results, the primary focus for both patients and surgeons remains the avoidance of recurrence. The reported recurrence rates range from 1.1% to 33%, and these rates are influenced by several factors such as the specific

method used and the characteristics of the mesh utilized for the initial hernia repair. [1-5] The recurrent hernia still represents a major challenge to general surgeons performing hernia surgery because of the difficult access due to adhesions and the mesh used in the primary operation.

The occurrence of inguinal hernia is widespread worldwide, making it a frequently encountered surgical disease. The repair of inguinal hernias has seen significant advancements in recent decades, and ongoing research continues to explore this area further. [5] While laparoscopy has been widely accepted in contemporary surgical practice, the

dispute between laparoscopic and open hernia mesh repair remains a topic of discussion. Multiple studies have shown the advantages of laparoscopic hernioplasty, including reduced postoperative pain and morbidity, decreased incidence of wound complications, and earlier return to normal activity and job. However, the procedure did have several drawbacks, including extended surgical time, a steeper learning curve, and a greater incidence of recurrence and complications. [6-10] There are two procedures available for doing laparoscopic hernioplasty: transabdominal preperitoneal (TAPP) and completely extraperitoneal (TEP) mesh repair. The Transabdominal Preperitoneal (TAPP) procedure entails accessing the abdominal cavity to directly see the hernia sac and its contents, and afterwards positioning the mesh in the preperitoneal space. [11] In contrast, Lichtenstein's open mesh repair is widely regarded as the most reliable and effective procedure among all open surgical approaches. [12]

Various hernia repair procedures exploded from the early to mid-twentieth century, with prosthetic mesh replacing tissue-based repairs. Ger documented the first laparoscopic hernia repair attempt in 1982. [13,14] Our understanding of the nature and treatment of hernias has evolved since then, with multiple treatment options currently available at the dispense of clinicians. There are many types of hernias, but most of them occur in the abdomen or groin. Direct inguinal, indirect inguinal, and femoral hernias are the three forms of groin hernias based on their placement relative to the inguinal (Hesselbach) triangle. A groin hernia is characterized by a protrusion in the groin that grows larger over time. An inguinal hernia affects 27% of men and 3% of women over the course of their lives, and the risk increases with age. Most people who have groin hernias experience discomfort or a general feeling of unease but up to a third are asymptomatic. Globally, more than 20 million inguinal hernia repairs are performed each year. [15,16]

Both laparoscopic and open surgical procedures include their own set of perks and disadvantages. The assessment of treatment techniques is crucial due to the influence of several patient and surgeon variables on the result.

Hence, the primary objective of this research was to meticulously assess and juxtapose the results pertaining to the length of the surgical procedure, level of post-operative discomfort, need for post-operative analgesics, and occurrence of post-operative complications in patients undergoing laparoscopic inguinal hernia repair vs those undergoing open incisional inguinal hernia repair surgery.

Methods

The present study was conducted in the Department of General Surgery, Himalayan Institute of Medical Sciences, Dehradun, India for 7 months. A total of 200 patients with uncomplicated inguinal small or medium sized, direct or indirect, unilateral or bilateral hernias undergoing elective inguinal hernia surgery, who are fit for laparoscopy and open surgery were included in the study. The study consisted of 200 patients, of which 100 were in the open surgery group and 100 were in the laparoscopic group.

Patients with complicated hernia (irreducible, obstructed, strangulated), those with large size sac, recurrent hernia were excluded. Also excluded were those unfit for general anesthesia, laparoscopy or pneumoperitoneum i.e. those with cardiac diseases (MI, IHD), respiratory diseases (chronic asthma, COPD), renal or hepatic diseases, bleeding disorders etc were excluded from the study.

All patients were clinically evaluated and underwent routine investigations for fitness. Even elderly patients with American Urological Association (AUA) Score for prostate of more than 6 also underwent evaluation for prostate by digital rectal examination, ultrasonography, and cystourethroscopy.

Group A were operated with open tension free hernioplasty.

Group B operated by laparoscopic repair using mesh.

Patients were admitted one day prior to surgery. They were operated as per allotted group and relevant operative findings were noted. The antibiotic protocol was perioperative antibiotics only, consisting of three intravenous doses of inj. ceftriaxone 1 gm. In patients with the drain, antibiotic was continued till the drain was removed.

All open procedures were conducted under local/epidural/spinal/general anaesthesia, while all laparoscopic procedures were performed under general anaesthesia. In addition, the post-operative outcomes of pain using the visual analogue scale (VAS) immediately, 6 hours, 12 hours, and 24 hours, analgesic requirement, and presence or absence of post-operative complications were recorded.

Sutures were removed between 7-10 days. The wounds were checked and graded accordingly. Patients were evaluated on 1st week, 2nd week, 1 month, 2 month, 3 month and presence of any cough impulse, swelling, and signs of recurrence. Patients where recurrence was suspected both immediate and early were kept under close supervision, if found they were operated by standard open repair. The scars were checked at each visit and the subjective and objective cosmetic

results of scar accessed. Required surgical variables and clinical outcomes were noted and compared between the two groups during and after surgeries.

The operative data and post-operative outcomes of all patients were recorded and statistically analyzed

by statistical package for the social sciences (SPSS) software. Descriptive statistics were calculated, and outcomes were compared using student's t-test. A p value ≤ 0.05 was considered significant.

Results

Table 1: Comparison of patient characteristics

Patient characteristics	Open N (%)	Laparoscopic N (%)	P value
Age	45.18±14.32	46.52±16.34	0.822
Gender			
Male	82 (82)	85 (85)	0.618
Female	18 (18)	15 (15)	
Laterality			
Right	55 (55)	54 (54)	0.854
Left	25 (25)	32 (32)	
Bilateral	20 (20)	14 (14)	
Types			
Direct	25 (25)	30 (30)	0.750
Indirect	54 (54)	52 (52)	
Direct/Indirect	21 (21)	18 (18)	

The open surgery group had patients with a mean age of 45.18±14.32 years, with 82 males and 18 females. The laparoscopic group consisted of patients with a mean age of 46.52±16.34 years with 85 males and 15 females. 80 of the cases presented with unilateral hernia, of which 55 showed right laterality and 25 displayed left laterality in open

surgery group. In 14 cases, bilateral representation was noted. 25 cases were of direct type, 54 of indirect type, and 21 of direct/indirect type in open surgery group. No statistical correlation was noted with the age, gender, laterality, type and surgical procedure employed.

Table 2: Postoperative pain score (VAS) among the study groups

Time	Open	Laparoscopic	P value
0 minutes	2.42±1.88	1.60±1.10	0.000
6 minutes	5.28±2.16	2.45±0.98	0.000
12 minutes	6.16±1.80	3.34±1.50	0.000
24 minutes	6.36±2.90	3.58±1.60	0.000
Duration of procedure (mins)	56.46±9.56	68.64±13.47	<0.0001
Post-op analgesic requirement N (%)			
Yes	25 (25)	5 (5)	0.045
No	75 (75)	95 (95)	
Post-op complications N (%)			
Seroma	3 (3)	15 (15)	0.02
Hematoma	7 (7)	5 (5)	0.220

The VAS score values of laparoscopic were always lower than that of open group at the same hour and this difference was shown to be statistically significant. Subsequently, the post-operative analgesic requirement was less in the laparoscopic method with only 2 patients requiring analgesic. Seroma was the most commonly noted post-operative complication, especially in laparoscopic cases.

Discussion

Over the last decade, there has been a global recognition of laparoscopic repair as a viable method for treating inguinal hernias. At our facility, the primary method for surgical treatment of inguinal hernia is now laparoscopic surgery. This surgical technique is used in cases of uni- or bilateral inguinal hernia recurrence subsequent to open surgery. Open repair is a surgical technique

used in cases of unilateral inguinal hernia recurrence after transabdominal preperitoneal (TAPP) repairs, as well as some cases of totally extraperitoneal (TEP) repairs. It is also utilized in situations when there has been a prior lower midline incision, an irreducible hernia, or the patient is unable to undergo general anesthesia.

The group of patients who had open surgery had a mean age of 45.18±14.32 years, consisting of 82 men and 18 females. The laparoscopic cohort included individuals with an average age of 46.52±16.34 years, consisting of 85 men and 15 females. In the open surgery group, a total of 80 patients were seen, all of whom presented with unilateral hernia. Among these instances, 55 exhibited right laterality whereas 25 indicated left laterality. Bilateral representation was seen in 14 instances. In the open surgery group, there were 25

instances classified as direct type, 54 cases classified as indirect type, and 21 cases classified as direct/indirect type. There was no observed statistical link between age, gender, laterality, type, and the surgical method used. The Visual Analog Scale (VAS) scores for the laparoscopic group consistently exhibited lower values compared to the open group at corresponding time intervals, and this disparity was shown to be statistically significant. Multiple prospective randomized trials have demonstrated the superiority of laparoscopic hernia repair over open repair. This is evidenced by reduced postoperative pain, a shorter recovery period, and earlier return to work. Additionally, laparoscopic repair offers improved cosmetic outcomes, cost effectiveness, and accessibility for various potential hernia defects. [17-19] However, the primary focus of attention is in the prevention of future occurrences. The reported recurrence rates range from 1.1% to 33%, and these rates are influenced by several factors such as the specific method used and the kind and amount of mesh utilized for the repair of the first inguinal hernia. [20-24]

Although not a novel topic for general surgeons, inguinal herniorrhaphy is still evolving. Many issues surrounding surgery for inguinal hernias remain unresolved, including the indications for correction and surgical approach, risk of complications, and even the disease's aetiology. This study established that laparoscopic herniorrhaphy is superior to the open incision method in post-operative pain. The post-operative pain and subsequent need for analgesics were significantly lesser with the laparoscopic method. However, the duration of surgery and post-operative complication of seroma was significantly higher with laparoscopic surgery. Pain is one of the most prevalent long- and short-term side effects of inguinal hernia repair. This is especially concerning because many patients arriving for hernia treatment have little or no pain from their hernia at the outset. [25] The postoperative hospital stay in both laparoscopic and open group was shown to be almost equal in our study. Whereas most of the studies in literature like that of Colak et al have reported a shorter hospital stay in laparoscopic group. [26] This may be due to the fact that we do not tend to discharge those patients of TEP in which drain was kept, till the drain is out. This is in contrast to most of the studies they send the patients home with drain which is removed later during follow up. A randomized multicenter trial compared 2164 patients compared the Lichtenstein open procedure and the laparoscopic procedure, primarily to analyze the recurrence outcomes. They also assessed pain and complications post-surgery. The study observed that patients who underwent open-incisional repair had significantly higher pain levels during the two-week post-operative period at

rest, work, during exercise, and performing normal activities compared to the laparoscopic group assessment period. The laparoscopic intervention cluster also had less on the day of surgery and resumed daily activities one day prior. They also note that 9% of laparoscopic patients experienced seroma or hematoma compared to 3% of open surgery patients. Similar outcomes were observed in the present study also. [27]

The VAS scores of the laparoscopic group consistently exhibited lower values compared to the open group during the same time interval, and this disparity was shown to have statistical significance. Following the surgical procedure, the laparoscopic approach demonstrated a reduced need for post-operative analgesics, as just two individuals needed such medication. The occurrence of seroma, particularly in laparoscopic procedures, was often seen as a post-operative complication.

Conclusion

Laparoscopic hernia repair is considered a safe procedure that results in reduced postoperative complications when performed by experienced surgeons. It offers several advantages over open repair, including a quicker return to daily activities and work, improved cosmetic outcomes based on subjective and objective assessments. However, it is important to note that laparoscopic repair may require longer operative times, the potential need for drainage, and a higher risk of hernia recurrence. The laparoscopic method is indicated for the treatment of bilateral and recurring inguinal hernias. Given the wide range of surgical procedures that are now accessible, the process of selecting the most suitable kind of repair may pose a significant challenge. Multiple criteria contribute to the determination of the optimal surgical method for a patient diagnosed with an inguinal hernia.

References

1. Schaap HM, Van de Pavoordt HD, Bast TJ. The preperitoneal approach in the repair of recurrent inguinal hernias. *Surgery, gynecology & obstetrics*. 1992 Jun 1;174(6):460-4.
2. Bittner R, Sauerland S, Schmedt CG. Comparison of endoscopic techniques vs Shouldice and other open nonmesh techniques for inguinal hernia repair: a meta-analysis of randomized controlled trials. *Surgical Endoscopy And Other Interventional Techniques*. 2005 May;19:605-15.
3. Aufenacker TJ, de Lange DH, Burg MD, Kuiken BW, Hensen EF, Schoots IG, Gouma DJ, Simons MP. Hernia surgery changes in the Amsterdam region 1994–2001: decrease in operations for recurrent hernia. *Hernia*. 2005 Mar;9:46-50.

4. Bay-Nielsen M, Kehlet H, Strand L, Malmstrøm J, Andersen FH, Wara P, Juul P, Callesen T. Quality assessment of 26 304 herniorrhaphies in Denmark: a prospective nationwide study. *The Lancet*. 2001 Oct 6;358 (9288):1124-8.
5. Bisgaard T, Bay-Nielsen M, Kehlet H. Recurrence after operation for recurrent inguinal hernia. A nationwide 8-year follow-up study on the role of type of repair. *Annals of surgery*. 2008 Apr 1;247(4):707-11.
6. Bhandarkar DS, Shankar M, Udvardia TE. Laparoscopic surgery for inguinal hernia: Current status and controversies. *J Minim Access Surg*. 2006;2(3):178-86.
7. Hamza Y, Gabr E, Hammadi H, Khalil R. Four-arm randomized trial comparing laparoscopic and open hernia repairs. *Int J Surg*. 2010;8(1):25-8.
8. Sudarshan PB, Sundaravadanan BS, Kaarthik VP, Pabu Shankar S. Laparoscopic versus open mesh repair of unilateral inguinal hernia: a comparative study. *Int Surg J*. 2017; 4:921-5.
9. Rathod CM, Karvande R, Jena J, Ahire MD. A comparative study between laparoscopic inguinal hernia repair and open inguinal hernia repair. *Int Surg J*. 2016; 3:18 61-7.
10. V Singh, U De. Laparoscopic Mesh versus Open Mesh Repair of Inguinal Hernia. An Experience from West Bengal, India. *Int Surg J*. 2008;20(1).
11. McCormack K, Scott NW, Go PM, Ross S, Grant AM; EU Hernia Trialists Collaboration. Laparoscopic techniques versus open techniques for inguinal hernia repair. *Cochrane Database Syst Rev*. 2003;(1): CD00 1785.
12. Hetzer FH, Hotz T, Steinke W, Schlumpf R, Decurtins M, Largiader F. Gold standard for inguinal hernia repair: Shouldice or Lichtenstein? *Hernia*. 1999;3(3) :117-20.
13. Kumar P, Hussain Z, Hela AH, Goel R. To Study the Outcome of Inguinal Hernia Repair with Sutureless Self-Gripping Mesh in Terms of Postoperative Pain, Complications and Recurrence. *JK Science*. 2020;22(1):32-5.
14. Matthews RD, Neumayer L. Inguinal hernia in the 21st century: an evidence-based review. *Curr Probl Surg*. 2008; 45:261-312.
15. Shakil A, Aparicio K, Barta E, Munez K. Inguinal Hernias: Diagnosis and Management. *Am Fam Physician*. 2020;102(8):487-92.
16. Huerta S, Timmerman C, Argo M. Open, Laparoscopic, and Robotic Inguinal Hernia Repair: Outcomes and Predictors of Complications. *J Surg Res*. 2019; 241:119-27.
17. Barrat C, Surlin V, Bordea A, Champault G. Management of recurrent inguinal hernias: a prospective study of 163 cases. *Hernia*. 2003 Sep;7(3):125-9.
18. Heikkinen TJ, Haukipuro K, Koivukangas P, Hulkko A. A prospective randomized outcome and cost comparison of totally extraperitoneal endoscopic hernioplasty versus Lichtenstein hernia operation among employed patients. *Surgical laparoscopy & endoscopy*. 1998 Oct 1;8(5):338-44.
19. Sayad P, Ferzli G. Laparoscopic preperitoneal repair of recurrent inguinal hernias. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 1999 Apr;9(2):127-30.
20. Schaap HM, Van de Pavoordt HD, Bast TJ. The preperitoneal approach in the repair of recurrent inguinal hernias. *Surgery, gynecology & obstetrics*. 1992 Jun 1;174(6): 460-4.
21. Bittner R, Sauerland S, Schmedt CG. Comparison of endoscopic techniques vs Shouldice and other open nonmesh techniques for inguinal hernia repair: a meta-analysis of randomized controlled trials. *Surgical Endoscopy And Other Interventional Techniques*. 2005 May;19(5):605-15.
22. Aufenacker TJ, de Lange DH, Burg MD, Kuiken BW, Hensen EF, Schoots IG, Gouma DJ, Simons MP. Hernia surgery changes in the Amsterdam region 1994–2001: decrease in operations for recurrent hernia. *Hernia*. 2005 Mar;9(1):46-50.
23. Bay-Nielsen M, Kehlet H, Strand L, Malmstrøm J, Andersen FH, Wara P, Juul P, Callesen T, Danish Hernia Database Collaboration. Quality assessment of 26 304 herniorrhaphies in Denmark: a prospective nationwide study. *The Lancet*. 2001 Oct 6; 358 (9288):1124-8.
24. Bisgaard T, Bay-Nielsen M, Kehlet H. Recurrence after operation for recurrent inguinal hernia. A nationwide 8-year follow-up study on the role of type of repair. *Annals of surgery*. 2008 Apr 1;247(4):707-11.
25. Matthews RD, Neumayer L. Inguinal hernia in the 21st century: an evidence-based review. *Current problems in surgery*. 2008 Apr;45(4): 261-312.
26. Colak T, Akca T, Kanik A, Aydin S. Randomized clinical trial comparing laparoscopic totally extra peritoneal approach with open mesh repair in inguinal hernia. *Surg Laparosc Endosc Percut Tech*. 2003;13(3):191-5.
27. Neumayer L, Giobbie-Hurder A, Jonasson O. Open mesh versus laparoscopic mesh repair of inguinal hernia. *N Engl J Med*. 2004;350 (18) :1819-27.