Bangladesh Med J. 2025 May; 54(2)
DOI: https://doi.org/10.3329/bmj.v54i2.89551

Original Article

Clinical Outcomes of Lichtenstein Repair for Adult Inguinal Hernia: A Decade of Experience in a Tertiary Care Hospital of Bangladesh

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Abstract

The introduction of tension-free mesh repair, particularly the Lichtenstein technique, has markedly improved surgical outcomes by reducing recurrence rates and postoperative morbidity. Despite its widespread adoption, evaluation of clinical outcomes and complication profiles remains essential, especially in resource-limited settings. To assess the feasibility, safety, and clinical outcomes of open tension-free mesh repair using the Lichtenstein technique in adult patients with inguinal hernia, this prospective observational study was conducted at Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh, over ten years from January 2009 to December 2018. A total of 897 adult patients with primary inguinal hernia underwent open Lichtenstein tension-free mesh repair using polypropylene mesh. Patients with recurrent, obstructed, or strangulated hernias and those unfit for surgery were excluded. The evaluation before surgery involved a clinical assessment and routine investigations. Surgeries were performed under spinal or local anaesthesia following a standardized technique. The main outcome measures included early postoperative complications like seroma, hematoma, wound infections, and testicular swelling, as well as late issues such as chronic groin pain and recurrence. Patients were evaluated at 6 weeks and 6 months post-surgery, with additional follow-up performed as needed. The data were analyzed using Microsoft Excel. Descriptive statistics were expressed as frequencies and percentages. Results were presented using tables and graphs where appropriate. Results: Among the 897 patients maximum (87.6%) of them were male, and male to female ratio was about 7:1, with a avarage age of 47 years, and the age range was 18 to 85 years. Indirect inguinal hernia was the most common type, observed in 63.2% patients, followed by direct hernia in 35.1% and pantaloon hernia in 1.7% cases. The majority (53.1%) of hernias were on the right side, while over one-third (38.1%) were found on the left side, and bilateral hernias constituted 8.8%. The average duration of the surgical procedure was 75.4 minutes, with a variation between 39 and 138 minutes, and there was no perioperative mortality. Early postoperative complications were infrequent. Seroma was noted in 1.78% patients, haematoma in 3.68%, testicular swelling in 5.24%, and wound infection in 0.78% patients. All complications were treated conservatively, and none necessitated the removal of the mesh. During the follow-up, late issues such as chronic groin pain (neuralgia) were reported in 4.35% patients, and hernia recurrence was found in 0.78% patients. There were no identified cases of mesh rejection or chronic discharging sinus. Open tension-free mesh repair using the Lichtenstein technique is a safe, effective, and reliable method for the management of primary inguinal hernia. It is related with low rates of postoperative complications, minimal chronic pain, and a very low recurrence rate. Given its simplicity and cost-effectiveness, this technique remains highly appropriate for routine use.

Kyword: *Inguinal hernia, lichtenstein repair, tension-free mesh repair, polypropylene mesh, hernia, recurrence, groin pain*

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INTRODUCTION

An inguinal hernia is defined as a protrusion of intra-abdominal contents through a weakness or defect in

the abdominal wall, most commonly occurring in the inguinal region. It is one of the most frequently encountered surgical conditions worldwide, with a significant lifetime risk, particularly among males, and continues to represent a major component of general surgical workload.[13, 14]

The development of an inguinal hernia is multifactorial, involving both mechanical and biological factors. Alterations in collagen metabolism—especially an imbalance between type I and type III collagen have been implicated in weakening of the transversalis fascia, predisposing individuals to hernia formation.[3, 4, 15] In addition, several risk factors such as advancing age, chronic cough, constipation, smoking, and increased intra-abdominal pressure contribute to its pathogenesis and recurrence.[16]

Historically, tissue-based repairs such as Bassini's and Shouldice techniques were widely practiced; however, these methods were associated with significant tissue tension and higher recurrence rates.[3] The introduction of prosthetic mesh marked a major advancement in hernia surgery by enabling tension-free repair, thereby significantly reducing recurrence rates and improving postoperative outcomes.[5-7, 17] The Lichtenstein tension-free mesh repair, first described in 1989, has since become the most widely accepted open surgical technique due to its simplicity, reproducibility, and consistently low recurrence rates.[8]

Over time, refinements in surgical techniques and prosthetic materials have further enhanced patient outcomes. Modern meshes are designed to improve biocompatibility and reduce complications such as chronic postoperative pain, which has emerged as an important determinant of long-term patient satisfaction.[19, 20] Despite these advancements, chronic groin pain and mesh-related complications remain clinically relevant concerns requiring careful evaluation.

Current international guidelines, including those from the European Hernia Society and HerniaSurge Group, strongly recommend mesh-based repair techniques as the standard of care for adult inguinal hernia due to their superiority over non-mesh repairs in minimizing recurrence and improving overall outcomes.[18, 21] However, the choice of surgical approach must consider patient-specific factors, surgeon expertise, and resource availability, particularly in resource-limited settings.

Given this background, the present study was undertaken to evaluate the feasibility, safety, and clinical outcomes of open tension-free mesh repair using the Lichtenstein technique in a large cohort of adult patients, with particular emphasis on postoperative complications and recurrence rates in a tertiary care hospital setting.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of Surgery at Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh, over ten years from January 2009 to December 2018. The study included adult patients diagnosed with inguinal hernia who underwent open tension-free mesh repair using the Lichtenstein technique.

Ethical Considerations

The study protocol was reviewed and approved by the Institutional Ethics Committee of Shaheed Suhrawardy Medical College Hospital. Written informed consent was obtained from all participants before inclusion in the study. Confidentiality of patient information was strictly maintained throughout the study in accordance with ethical standards.

Study Population and Selection Criteria: A total of 897 patients were enrolled consecutively during the study period. Patients with primary inguinal hernia, including indirect, direct, and pantaloon types, were included irrespective of age and sex. Both unilateral and bilateral hernias were considered. Patients with complicated hernias (e.g., obstructed or strangulated), recurrent inguinal hernias, or those deemed unfit for surgery due to severe comorbid conditions were excluded.

Sample Size Justification: The sample size was determined by the total number of eligible patients presenting during the study period who fulfilled the inclusion criteria. As this was a single-center, prospective observational study conducted over a defined time frame, no formal sample size calculation was performed. However, the relatively large sample size (n = 897) enhances the reliability and generalizability of the study findings.

Preoperative Assessment: The diagnosis of an inguinal hernia was established based on a detailed clinical history and physical examination. Relevant laboratory investigations and pre-anaesthetic assessments were performed in all patients to determine surgical fitness. Identified predisposing factors, such as chronic cough, constipation, and urinary obstruction, were managed appropriately before surgery.

Surgical Technique: All patients underwent open inguinal hernia repair using the standardized Lichtenstein tension-free mesh technique under spinal or, in selected cases, local anaesthesia. Following standard aseptic preparation, an inguinal incision was made, and the external oblique aponeurosis was opened. The spermatic cord was mobilized, and the hernial sac was identified. In indirect hernias, the sac was dissected up to the deep inguinal ring, opened, and ligated; in large inguinoscrotal hernias, the distal sac was left in situ to prevent hydrocele formation. In direct hernias, the posterior wall defect was reinforced using non-absorbable sutures. A polypropylene mesh (approximately 3 × 5 inches) was tailored and placed over the posterior wall. It was fixed medially to the pubic tubercle and inferiorly to the inguinal ligament using continuous non-absorbable sutures. A lateral slit was made to accommodate the spermatic cord, and the mesh was secured around it. The superior margin was anchored to the conjoined tendon with interrupted sutures, ensuring adequate overlap beyond Hesselbach's triangle. Haemostasis was ensured in all cases. A closed suction drain was placed selectively. The external oblique aponeurosis and skin were closed in layers. Local anaesthetic infiltration was administered before wound closure.

Perioperative Management: All patients received prophylactic intravenous antibiotics (first-generation cephalosporin) at induction, followed by postoperative antibiotics for 48–72 hours. Standard postoperative care included analgesia, early mobilization, and routine wound care.

Outcome Measures: Primary outcome measures included postoperative complications and recurrence. Early postoperative complications were defined as seroma, haematoma, wound infection, and testicular swelling. Late complications included chronic groin pain (neuralgia) and hernia recurrence.

Follow-up: Patients were followed up at 6 weeks and 6 months postoperatively. Thereafter, follow-up was conducted on a need-based basis. Clinical evaluation focused on the detection of recurrence, chronic pain, and mesh-related complications.

Statistical analysis: Data were entered, cleaned, and analyzed using Microsoft Excel. Descriptive statistics were expressed as frequencies and percentages. Results were presented using tables and graphs where appropriate.

OPERATIONAL DEFINITIONS

Early Postoperative Complication: Complications occurring within the early postoperative period (up to 7 days after surgery), including events identified during hospital stay or shortly after discharge. In this study, immediate postoperative complications include seroma, haematoma, wound infection, and early testicular swelling, diagnosed clinically and managed conservatively or with minimal intervention.

Late Postoperative Issue: Outcomes or complications that become apparent after the immediate postoperative period, typically beyond 7 days and during follow-up (up to 6 months or later). In this study, delayed postoperative outcomes include chronic groin pain (neuralgia) and hernia recurrence, assessed during scheduled follow-up visits at 6 weeks and 6 months or thereafter as needed.

Chronic Groin Pain (Neuralgia): Pain or discomfort in the groin region persisting for more than 3 months after surgery, not attributable to other identifiable causes, and affecting daily activities to varying degrees.

Hernia Recurrence: Reappearance of a clinically detectable inguinal hernia at or near the site of previous repair after an initially successful surgical outcome, confirmed by physical examination during follow-up.

Seroma: A localized collection of serous fluid at the surgical site, presenting as a painless or mildly tender swelling, typically detected within the early postoperative period and resolving spontaneously or with aspiration if required.

Haematoma: A localized accumulation of blood at the operative site, presenting with swelling, discoloration, or discomfort, occurs in the immediate postoperative period.

Wound Infection: Infection occurring at the surgical incision site, characterized by redness, warmth, pain, discharge, or pus formation, with or without systemic signs, diagnosed clinically.

Testicular Swelling: Postoperative enlargement of the testis or scrotum, likely due to oedema, venous congestion, or inflammatory response, observed in the early postoperative period.

Early Mobilization: Encouragement of patients to resume ambulation within 24 hours after surgery, aimed at reducing postoperative complications and promoting recovery.

RESULTS

A total of 897 patients underwent open tension-free mesh repair using the Lichtenstein technique during the study period. The study population comprised a male-female ratio of about 7:1, with a mean age of 47 years and an age range of 18–85 years.

Figure 1 illustrates the distribution of patients by sex. The majority of patients were male, accounting for 786 (87.6%) cases.

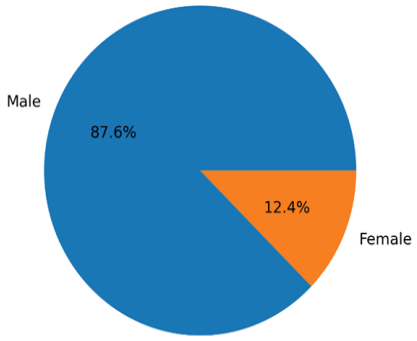

Figure 1: Distribution of patients by sex (n = 897)

Table I shows the frequency and percentage distribution of different types of inguinal hernia among the study population. Indirect inguinal hernia was the most common type, observed in 567 (63.2%) patients, followed by direct hernia in 315 (35.1%) and pantaloon hernia in 15 (1.7%) cases.

Table I: Distribution of patients by type of inguinal hernia (n = 897)

Type of Hernia	Frequency (n)	Percentage (%)
Indirect	567	63.2
Direct	315	35.1
Pantaloon	15	1.7

Figure 2, the bar diagram represents the anatomical distribution of inguinal hernia according to side. In terms of laterality, 476 (53.1%) patients had right-sided hernia, 342 (38.1%) had left-sided hernia, and 79 (8.8%) presented with bilateral hernia.

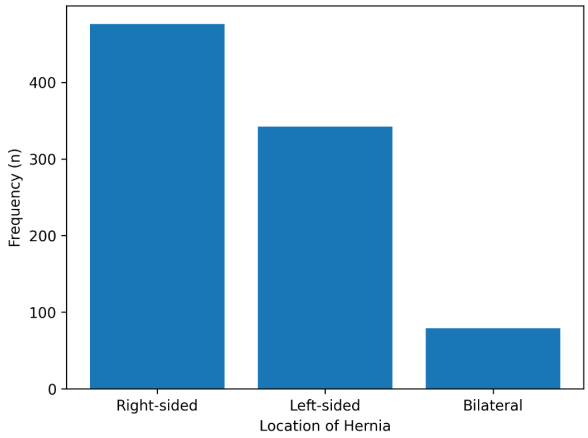

Figure 2: Distribution of hernia by laterality (n = 897)

Table II presents the frequency and percentage of early postoperative complications observed among patients undergoing open tension-free mesh repair. Testicular swelling was the most common complication, observed in 47 (5.24%) patients, followed by haematoma in 33 (3.68%) and seroma in 16 (1.78%) cases. Wound infection occurred in 7 (0.78%) patients. Early postoperative complications were generally minimal and managed conservatively.

Table II: Early postoperative complications following Lichtenstein repair (n = 897)

Complication	Frequency (n)	Percentage (%)
Seroma	16	1.78
Haematoma	33	3.68
Testicular swelling	47	5.24
Wound infection	7	0.78
Normal	794	88.52

Table III shows the frequency and percentage of late postoperative issues observed during the follow-up period. During follow-up, chronic groin pain was reported in 39 (4.35%) patients, while hernia recurrence was observed in 7 (0.78%) patients. During the follow-up period, chronic groin pain (neuralgia) was generally mild and managed with conservative measures.

Table III: Late postoperative issues following Lichtenstein repair (n = 897)

Outcome	Frequency (n)	Percentage (%)
Chronic groin pain (neuralgia)	39	4.35
Hernia recurrence	7	0.78
Normal	851	94.87

Figure 3 summarizes the operative details of surgery, mean surgical duration (75.4 minutes) and the observed range (39–138 minutes), and highlights that no perioperative mortality was observed.

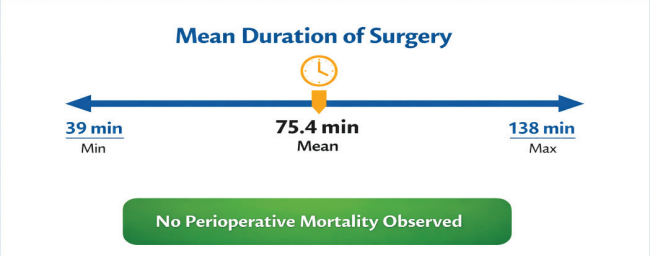

Figure 3: Operative details of surgery- mean surgical duration with range and perioperative outcomes

Figure 4 highlights the key outcomes of follow-up visits, with an additional visit after surgery. Patients were followed up at 6 weeks and 6 months, with additional visits as required. No cases of mesh rejection or chronic discharging sinus were observed during the follow-up period.

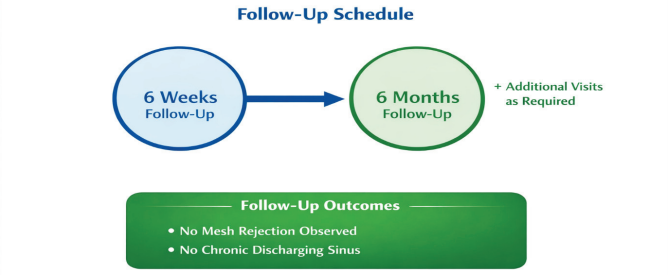

Figure 4: Follow-up schedule with additional visits as required after surgery

DISCUSSION

Inguinal hernia repair remains one of the most commonly performed general surgical procedures worldwide, with mesh-based tension-free techniques now considered the standard of care.[1, 17, 21] The present study evaluates a large single-center experience of 897 patients undergoing Lichtenstein tension-free mesh repair over ten years, demonstrating favourable outcomes in terms of low complication and recurrence rates.

The demographic profile in this study, with a predominance of male patients (87.6%) and a mean age of 47 years, is consistent with previously reported epidemiological patterns of inguinal hernia.[13, 14] The higher incidence among males has been attributed to anatomical differences and occupational factors contributing to increased intra-abdominal pressure.[16] The predominance of indirect hernia (63.2%) over direct and pantaloon types also aligns with established literature.[1]

The mean operative time in this study was 75.4 minutes, which is comparable to other reports of open Lichtenstein repair.[6, 11] The absence of perioperative mortality further supports the safety of this procedure, particularly in a high-volume setting.

Early postoperative complications observed in this study, including seroma (1.78%), haematoma (3.68%), testicular swelling (5.24%), and wound infection (0.78%), were relatively low and comparable to previously published series.[5, 6] These complications were managed conservatively in most cases, and no patient required mesh removal, highlighting the safety and tolerability of polypropylene mesh.[10]

Chronic groin pain remains an important concern following mesh repair.[20] In the study, postoperative neuralgia was observed in 4.35% of patients, which is within the lower range reported in the literature.[12, 20] The relatively low incidence may be attributed to meticulous surgical technique and careful handling of inguinal nerves. Recurrence remains a key outcome measure in hernia surgery. The recurrence rate of 0.78% observed in this study is comparable to, or even lower than, rates reported in randomized trials and meta-analyses of Lichtenstein repair, which typically range from 1% to 2%.[11, 17] This finding reinforces the effectiveness of tension-free mesh repair in preventing recurrence. Proper mesh placement with adequate overlap beyond Hesselbach's triangle likely contributed to this favourable outcome.

The findings of this study are also consistent with international guidelines, which strongly recommend mesh-based repair techniques as the gold standard for adult inguinal hernia management due to their superior outcomes compared to tissue-based repairs.[18, 21] Furthermore, advances in mesh technology and surgical techniques have contributed to improved patient outcomes, although long-term complications such as chronic pain continue to warrant attention.[19]

Limitations of the Study

However, as a single-center observational study, it may be subject to selection bias and lacks a comparative group. Additionally, the study was conducted over ten years; the follow-up duration for individual patients was relatively limited (primarily up to 6 months, with additional follow-up on a need-based basis), which may underestimate late recurrence or chronic complications. Outcomes such as chronic groin pain were assessed clinically without standardized pain scoring systems. The study did not include a detailed analysis of patient-related risk factors (e.g., comorbidities, smoking status, occupational strain).

CONCLUSION

Open tension-free mesh repair using the Lichtenstein technique is a safe, effective, and reproducible method for the management of primary inguinal hernia. It is related to low rates of postoperative complications, minimal chronic pain, and a very low recurrence rate. Given its cost-effectiveness and favourable outcomes, this technique

remains highly suitable for routine use, particularly in high-volume and resource-limited settings. Further comparative studies and long-term follow-up are recommended to evaluate outcomes related to chronic pain and quality of life.

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