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Comparative Study Between Laparoscopic Transabdominal Preperitoneal (TAPP) Repair and Open Lichtenstein Hernioplasty for Primary Inguinal Hernia: A Prospective Comparative Study

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Abstract: ***Inguinal hernia repair is one of the most frequently performed operations in general surgery (1). Although open Lichtenstein mesh hernioplasty remains the conventional standard because of its simplicity and low recurrence rate. (2, 6). laparoscopic Transabdominal Preperitoneal (TAPP) repair has become increasingly popular owing to its minimally invasive approach and faster postoperative recovery (7,8). Choosing between these techniques requires consideration of operative outcomes, postoperative pain, complications, recovery profile, and overall patient satisfaction.***

Keywords: Inguinal hernia; Transabdominal preperitoneal repair; TAPP; Lichtenstein hernioplasty; Laparoscopic hernia repair; Mesh repair; Postoperative pain; Comparative study

1. Introduction

Inguinal hernia is one of the most common conditions encountered in general surgical practice and accounts for a substantial proportion of elective surgical procedures performed worldwide (1). The condition develops because of weakness in the abdominal wall, allowing protrusion of intra-abdominal contents through the inguinal canal. If untreated, inguinal hernias may progressively enlarge and can lead to complications such as incarceration, intestinal obstruction, and strangulation, making timely surgical repair essential (1).

The lifetime risk of developing an inguinal hernia has been estimated to be approximately 27% in men and 3% in women (2). Improvements in surgical techniques over the past several decades have markedly reduced recurrence rates and postoperative morbidity. The introduction of prosthetic mesh transformed hernia surgery by enabling tension-free repair, with the Lichtenstein technique becoming the most widely accepted open procedure because of its reproducibility, simplicity, and consistently favorable long-term outcomes (6).

The development of minimally invasive surgery introduced laparoscopic techniques for groin hernia repair, primarily the Transabdominal Preperitoneal (TAPP) and Totally Extraperitoneal (TEP) approaches (7). Among these, TAPP repair provides excellent visualization of the myopectineal orifice and permits simultaneous identification of occult or bilateral hernias while facilitating placement of a large prosthetic mesh within the preperitoneal space (7, 10). These advantages have contributed to increasing acceptance of laparoscopic repair, particularly in bilateral and recurrent inguinal hernias.

Despite these advantages, laparoscopic repair requires general anaesthesia, specialized equipment, advanced surgical expertise, and a longer learning curve (8,10). Open Lichtenstein repair remains widely practiced because it is technically less demanding, economical, and can be performed under regional or spinal anaesthesia (6). Consequently, both procedures continue to play important roles in contemporary surgical practice.

Although numerous studies have compared laparoscopic and open mesh repair, differences remain regarding postoperative pain, recovery time, complication rates, cost-effectiveness, and patient satisfaction, especially in tertiary care institutions within developing countries (3-5,8,9). Local clinical data are therefore valuable for guiding procedure selection according to patient characteristics, available resources, and surgeon experience.

The present prospective comparative study was undertaken to evaluate laparoscopic Transabdominal Preperitoneal (TAPP) repair and open Lichtenstein hernioplasty using standardized clinical parameters, including operative duration, postoperative pain, intraoperative and postoperative complications, duration of hospital stay, time to ambulation, return to routine work, chronic groin pain, and recurrence among patients treated at a tertiary care teaching hospital.

2. Materials and Methods

- **Study Design:** This was a prospective, comparative, observational study conducted to evaluate the clinical outcomes of laparoscopic Transabdominal Preperitoneal (TAPP) repair and open Lichtenstein tension-free mesh hernioplasty in patients with primary inguinal hernia.
- **Study Setting:** The study was carried out in the Department of General Surgery, Vilasrao Deshmukh Government Medical College and Hospital, Latur, Maharashtra, India.
- **Sample Size:** A total of 130 adult male patients diagnosed with uncomplicated primary inguinal hernia were enrolled consecutively. Patients were allocated into two equal groups according to the operative technique performed:
  Group A (TAPP repair): 65 patients
  Group B (Open Lichtenstein hernioplasty): 65 patients
  The choice of procedure was based on patient suitability, surgeon expertise, and informed patient preference.
- **Inclusion Criteria:** Male patients aged 18 years or older, Clinically diagnosed primary unilateral or bilateral inguinal hernia, Elective surgery planned, Patients fit to undergo anaesthesia and surgery, Patients willing to participate and providing written informed consent.
- **Exclusion Criteria:** Obstructed or strangulated inguinal hernia, Recurrent hernia previously treated by laparoscopic repair, Patients requiring emergency surgery, Severe uncontrolled systemic illness precluding surgery, Patients unwilling to participate.

Preoperative Evaluation : All patients underwent detailed history taking and thorough clinical examination. Demographic variables including age, body mass index (BMI), occupation, duration of symptoms, and associated comorbidities such as diabetes mellitus and hypertension were recorded. Routine laboratory investigations, electrocardiography, chest radiography, and anaesthetic fitness assessment were performed before surgery.

3. Surgical Technique

- **Laparoscopic TAPP Repair:** All TAPP procedures were performed under general anaesthesia. Pneumoperitoneum was established using a standard three-port technique. Following inspection of the abdominal cavity, a peritoneal flap was created above the hernia defect. The preperitoneal space was dissected carefully to expose the myopectineal orifice, inferior epigastric vessels, vas deferens, and gonadal vessels. The hernia sac was reduced, and an appropriately sized polypropylene mesh was positioned to cover all potential hernia sites. The mesh was secured when required, and the peritoneal flap was closed using absorbable sutures or tacking devices.
- **Open Lichtenstein Hernioplasty:** Open repair was performed through a standard inguinal incision under spinal or general anaesthesia as appropriate. After opening the inguinal canal, the hernia sac was identified, dissected, and managed according to the type of hernia. A polypropylene mesh was placed over the posterior wall of the inguinal canal and fixed using interrupted non-absorbable sutures to create a tension-free repair. Haemostasis was secured before layered wound closure.

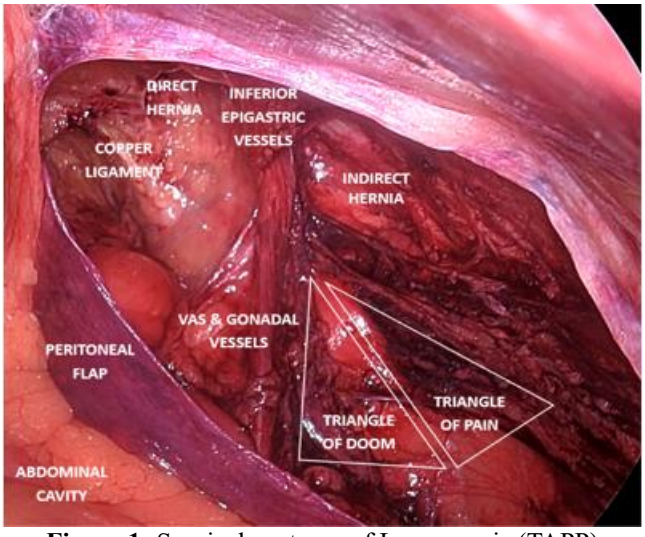


Figure 1: Surgical anatomy of Laproscopic (TAPP) hernioplasty

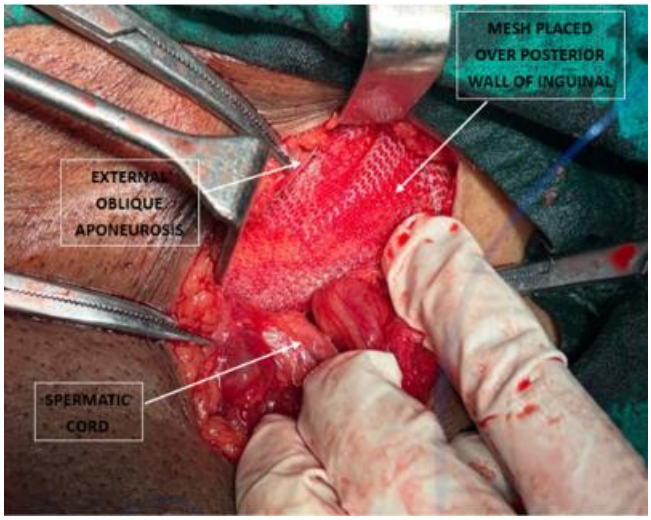
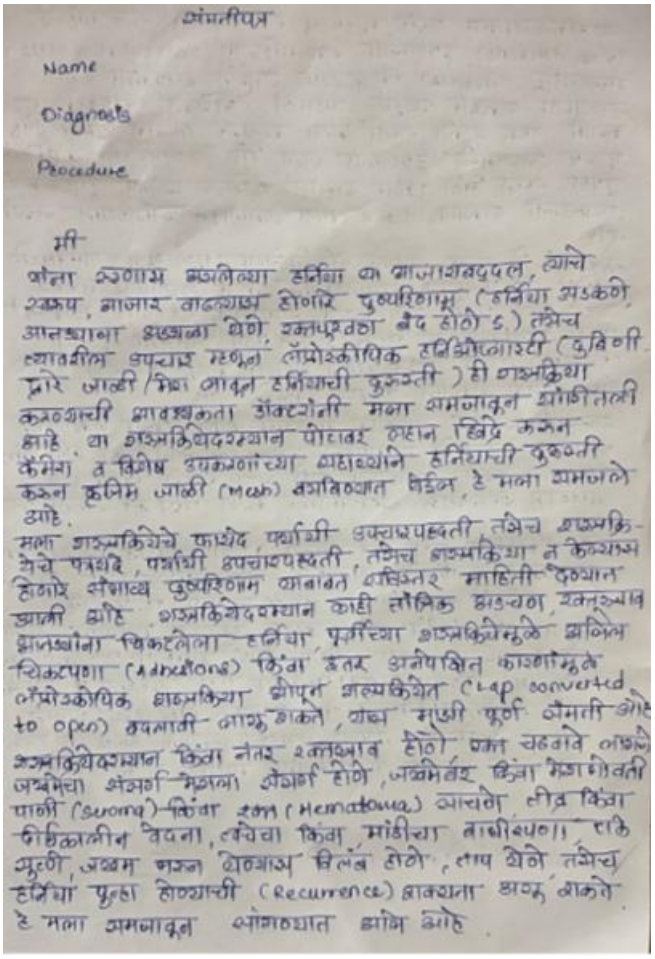


Figure 2: Surgical anatomy of Open lichenstein hernioplasty

Consent


संमतीपत्र

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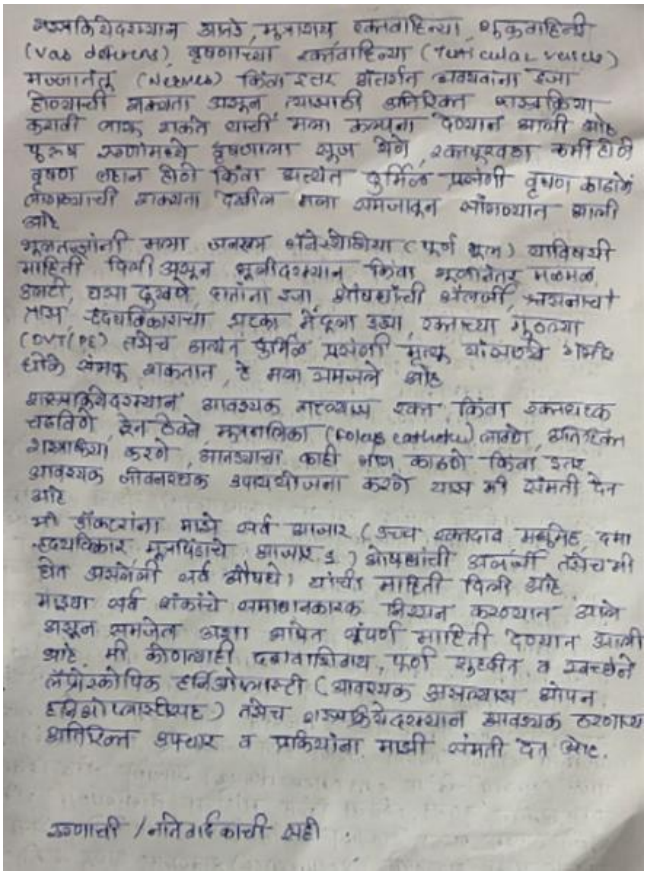
वरील आजाराने ग्रासलेल्या हर्निया या आजाराबद्दल, त्याचे स्वरूप, आजार वाढल्यास होणारे दुष्परिणाम (हर्निया अडकणे, आतड्याला इजा होणे, रक्तपुरवठा बंद होणे इ.) तसेच त्यावरील उपचार म्हणून लॅप्रोस्कोपिक हर्निओप्लास्टी (दुर्बिणी द्वारे जाळी/मेश लावून हर्नियाची दुरुस्ती) ही शस्त्रक्रिया करण्याची आवश्यकता डॉक्टरांनी मला समजावून सांगितली आहे. या शस्त्रक्रियेदरम्यान पोटावर लहान छिद्रे करून कॅमेरा व विशेष उपकरणांच्या साहाय्याने हर्नियाची दुरुस्ती करून कृत्रिम जाळी (mesh) बसविण्यात येईल हे मला समजले आहे.

मला शस्त्रक्रियेचे फायदे पर्यायी उपचारपद्धती तसेच शस्त्रक्रियेचे संभाव्य दुष्परिणाम याबाबत सविस्तर माहिती देण्यात आली आहे. शस्त्रक्रियेदरम्यान काही तांत्रिक अडचण उद्भवल्यास आधीच ठरविलेला हर्निया दुरुस्तीचा शस्त्रक्रियेमुळे झालेल्या चिकटपणा (adhesions) किंवा इतर अनपेक्षित कारणांमुळे लॅप्रोस्कोपिक शस्त्रक्रिया शक्य न झाल्यास (Lap converted to open) उघडी शस्त्रक्रिया करावी लागू शकते, याचा मला पूर्ण संमती आहे.

शस्त्रक्रियेदरम्यान किंवा नंतर रक्तस्राव होणे, रक्त चढवावे लागणे, जखमेचा संसर्ग होणे, जखमेतून किंवा मेशभोवती पाणी (Seroma) किंवा रक्त (Hematoma) साचणे, तीव्र किंवा दीर्घकालीन वेदना, त्वचा किंवा मांडीचा बधीरपणा, सूज, जखम भरून येण्यास विलंब होणे, ताप येणे तसेच हर्निया पुन्हा होण्याची (Recurrence) शक्यता असू शकते हे मला समजावून सांगण्यात आले आहे.


शस्त्रक्रियेदरम्यान अगदी मूत्राशय रक्तवाहिन्या शुक्रवाहिनी (Vas deferens) वृषणाच्या रक्तवाहिन्या (Testicular vessels) मज्जातंतू (Nerves) किंवा इतर शरीरातील अवयवांना इजा होण्याची शक्यता असून त्यासाठी अतिरिक्त शस्त्रक्रिया करावी लागू शकते याची मला कल्पना देण्यात आली आहे. पुरुष रजोनिवृत्तीच्या वृषणाला सूज येणे, रक्तपुरवठा कमी होणे वृषण लहान होणे किंवा क्वचित दुर्मिळ प्रसंगी वृषण काढावे लागण्याची शक्यता याबाबत मला समजावून सांगण्यात आली आहे.

भूलतज्ज्ञांनी मला जनरल ॲनेस्थेशिया (पूर्ण ग्लानी) याविषयी माहिती दिली असून भूलीदरम्यान किंवा भूलोत्तर मळमळ, उलटी, घसा दुखणे, दातांना इजा, शरीराच्या भागांची बधिरता, रक्तवाहिकाशोथ (DVT/PE) तसेच क्वचित दुर्मिळ प्रसंगी मृत्यू होऊ शकतो याविषयी मला समजले आहे.

शस्त्रक्रियेदरम्यान आवश्यक वाटल्यास रक्त किंवा रक्तघटक चढविणे, इन हेवले मूत्रनलिका (Foley catheter) लावणे, अतिरिक्त शस्त्रक्रिया करणे, आतड्याचा काही भाग काढणे किंवा इतर आवश्यक जीवनरक्षक उपचारयोजना करणे याला मी संमती देत आहे.

मी डॉक्टरांना माझे पूर्व आजार (उच्च रक्तदाब मधुमेह, दमा हृदयविकार मूत्रपिंडाचे आजार इ.) शस्त्रक्रियेपूर्वी घेत असलेली पूर्व औषधे) यांची माहिती दिली आहे. मद्यपान पूर्व धूम्रपानाचे भयानकारक परिणाम याबाबत डॉक्टरांनी समजावून सांगितले आहे. मी कोणतीही दबावाखालीय, पूर्ण सुज्ञपणे व स्वखुशीने लॅप्रोस्कोपिक हर्निओप्लास्टी (आवश्यक असल्यास ओपन हर्निओप्लास्टीसह) तसेच शस्त्रक्रियेदरम्यान आवश्यक ठरणाऱ्या अतिरिक्त उपचार व प्रक्रियांना माझी संमती देत आहे.

रुग्णाची / नातेवाईकाची सही

Study Variables

The following parameters were evaluated in every patient:

Preoperative variables : Age, Body mass index, Occupation, Type of hernia, Duration of symptoms, Associated comorbidities, Intraoperative variables, Operative duration (minutes), Intraoperative complications, Peritoneal tear, Minor bleeding, Other complications, Postoperative variables, Visual Analogue Scale (VAS) pain score at 6 hours, Visual Analogue Scale (VAS) pain score at 24 hours, Duration of hospital stay (days), Time to ambulation (hours), Time required for return to work (days), Seroma formation, Hematoma, Surgical site infection (SSI), Urinary retention, Chronic groin pain, Hernia recurrence during follow-up, Postoperative Care and Follow-up

Patients received standardized postoperative analgesia and antibiotic prophylaxis according to institutional protocol. Early ambulation was encouraged. Wound assessment was performed before discharge and during outpatient follow-up visits. Patients were monitored for postoperative complications including seroma, hematoma, wound infection, urinary retention, chronic groin pain, and recurrence.

Outcome Measures: The primary outcome was comparison of postoperative pain between TAPP repair and open Lichtenstein hernioplasty.

Secondary outcomes included: Operative duration, Intraoperative complications, Length of hospital stay, Early ambulation, Return to normal work, Postoperative complications, Chronic groin pain, Recurrence.

Statistical Analysis: All collected data were entered into Microsoft Excel and analysed using the Statistical Package for Social Sciences (SPSS) software.

- Continuous variables were expressed as **mean ± standard deviation (SD).**
- Categorical variables were expressed as **frequency and percentage.**
- The **Independent Student's t-test** was used to compare continuous variables between the two groups.
- The **Chi-square test or Fisher's exact test** was applied for categorical variables whenever appropriate.
- A **p-value <0.05** was considered statistically significant.

Ethical Considerations: The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Approval was obtained from the Institutional Ethics Committee of Vilasrao Deshmukh Government Medical College and Hospital before commencement of the study. Written informed consent was obtained from every participant before enrolment. Confidentiality of patient information was maintained throughout the study.

4. Results

Study Population: A total of 130 adult male patients with primary uncomplicated inguinal hernia were included in the study. Sixty-five patients underwent laparoscopic Transabdominal Preperitoneal (TAPP) repair, while the

remaining sixty-five underwent Open Lichtenstein tension-free mesh hernioplasty. Both groups were comparable with respect to demographic characteristics and clinical presentation.

1) Baseline Characteristics of the Study Population:

Variable	Lichtenstein (n=65)	TAPP (n=65)
Mean age (years)	47.23	49.86
Mean BMI (kg/m²)	24.94	26.18
Sex	100% Male	100% Male

The demographic profile of patients in both groups was broadly comparable. The mean age was 47.23 years in the Lichtenstein group and 49.86 years in the TAPP group. Mean body mass index was slightly higher in the TAPP group.

2) Comparison of Operative Parameters

Parameter	Lichtenstein	TAPP
Mean operative time (minutes)	56.23	67.49

The average operative duration was longer in patients undergoing laparoscopic TAPP repair than in those treated with open Lichtenstein hernioplasty, reflecting the greater technical complexity of the laparoscopic procedure.

3) Postoperative Pain Scores

Variable	Lichtenstein	TAPP
Mean VAS at 6 hours	5.02	3.98
Mean VAS at 24 hours	2.23	1.91

Patients who underwent TAPP repair experienced lower postoperative pain scores at both 6 and 24 hours compared with those undergoing open Lichtenstein repair.

4) Recovery Parameters

Parameter	Lichtenstein	TAPP
Mean hospital stay (days)	2.08	1.34
Mean ambulation time (hours)	9.85	6.95
Mean return to work (days)	14.95	8.63

Patients treated with laparoscopic TAPP repair demonstrated earlier postoperative ambulation, shorter hospital stay, and a significantly faster return to routine activities than patients treated with open Lichtenstein repair.

5) Comparison of Intraoperative and Postoperative Outcomes Between TAPP and Open Lichtenstein Hernioplasty

Variable	Lichtenstein (n = 65)	TAPP (n = 65)	p-value
a) Intraoperative Complications			
None	65 (100.0%)	30 (46.2%)	<0.001
Minor bleeding	0 (0%)	16 (24.6%)	
Peritoneal tear	0 (0%)	19 (29.2%)	
Major vascular injury	0	0	NS
Bowel injury	0	0	NS
Conversion to open surgery	0	0	NS
b) Postoperative Complications			
Seroma	6 (9.2%)	2 (3.1%)	0.14
Hematoma	7 (10.8%)	2 (3.1%)	0.08
Surgical site infection	2 (3.1%)	1 (1.5%)	0.56
Urinary retention	3 (4.6%)	3 (4.6%)	1.00
• **Chronic Groin Pain**			
No pain	47 (72.3%)	42 (64.6%)	
Mild pain	18 (27.7%)	22 (33.8%)	
Moderate pain	0	1 (1.5%)	0.61
• **Recurrence**			
Yes	1 (1.5%)	2 (3.1%)	0.56
No	64 (98.5%)	63 (96.9%)	

NS = Not statistically significant

This table compares the intraoperative and postoperative outcomes between the two study groups. No intraoperative complications were encountered during open Lichtenstein hernioplasty. In contrast, peritoneal tear (29.2%) and minor bleeding (24.6%) were the most common intraoperative complications during TAPP repair; however, all were managed laparoscopically without conversion to open surgery or major vascular or bowel injury.

Among postoperative complications, seroma occurred in 9.2% of patients undergoing Lichtenstein repair and 3.1% following TAPP repair. Hematoma formation was observed in 10.8% and 3.1% of patients, respectively. Surgical site infection was infrequent in both groups (3.1% vs. 1.5%), while urinary retention occurred equally in both groups (4.6%). Chronic groin pain was predominantly mild and showed no statistically significant difference between the groups. During follow-up, recurrence was observed in one patient (1.5%) in the Lichtenstein group and two patients (3.1%) in the TAPP group.

5. Discussion

The present study demonstrated significantly lower postoperative pain following TAPP repair, which is consistent with previous randomized trials. (3–5)

The longer operative time observed with TAPP has also been reported in earlier studies and is mainly attributed to the technical complexity and learning curve associated with laparoscopic repair. (7,8)

Earlier ambulation, shorter hospital stay and faster return to work among patients undergoing TAPP repair in our study are comparable with findings from previous meta-analyses. (8, 9)

The recurrence rates were low in both groups, similar to those reported in international guidelines. (10)

Open Lichtenstein repair continues to remain an effective and economical option, particularly in resource-limited settings. (2,6)

6. Conclusion

The present prospective comparative study demonstrated that both laparoscopic Transabdominal Preperitoneal (TAPP) repair and open Lichtenstein tension-free mesh hernioplasty are safe, effective, and reliable techniques for the management of primary inguinal hernia.

Although the mean operative time was longer in the TAPP group, the laparoscopic approach provided significant clinical advantages, including lower postoperative pain scores, earlier postoperative ambulation, shorter hospital stay, faster return to routine activities, and better cosmetic outcomes. Intraoperative complications such as peritoneal tears and minor bleeding were encountered only during TAPP repair; however, these were managed successfully without conversion to open surgery or major morbidity.

Open Lichtenstein hernioplasty remains a simple, cost-effective, and reproducible procedure with a shorter operative duration and minimal intraoperative complications. However, patients undergoing open repair experienced comparatively higher postoperative pain and a longer recovery period.

The incidence of postoperative complications and recurrence was low in both groups, indicating that both techniques provide durable and effective repair when performed according to standard surgical principles. The choice of surgical approach should therefore be individualized based on patient characteristics, surgeon expertise, available infrastructure, and institutional resources.

References

[1] Schwartz's Principles of Surgery. Brunicardi FC, Andersen DK, Billiar TR, Dunn DL, Kao LS, Hunter JG, et al. 11th ed. New York: McGraw-Hill Education; 2019.
[2] Hernia. Simons MP, Aufenacker T, Bay-Nielsen M, Bouillot JL, Campanelli G, Conze J, et al. European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. Hernia. 2009;13(4):343-403.
[3] New England Journal of Medicine. Neumayer L, Giobbie-Hurder A, Jonasson O, Fitzgibbons R Jr, Dunlop D, Gibbs J, et al. Open mesh versus laparoscopic mesh repair of inguinal hernia. N Engl J Med. 2004;350(18):1819-27.
[4] Annals of Surgery. Liem MS, van der Graaf Y, van Steensel CJ, Boelhouwer RU, Clevers GJ, Meijer WS, et al. Comparison of conventional anterior surgery and laparoscopic surgery for inguinal-hernia repair. Ann Surg. 1997;226(6):668-75.
[5] The Lancet. The MRC Laparoscopic Groin Hernia Trial Group. Laparoscopic versus open repair of groin hernia: a randomised comparison. Lancet. 1999;354(9174):185-90.
[6] Annals of Surgery. Lichtenstein IL, Shulman AG, Amid PK, Montllor MM. The tension-free hernioplasty. Am J Surg. 1989;157(2):188-93.
[7] Surgical Endoscopy. Bittner R, Schwarz J. Inguinal hernia repair: current surgical techniques. Surg Endosc. 2012;26(5):1259-65.
[8] British Journal of Surgery. McCormack K, Scott NW, Go PM, Ross S, Grant AM. Laparoscopic techniques versus open techniques for inguinal hernia repair. Br J Surg. 2003;90(12):1479-92.
[9] Cochrane Database of Systematic Reviews. McCormack K, Scott NW, Go PM, Ross SJ, Grant AM. Laparoscopic techniques versus open techniques for inguinal hernia repair. Cochrane Database Syst Rev. 2003;(1):CD001785.
[10] HerniaSurge Group. International guidelines for groin hernia management. Hernia. 2018;22(1):1-165.