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Chapter 25

Recurrent Inguinal Hernia in Adults: A Review

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Abstract

Recurrent inguinal hernia continues to pose a substantial clinical challenge despite advancements in hernia surgery. The recurrence rate following primary inguinal hernia repair varies between 1% and 15%, influenced by patient-related factors, surgical technique, mesh use, and follow-up duration. It is crucial for surgeons engaged in abdominal wall reconstruction to comprehend the factors associated with recurrence and to identify optimal management strategies. Numerous risk factors have been associated with hernia recurrence. Patient-related factors include advanced age, obesity, smoking, diabetes mellitus, malnutrition, collagen disorders, chronic cough, constipation, and activities that increase intra-abdominal pressure. Surgical factors such as inadequate dissection, improper mesh placement or fixation, tension on the repair, infection, and surgeon inexperience also significantly contribute to recurrence. The management of recurrent inguinal hernia requires a tailored approach based on the index repair. For recurrences following an anterior repair, a posterior laparoscopic approach, such as transabdominal preperitoneal (TAPP) or totally extraperitoneal (TEP) repair, is generally preferred. In contrast, recurrent hernias after a posterior repair are typically managed with an open anterior mesh repair. This chapter synthesizes current evidence on the incidence, risk factors, and contemporary management of recurrent inguinal hernia in adults.

Keywords: Recurrence, Anterior approach, TAPP, TEP, Preperitoneal repair, Open repair, and Posterior approach.

Introduction

Recurrent hernias, which arise from unsuccessful inguinal hernia repairs, serve as indicators of the efficacy of specific repair techniques. Several risk factors contribute to recurrence, including obesity and comorbidities such as diabetes mellitus, hypertension, and elevated American Society of Anesthesiologists (ASA) scores. Technical aspects of inguinal hernia surgery, such as inadequate mesh fixation, the presence of a sliding hernia, and the occurrence of hematoma and seroma, can also lead to recurrence. The recurrence rate post-inguinal hernia surgery ranges from 1% to 17%, varying by institution, with specialized hernia centers reporting lower rates. The management of recurrent inguinal hernia is contingent upon the type of hernia repair initially performed and whether the recurrent hernia is approached anteriorly or posteriorly (Itani et al., 2009).

The HerniaSurge guidelines for managing inguinal hernia in adults recommend a laparoscopic or endoscopic approach following a failed anterior tissue or Lichtenstein repair, and an anterior approach for a failed posterior or laparoscopic inguinal hernia repair. In cases where both anterior and posterior repairs have failed, it is advised that such recurrent inguinal hernias be managed by an expert inguinal hernia surgeon, with the type of repair determined by the operating surgeon (Tran, 2018). The Consensus on international guidelines for groin hernia management, endorsed by the European Hernia Society (EHS), the European Association of Endoscopic Surgeons (EAES), the Asia Pacific Hernia Society (APHS), and the American Hernia Society (AHS), also supports the use of either an anterior or posterior approach, contingent upon the type of approach utilized in the primary inguinal hernia repair (Veenendaal et al., 2020).

A tailored approach is advised for managing recurrent inguinal hernias, contingent upon the type of initial surgical intervention. This chapter examines the incidence and risk factors associated with recurrent inguinal hernias, with a focus on the roles of open and laparoscopic repairs in their management. A comprehensive literature review was conducted using PUBMED, the Cochrane Database of Clinical Reviews, and Google Scholar, targeting clinical trials, observational studies, cohort studies, systematic reviews, and meta-analyses published between 1995 and 2026. The search employed keywords such as "recurrence," "anterior approach," "TAPP," "TEP," "preperitoneal repair," "open

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repairs," and "posterior approach." Only articles published in English were considered. Additional articles were identified through manual cross-referencing of the literature. Exclusion criteria included case reports, studies with fewer than 10 patients, and editorials. The study population comprised adult male and female patients, while pediatric patients were excluded.

Discussion

Incidence of recurrent inguinal hernia in adults

The incidence of inguinal hernia in adults ranges from 5% to 10% for individuals under 40 years of age, increases to 31% for those under 70, and reaches 45% for individuals over 75 years. Recurrent inguinal hernias constitute 13% to 17% of all inguinal hernia repairs (Jensen et al., 2017). Recurrent inguinal hernia is a significant outcome measure following inguinal hernia repair and serves as a crucial indicator of surgical quality. Despite the substantial reduction in recurrence rates due to modern mesh-based repair techniques, the incidence of recurrent inguinal hernia varies internationally. This variation is attributed to differences in surgical expertise, operative techniques, patient characteristics, follow-up duration, and the quality of national hernia registries. Data from large national registries in Sweden and Denmark reveal some of the lowest recurrence rates worldwide, with long-term reoperation rates for recurrence generally reported between 1% and 5% following contemporary mesh repairs (Wang et al., 2024).

In the United Kingdom, registry and population-based studies have demonstrated that approximately 3.5% to 4% of inguinal hernia surgeries are conducted due to symptomatic recurrence, a trend attributed to the widespread adoption of mesh use (Smith et al., 2021). Data from the German Herniamed Registry reveal that recurrent inguinal hernias constitute approximately 11% to 14% of all male inguinal hernia repairs and 7% to 7.4% of female repairs, underscoring the persistent challenge of recurrence despite advancements in surgical techniques. Population-based studies from Nordic countries indicate that long-term recurrence rates are among the lowest globally, attributed to established quality assurance programs such as the Swedish Hernia Register and the Danish Hernia Database, which have significantly enhanced outcomes through continuous audit and feedback. Conversely, recurrence rates reported from low- and middle-income countries are generally higher, often ranging from 5% to 15%, potentially reflecting limited access to mesh, delayed presentation, resource constraints, and variations in surgical training. Overall, contemporary recurrence rates following elective mesh-based repair in high-income countries typically remain below 5%, whereas resource-limited settings continue to report substantially higher rates(Andresen et al., 2025; Köckerling et al., 2020; Murphy et al., 2018).

Risk Factors for Recurrence

Risk factors for recurrence following inguinal hernia repair encompass both patient-specific and hernia-related elements. Patient factors include age over 50 years, a family history of inguinal hernia, and a history of smoking. Additionally, the size of the hernia defect is significant, with defects measuring 3 cm or more being linked to a higher likelihood of recurrence. Direct inguinal hernias are particularly associated with an elevated risk of recurrence (Jansen et al., 2009; Junge et al., 2006). Burcharth et al. conducted a systematic review and meta-analysis of observational studies to examine patient-related risk factors for recurrence post-inguinal hernia repair. This analysis included 14 studies involving 378,824 repairs on 375,620 patients. The findings identified female sex (RR 1.38, 95% CI, 1.28-1.48), direct inguinal hernias (RR 1.91, 95% CI, 1.62-2.26), and smoking (OR 2.53, 95% CI, 1.43-4.47) as significant risk factors for inguinal hernia recurrence (Burcharth et al., 2015).

Recurrence is influenced by several factors, including the type of surgery performed. Laparoscopic repairs are linked to a higher recurrence rate, attributed to the technical challenges and the extensive learning curve necessary to master the procedure. Similarly, sutured repair techniques exhibit a higher recurrence rate due to a significant proportion of technical failures (Lee et al.,2016; Magnusson et al., 2010). Guillaume et al. conducted a retrospective study in Spain on inguinal hernia repairs performed for recurrence. This study included 95,025 patients, revealing that male and elderly patients are more likely to undergo surgery for recurrent inguinal hernia (Guillaume & Juvany, 2022).

Management of Recurrent inguinal hernia in adults

Laparoscopic inguinal hernia repair for recurrent inguinal hernia

Haggerty et al. conducted a prospective study examining the laparoscopic repair, specifically Total Extraperitoneal (TEP), of recurrent inguinal hernia. The study encompassed 1,298 patients, with 1,139 undergoing primary inguinal hernia repairs and 159 undergoing repairs for recurrent inguinal hernia. The study reported no major complications; however, hematoma formation was more prevalent in the recurrent hernia repair group (4.4% compared to 1.5%). The short- and long-term quality of life outcomes were comparable between the two groups (Haggerty et al., 2021). In a separate prospective study, Scheuerlein et al. investigated TEP repair for recurrent inguinal hernia, including 179 patients. Intra-operative complications were noted in 4 patients, with no conversions to open hernia repair. Postoperative hematoma occurred in 7 patients, and the recurrence rate was 0.4% after a 2-year follow-up (Scheuerlein et al., 2003).

Goo et al. conducted a five-year review of the total extraperitoneal (TEP) repair for recurrent inguinal hernia, involving 37 patients. In this study, seroma developed in two patients, and three patients required conversion to open repair. The recurrence rate was 2.7% after a 12-month follow-up (Goo et al., 2010). Staarink et al. performed a retrospective study examining the long-term outcomes of TEP repair for both primary and recurrent inguinal hernia. This study included 306 patients, with 28 undergoing TEP for recurrence, and three patients experienced re-recurrence (Staarink et al., 2008). Choi et al. conducted a retrospective study on the safety and efficacy of TEP repair for recurrent inguinal hernia following open herniorrhaphy. The study encompassed 100 recurrent inguinal hernias, noting longer operation times and a higher incidence of peritoneal rupture during the procedure. The re-recurrence rate was 2% (Choi et al., n.d.). Lau conducted another retrospective study on TEP repair for recurrent hernia, involving 100 cases, with a 46% incidence of peritoneal tears (Ung & Au, 2004). Kockerling et al. performed a register-based comparison of outcomes between TEP and Transabdominal preperitoneal (TAPP) approaches for recurrent inguinal hernia. This study included 2246 patients, with 1464 undergoing TAPP and 782 undergoing TEP, and

found no differences in postoperative complications, recurrence rates, or chronic pain between the procedures (Köckerling et al., 2017).

Comparison between laparoscopic and open repair for recurrent inguinal hernia

Feliu et al. conducted a retrospective study to compare laparoscopic and open approaches for recurrent inguinal hernia repair. A total of 188 patients underwent 207 hernia repairs, with 86 patients receiving TEP repairs and 121 undergoing open hernia repairs. The incidence of postoperative complications was higher in the open approach group (23.9% compared to 13.9% in the TEP group); however, there was no significant difference in recurrence rates between the two procedures (1.3% vs. 1.8%) (Feliu et al., 2004). Additionally, Kouhia et al. conducted a prospective randomized trial comparing the Lichtenstein repair with the total extraperitoneal (TEP) repair for recurrent inguinal hernia. In this study, 99 patients were randomized, with 47 undergoing the Lichtenstein repair and 49 receiving the TEP repair. The postoperative complication rates were similar between the two groups; however, chronic pain was more prevalent in the Lichtenstein group (27.7% vs. 8.2%), and no differences were observed in recurrence rates between the procedures (Kouhia et al., 2009).

A meta-analysis conducted by Dedemadi et al. compared laparoscopic and open mesh repair for recurrent inguinal hernia. This review included seven studies with a total of 1,542 patients. The analysis revealed no significant differences in wound infection rates between laparoscopic and open mesh repair (OR = 0.48, 95% CI, 0.15-1.43). However, seroma formation was more prevalent in the laparoscopic group (OR = 0.38, 95% CI, 0.15-0.96). Additionally, there was no significant difference in recurrence rates between the two repair methods (RR = 0.72, 95% CI, 0.45-1.15). Within the laparoscopic group, the TAPP approach exhibited a higher overall recurrence rate compared to the TEP approach (RR = 3.25, 95% CI, 1.32-7.9) (Dedemadi et al., 2010). In a randomized controlled trial by Beets et al., 79 patients were randomized to undergo either TAPP repair (42 patients) or open preperitoneal repair (37 patients) for recurrent inguinal hernia. The study found no significant differences in complications between the two groups. However, the TAPP repair required longer operative time (79 minutes vs. 59 minutes) and was associated with higher recurrence rates (12.5% vs. 1.9%) (Beets et al., 1999).

Eklund et al. conducted a randomized multicenter trial to compare laparoscopic and Lichtenstein repair techniques for recurrent inguinal hernia. In this study, 147 patients were randomized, with 73 undergoing Transabdominal Preperitoneal (TAPP) repair and 74 undergoing the Lichtenstein repair. The TAPP group experienced reduced early postoperative pain, with recurrence rates of 19% for TAPP and 18% for Lichtenstein repair at the 5-year follow-up (Eklund et al., 2007). Pisanu et al. conducted a meta-analysis of prospective randomized trials comparing these two repair methods for recurrent inguinal hernia. This review included 7 studies with a total of 647 patients, comprising 333 who underwent laparoscopic repair and 314 who underwent Lichtenstein repair. The laparoscopic group exhibited reduced chronic pain (9.2% vs. 21.5%, M-H-0.39, 95% CI, 0.21-0.72), although no significant differences in recurrence rates were observed (8.3% vs. 11.6%, M-H-0.67, 95% CI, 0.39-1.16). The operative time was longer for the laparoscopic group (62.9 minutes vs. 54.2 minutes, 95% CI, 0.03-0.89) (Pisanu et al., 2015). Karthikesalingam et al. conducted a meta-analysis of randomized controlled trials comparing laparoscopic and open mesh repair for recurrent inguinal hernia. This review included 4 studies with 404 patients. No significant differences were found in recurrence rates (OR 0.84, 95% CI 0.33-2.17), chronic pain (OR 0.91, 95% CI 0.14-5.88), or hematoma formation (OR 0.65, 95% CI 0.22-1.95) between the procedures (Karthikesalingam et al., 2010).

Li et al. conducted a meta-analysis comparing laparoscopic and open repair for recurrent inguinal hernia, incorporating 11 studies with a total of 1311 patients. The findings indicated that laparoscopic repair was associated with a lower incidence of wound infection and a quicker return to work, while no significant differences were observed in the re-recurrence rates between the two procedures (Li et al., 2014). Similarly, Yang et al. performed a systematic review and meta-analysis comparing laparoscopic and open mesh repair for recurrent inguinal hernia, which included 10 studies with 1017 patients. This analysis revealed that laparoscopic repair resulted in a reduced wound infection rate (OR=0.28, 95% CI, 0.10-0.81) and a shorter hospital stay (MD=-3.65, 95% CI,-4.76 to -2.53). However, no significant differences were found in recurrence rates (OR=0.74, 95% CI, 0.45-1.21) or hematoma formation (OR=0.71, 95% CI, 0.28-1.79) (Yang & Deng, 2020).

Table 1

Study	Study Type	N=numbers	Complication Rate	Recurrence Rate
Dedemadi et al. (2010)	Meta-analysis	1542	No differences between laparoscopic and open repair (OR-0.48)	No differences between laparoscopic and open repair (0.72)
Karthikesalingam et al. (2010)	Meta-analysis	404	No differences between laparoscopic and open repair (OR-0.65)	No differences between laparoscopic and open repair (OR-0.84)
Yang et al (2020)	Systematic review & Meta-analysis	1017	Reduced complications in the laparoscopic group (OR-0.28)	No differences between laparoscopic and open repair (OR-0.74)

Table showing the complication and recurrence rate between laparoscopic and open repair for recurrent inguinal hernia.

The Open Preperitoneal approach for recurrent inguinal hernia

Katri conducted a prospective study on the open preperitoneal mesh repair of recurrent inguinal hernia, involving 45 patients. The procedure utilized a 15 cm by 15 cm polypropylene mesh. The study reported no major complications and no recurrence after a follow-up period of 10.8 months (Katri, 2009). Similarly, Kruzer et al. undertook a prospective study on the same repair technique for recurrent inguinal hernia, with a cohort of 101 patients. This study also reported no major complications; however, there were 5 recurrences after 6 months of follow-up. Notably, only one recurrence was observed following an extended follow-up of 21 months (Kurzer et al., 2002).

Yang et al. investigated the long-term outcomes of open preperitoneal mesh repair for recurrent inguinal hernia. This prospective study involved 107 patients, with a complication rate of 8.4%, encompassing wound infection, seroma formation, and acute urinary retention. After a follow-up period of 42.3 months, three recurrences were observed (C. Yang & Deng, 2020). Saber et al. conducted a comparison between open preperitoneal mesh repair and Lichtenstein repair for recurrent inguinal hernia. This randomized study included 120 patients,

with 56 undergoing open preperitoneal repair and 54 undergoing Lichtenstein repair. The Lichtenstein repair group experienced a higher overall complication rate, and the recurrence rates were also elevated in this group (6.25% vs. 3.3%) (Saber et al., 2012).

Table 2

Study	Study Type	N=numbers	Post operative complications	Recurrence rate
Kruzer et al. (2002)	Prospective cohort study	101	No postoperative complication	One recurrence after 21 months of follow-up
Saber et al. (2012)	Randomized study (preperitoneal vs Lichtenstein)	120-56(open preperitoneal), 54(Lichtenstein)	Higher complications in the Lichtenstein group	Lichtenstein-6.25%, Preperitoneal-3.3%.
Yang et al	Prospective study	107	Complication rate-8.4%	3 recurrence noted after 42 months follow up

Table showing the complication and recurrence rate of the open preperitoneal approach in recurrent inguinal hernia.

Conclusion

Recurrence remains a significant outcome measure following inguinal hernia repair, despite considerable advancements in surgical techniques and mesh technology. Both open mesh repair and laparoscopic approaches achieve low recurrence rates when executed correctly. Current evidence indicates that recurrence rates are similar between contemporary open and laparoscopic techniques, although laparoscopic repair provides additional advantages regarding postoperative pain and recovery. Effective management of recurrent hernias necessitates a thorough evaluation of the previous repair and adherence to guideline-recommended strategies. Continued advancements in mesh technology, surgical training, and minimally invasive techniques are anticipated to further decrease recurrence rates in the future.

Declaration

Conflict of interest: There is no conflict of interest

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