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Recurrent Inguinal Hernia in Adults: An Update on Management: Narrative Review Article

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ABSTRACT

Recurrent inguinal hernia remains a significant clinical challenge despite advances in hernia surgery. The incidence of recurrence following primary inguinal hernia repair ranges from 1% to 15%, depending on patient-related factors, surgical technique, mesh utilization, and duration of follow-up. Understanding the factors associated with recurrence and optimal management strategies is therefore essential for surgeons involved in abdominal wall reconstruction. Multiple risk factors have been implicated in hernia recurrence. Patient-related factors include advanced age, obesity, smoking, diabetes mellitus, malnutrition, collagen disorders, chronic cough, constipation, and activities associated with increased intra-abdominal pressure. Surgical factors such as inadequate dissection, improper mesh placement or fixation, tension on the repair, infection, and surgeon inexperience also contribute significantly to recurrence. The management of recurrent inguinal hernia is a tailored approach based on index repair. For recurrence after an anterior repair, a posterior laparoscopic approach, including transabdominal preperitoneal (TAPP) or totally extraperitoneal (TEP) repair, is generally preferred. Conversely, recurrent hernias following a posterior repair are commonly managed through an open anterior mesh repair. This review summarizes the current evidence regarding the incidence, risk factors, and contemporary management of recurrent inguinal hernia in adults.

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INTRODUCTION

Recurrent hernias result from failed inguinal hernia repair and indicate how successful a particular repair is. There are risk factors for recurrence, such as obesity and the presence of comorbidities like diabetes mellitus, hypertension, and a high American Society of Anesthesiologists (ASA) score. Technical factors during inguinal hernia surgery include inadequate fixation of mesh, the presence of a sliding hernia, and the presence of hematoma and seroma, which can lead to recurrence. The recurrence rate following inguinal hernia surgery varies from 1% to 17%, depending on the institution, with specialist hernia centers having lower recurrence rates. The treatment of recurrent inguinal hernia will depend on which type of hernia was performed during the primary inguinal hernia repair and on approaching the recurrent hernia from either the anterior or posterior approach(Itani et al., 2009).

The HerniaSurge guidelines for the management of inguinal hernia in adults have recommended a laparoscopic/endoscopic approach for a failed anterior tissue or Lichtenstein repair, and an anterior approach for a failed posterior or laparoscopic inguinal hernia repair. For patients who have failed both anterior and posterior repairs, this type of recurrent inguinal hernia should be managed by an expert inguinal hernia surgeon, and the type of repair will be decided by the operating surgeon(Tran, 2018). The Consensus on international guidelines for the management of groin hernias 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) has also agreed on the use of an anterior or posterior approach, depending on what type of approach was performed by a primary inguinal hernia repair(van Veenendaal et al., 2020).

A tailored approach is recommended for the management of recurrent inguinal hernias depending on the type of surgery that was initially performed. We conducted this review article to investigate the incidence and risk factors for recurrent inguinal hernias. We will look at the role of open and laparoscopic repairs in their management. We conducted a literature review using PUBMED, Cochrane Database of Clinical Reviews, and Google Scholar, looking for clinical trials, observational studies, cohort studies, systematic reviews, and meta-analyses from 1995 to 2026. We used the following keywords: "recurrence", "anterior approach", "TAPP", "TEP "," preperitoneal repair "," open repairs", and "posterior approach". All articles were in English only. Further articles were obtained by manually cross-referencing the literature. Case reports and studies with fewer than 10 patients and editorials were excluded. Adult male and female patients were included in this study, and pediatric patients were excluded.

DISCUSSION

Incidence of recurrent inguinal hernia in adults

The incidence of inguinal hernia in adults is 5% to 10% for those below the age of 40, and it increases to 31% for those below the age of 70, and it is 45% for those above the age of 75 years. Recurrent inguinal hernias account for 13% to 17% of all inguinal hernia repairs(Jensen et al., 2017). Recurrent inguinal hernia remains an important outcome measure following inguinal hernia repair and is used as a key indicator of surgical quality. Although modern mesh-based repair techniques have substantially reduced recurrence rates, the incidence of recurrent inguinal hernia varies across countries because of differences in surgical expertise, operative techniques, patient characteristics, follow-up duration, and the quality of national hernia registries. Large national registry data from Sweden and Denmark demonstrate some of the lowest recurrence rates globally, 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 shown that approximately 3.5%-4% of inguinal hernia operations are performed for symptomatic recurrence, reflecting improvements associated with widespread mesh use(Smith et al., 2021). Data from the German Herniamed Registry indicate that recurrent inguinal hernias account for approximately 11%-14% of all male inguinal hernia repairs and 7%-7.4% of female repairs, highlighting the continued burden of recurrence despite modern operative techniques. Population-based studies from Nordic countries suggest that long-term recurrence rates are among the lowest worldwide, thanks to established quality assurance programs such as the Swedish Hernia Register and the Danish Hernia Database, which have significantly improved outcomes through continuous audit and feedback. In contrast, recurrence rates reported from low- and middle-income countries are generally higher, often ranging from 5% to 15%, which may reflect limited access to mesh, delayed presentation, resource constraints, and variations in surgical training. Overall, contemporary recurrence rates after elective mesh-based repair in high-income countries are typically 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

The risk factors for the development of recurrence after inguinal hernia repair include patient factors like age above 50 years, a family history of inguinal hernia, and a history of smoking, and other factors include the size of the hernia defect, with an increased size of 3cm or more being associated with recurrence. Direct inguinal hernias were associated with a higher risk of recurrence(Jansen et al., 2009; Junge et al., 2006). A systematic review and meta-analysis of observational studies on the patient-related risk factors for recurrence after inguinal hernia repair was conducted by Burcharth et al. A total of 14 studies with 378,824 repairs were performed on 375,620 patients, and 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) were significant risk factors for recurrence of inguinal hernias(Burcharth et al., 2015).

The other factors that affect recurrence include the type of surgery that was performed, with laparoscopic repairs being associated with a higher recurrence rate due to the technical difficulty and the long learning curve that is required to master the procedure. The sutured repair techniques are also associated with a higher recurrence rate due to a high proportion of technical failures(Lee et al., 2016; Magnusson et al., 2010). A retrospective study on inguinal hernia repairs performed for recurrence in Spain was conducted by Guillaume et al. A total of 95,025 patients were included in this study, and male and elderly patients were most likely to undergo surgery for recurrent inguinal hernia(Guillaume & Juvany, 2022).

Management of Recurrent inguinal hernia in adults

A. Laparoscopic inguinal hernia repair for recurrent inguinal hernia

Haggerty et al. conducted a prospective study on laparoscopic repair (Total Extraperitoneal) of recurrent inguinal hernia. There were 1298 patients in this study, with 1139 patients undergoing primary inguinal hernia repair and 159 undergoing recurrent inguinal hernia repair. There were no major complications, with hematoma formation being more common in the recurrent hernia repair group (4.4% vs 1.5%), and the short- and long-term quality of life was similar between the groups(Haggerty et al., 2021). A prospective study on the total extraperitoneal (TEP) repair for recurrent inguinal hernia was conducted by Scheurlein et al. There

were 179 patients with recurrent inguinal hernia included in this study, and intra-operative complications occurred in 4 patients; there were no conversions to open hernia repair. Postoperative hematoma was observed in 7 patients, and the recurrence rate was 0.4% after a follow-up of 2 years(Scheuerlein et al., 2003).

Goo et al. conducted a 5-year review on the total extraperitoneal (TEP) repair for recurrent inguinal hernia. The study included 37 patients; seroma developed in 2 patients, and 3 patients underwent conversion to open repair. The recurrence rate was 2.7% after 12 months of follow-up (Goo et al., 2010). Staarink et al. conducted a retrospective study on the long-term results of the total extraperitoneal (TEP) repair for primary and recurrent inguinal hernia. There were 306 patients in this study, with 28 patients undergoing TEP for recurrence. 3 patients developed re-recurrence(Staarink et al., 2008).Choi et al. performed a retrospective study on the safety and effectiveness of the Total Extraperitoneal (TEP) repair for recurrent inguinal hernia following open herniorrhaphy. There were 100 recurrent inguinal hernias in this study; the operation time was longer, and there was a higher incidence of peritoneal rupture during the procedure. The re-recurrence rate was 2%(Choi et al.,2010). Another retrospective study on the total extraperitoneal (TEP) repair for recurrent hernia was conducted by Lau. There were 100 cases in this study, and the incidence of peritoneal tears was 46%(Lau et al., 2004). Kockerling et al. conducted a register-based comparison of the outcomes between the total extraperitoneal (TEP) and Transabdominal preperitoneal (TAPP) for recurrent inguinal hernia. There were 2246 patients, with 1464 undergoing TAPP and 782 undergoing TEP, and there were no differences regarding postoperative complications, recurrence rate, and chronic pain between the procedures(Köckerling et al., 2017).

B. Comparison between laparoscopic and open repair for recurrent inguinal hernia

Feliu et al. performed a retrospective study comparing the laparoscopic and open approaches for recurrent inguinal hernia. 188 patients underwent 207 hernia repairs, with 86 undergoing TEP repairs and 121 undergoing open hernia repairs. Postoperative complications were more common in the open approach (23.9% vs 13.9%), but there were no differences regarding recurrence between the procedures (1.3% vs 1.8%)(Feliu et al., 2004). A prospective randomized trial comparing the Lichtenstein versus total extraperitoneal (TEP) repair for recurrent inguinal hernia was conducted by Kouhia et al.99 patients were randomized, with 47 who underwent the Lichtenstein repair and 49 who underwent the TEP repair. Postoperative complications were similar between both groups, but chronic pain was more common in the Lichtenstein group (27.7% vs 8.2%), and there were no differences in the recurrence rate between the procedures(Kouhia et al., 2009).

A meta-analysis comparing laparoscopic versus open mesh repair for recurrent inguinal hernia was conducted by Dedemadi et al. There were 7 studies with 1542 patients in this review, and there were no differences regarding wound infection between laparoscopic and open mesh repair (OR=0.48, 95% CI, 0.15-1.43), but seroma formation was higher in the laparoscopic group (OR=0.38, 95% CI, 0.15-0.96). There was no difference in the recurrence rate between the laparoscopic and open mesh repair (RR=0.72, 95% CI, 0.45-1.15), but in the laparoscopic hernia group, the overall recurrence rate was highest in the TAPP group when compared to the TEP group (RR=3.25, 95% CI, 1.32- 7.9)(Dedemadi et al., 2010). A randomized controlled trial comparing open versus laparoscopic preperitoneal mesh repair for recurrent inguinal hernia was conducted by Beets et al.79 patients were randomized, with 42 who underwent TAPP repair and 37 who underwent open preperitoneal repair. There were no differences regarding complications, but the TAPP repair took longer to perform (79minutes vs 59 minutes), and the recurrence rates were higher (12.5% vs 1.9%)(Beets et al., 1999).

A randomized multicenter trial comparing laparoscopic and the Lichtenstein repair for recurrent inguinal hernia was conducted by Eklund et al. A total of 147 patients were randomized, with 73 who underwent TAPP and 74 who underwent the Lichtenstein repair. The patients who underwent TAPP had reduced early postoperative pain, and the recurrence rates were 19% for TAPP and 18% for Lichtenstein repair at 5-year follow-up(Eklund et al., 2007). A meta-analysis of prospective randomized trials comparing laparoscopic and Lichtenstein repair for recurrent inguinal hernia was conducted by Pisanu et al. There were 7 studies with 647 patients (333 laparoscopic and 314 Lichtenstein) in this review. The patients who underwent laparoscopic repair had reduced chronic pain (9.2% vs 21.5%, M-H-0.39,95%CI,0.21.0.72), but no differences in the recurrence rates (8.3% vs11.6%, M-H-0.67,95%CI,0.39-1.16). The operative time was longer in the laparoscopic group (62.9minutes vs 54.2minutes,95%CI,0.03-0.89)(Pisanu et al., 2015). A meta-analysis of randomized controlled trials comparing laparoscopic and open mesh repair for recurrent inguinal hernia was conducted by Karthikesalingam et al. There were 4 studies with 404 patients in this review. There were no differences regarding recurrence rates (OR 0.84, 95% CI 0.33-2.17), chronic pain (OR-0.91,95%CI,0.14-5.88), and hematoma formation (OR-0.65,95%CI,0.22-1.95) between the procedures(Karthikesalingam et al., 2010).

A meta-analysis comparing laparoscopic versus open repair for recurrent inguinal hernia was conducted by Li et al. This review included 11 studies with 1311 patients, and laparoscopic repair was associated with a lower wound infection rate and a faster return to work. There were no differences regarding the re-recurrence rate between the procedures(Li et al., 2014). Yang et al. conducted a systematic review and meta-analysis comparing laparoscopic versus open mesh repair for recurrent inguinal hernia. There were 10 studies with 1017 patients in this review, and laparoscopic repair was associated with reduced wound infection rate (OR=0.28, 95% CI, 0.10-0.81), and reduced length of hospital stay (MD-3.65,95%CI,4.76-2.53) but there were no differences regarding recurrence rates (OR-0.74,95%CI,0.45-1.21), and hematoma formation (OR-0.71,95%CI,0.28-1.79)(C. Yang & Deng, 2020).

Table I

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

C. The Open Preperitoneal approach for recurrent inguinal hernia

Katri performed a prospective study on the open preperitoneal mesh repair of recurrent inguinal hernia. There were 45 patients in this study, and the repair was performed with a 15cm by 15 cm polypropylene mesh. There were no major complications, and there was no recurrence after a 10.8-month follow-up(Katri, 2009). Kruzer et al. performed a prospective study on the open preperitoneal mesh repair for recurrent inguinal hernia. There were 101 patients in this study, and there were no major complications, but there were 5 recurrences after 6 months of follow-up; however, there was only one recurrence following the subsequent follow-up of 21 months(Kurzer et al., 2002).

Yang et al. looked at the long-term outcomes of the open preperitoneal mesh repair for recurrent inguinal hernia. This prospective study included 107 patients, and the complication rate was 8.4%, which included wound infection, seroma formation, and acute urinary retention. There were 3 recurrences after a follow-up of 42.3 months(B. Yang et al., 2015). Saber et al. compared the open preperitoneal mesh repair against the Lichtenstein repair for recurrent inguinal hernia. This randomized study included 120 patients who were divided into 56 who underwent open preperitoneal repair and 54 who underwent Lichtenstein repair. There were more overall complications in the Lichtenstein repair, while the recurrence rates were also higher in the Lichtenstein repair (6.25% vs 3.3%)(Saber et al., 2012).

CONCLUSION

Recurrence remains a critical outcome measure following inguinal hernia repair despite substantial advances in surgical techniques and mesh technology. Both open mesh repair and laparoscopic approaches achieve low recurrence rates when performed appropriately. Current evidence suggests that recurrence rates are comparable between modern open and laparoscopic techniques, although laparoscopic repair offers additional benefits in terms of postoperative pain and recovery. Optimal management of recurrent hernias requires careful consideration of the previous repair and application of guideline-recommended approaches. Ongoing advances in mesh technology, surgical training, and minimally invasive techniques are expected to further reduce recurrence rates in the future.

Conflict of interest: There is no conflict of interest

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