

Chapter 23

Transabdominal Preperitoneal (TAPP) Inguinal Hernia Repair: A Review

Kumar Hari Rajah^{1*}

¹Associate Professor of Surgery, Taylor's University School of Medicine and Health Science, 47500 Subang Jaya, Malaysia.

*Corresponding Author.

Abstract

Inguinal hernia repair ranks among the most commonly performed general surgical procedures globally. The advent of laparoscopic techniques has markedly altered the management of adult inguinal hernias, with transabdominal preperitoneal (TAPP) repair gaining acceptance as a minimally invasive approach. TAPP repair offers superior visualization of the myopectineal orifice, aids in the detection of occult hernias, and permits bilateral repairs using the same access ports. The outcomes of TAPP repair are comparable to those of open mesh repair in terms of recurrence, while it provides benefits in postoperative pain, resumption of normal activities, and cosmetic results. Nonetheless, the procedure necessitates advanced laparoscopic skills and presents a minor risk of visceral and vascular complications due to entry into the peritoneal cavity. This chapter provides an overview of the TAPP procedure and contrasts it with the totally extraperitoneal (TEP) repair and open inguinal hernia repairs, such as the Lichtenstein and Shouldice techniques.

Keywords: TAPP, Inguinal Hernia, Laparoscopic, Endoscopic, Recurrence, Chronic Pain, and Mesh Repair.

Introduction

In 1992, Arregui et al. conducted the inaugural transabdominal preperitoneal (TAPP) repair. The procedure commenced with an incision into the peritoneum upon entering the peritoneal cavity, followed by accessing the preperitoneal space and performing dissection up to the transversalis fascia. Subsequently, the hernia sac was reduced, and a mesh measuring 2.5 × 4.5 inches was inserted. This mesh was secured with sutures to the transversus abdominis aponeurosis superiorly, the iliotibial tract inferiorly, and the transversus abdominis laterally. The peritoneum was then reapproximated. Arregui applied this technique to 52 patients, with complications observed in 3 patients, and no recurrences were reported (Arregui et al., 1992). The TAPP repair is the most frequently performed laparoscopic repair due to its provision of a broader surgical field, facilitating the identification of anatomical structures. It is applicable for unilateral, bilateral, incarcerated, and obstructed inguinal hernias, although it carries a risk of bowel and vascular injuries (Xu et al., 2023).

The HerniaSurge guidelines, as endorsed by the Australasian Hernia Society, advocate for the Transabdominal Preperitoneal (TAPP) repair as a laparoscopic technique for the surgical management of inguinal hernia in adults. This recommendation is contingent upon the surgeon's skills, experience, and expertise (Tran, 2018). The TAPP repair is noted for its association with a decreased incidence of immediate postoperative pain. Furthermore, the occurrence of chronic pain is also diminished in comparison to open inguinal hernia repairs, as emphasized in the updated guidelines of the Australasian Hernia Society (Stabilini et al., 2023).

This chapter seeks to evaluate the role of transabdominal preperitoneal (TAPP) repair by examining its indications and complications. A comparison will be made between TAPP and other laparoscopic inguinal hernia repairs, such as total extraperitoneal (TEP) repair. Additionally, TAPP will be compared with the Lichtenstein and other open inguinal hernia repair techniques. A comprehensive literature review was conducted using PubMed, Google Scholar, Semantic Scholar, and Cochrane databases to identify original research studies, observational studies, clinical trials, clinical reviews, review articles, systematic reviews, and meta-analyses from 1990 to 2026. The search utilized the following keywords: "TAPP," "Inguinal hernia," "laparoscopic," "endoscopic," "recurrence," "chronic pain," and "mesh repair."

All articles were in English, and additional articles were identified through manual cross-checking. Case reports, commentaries, and editorials were excluded, while all articles involving adult patients were included in this review.

Discussion

Transabdominal Preperitoneal (TAPP) inguinal hernia repair

Thanh et al. conducted a prospective study on the Transabdominal Preperitoneal (TAPP) approach for inguinal hernia repairs in adults, involving 31 patients. The mean duration of surgery was 60 minutes, and no recurrences were observed (Thanh Xuan & Huu Son, 2020). Muschalla et al. also conducted a prospective study to evaluate the effectiveness of TAPP in inguinal hernia repair. This study included 952 patients, with TAPP repair performed in 98.02% of cases. Early postoperative complications occurred in 2.8% of cases, and after a 5-year follow-up, the recurrence rate was 0.4%, while chronic pain was reported in 0.59% of cases (Muschalla et al., 2016). Schultz et al. conducted a prospective study on TAPP repair for inguinal hernia in adults, involving 1952 patients and 2500 TAPP procedures. The complication rate was 3.56%, with hematoma formation being the most common complication, and the recurrence rate was 1.04% (Schultz et al., 2001).

Kapiris et al. conducted a study on laparoscopic transabdominal preperitoneal (TAPP) repair for inguinal hernia in adults, involving 3017 patients and 3530 TAPP procedures. The study reported an 8% incidence of postoperative hematoma and seroma, with a recurrence rate of 0.16% after a 45-month follow-up period (Kapiris et al., 2001). In a separate investigation, Mortensen et al. examined the impact of mesh fixation methods on recurrence rates in TAPP repair, utilizing data from the Danish Hernia Database. This study encompassed 49,502 TAPP repairs and identified a recurrence rate of 3.6% following a 5.76-year follow-up. The findings indicated that tack fixation was associated with a higher recurrence rate compared to glue fixation of the mesh (Mortensen et al., 2025).

Mayer et al. conducted a registry-based analysis to determine the necessity of mesh fixation in the transabdominal preperitoneal (TAPP) repair for inguinal hernia in adults. The study included 11,228 patients from the Hernia Med Hernia registry, with 66.1% undergoing mesh fixation and 33.9% not receiving mesh fixation. The recurrence rates were comparable between the two groups, at 0.8% for mesh fixation and 1.1% for non-mesh fixation (Mayer et al., 2016). In a separate study, Lovisetto et al. examined the surgical phases and complications associated with laparoscopic TAPP. Among 1,973 patients who underwent TAPP repair, complications occurred in 3.7% of cases, with major complications accounting for 1.7% and minor complications for 2%. The recurrence rate was reported as 0.6% after a follow-up period of five years (Lovisetto et al., 2007).

A randomized controlled clinical trial conducted by Habeeb et al. examined the outcomes of mesh fixation in transabdominal preperitoneal (TAPP) repair. The study involved 798 patients, divided into three groups: 266 patients with mesh non-fixation, 266 with tackler mesh fixation, and 266 with cyanoacrylate mesh fixation. The results indicated no differences in postoperative complications and chronic pain among the procedures; however, mesh fixation with tackers was associated with an increased risk of postoperative complications (Habeeb et al., 2020). Additionally, a systematic review and meta-analysis of randomized controlled trials on mesh fixation in TAPP inguinal hernia repair, conducted by Riemenschneider et al., included seven studies with a total of 1732 patients (995 with mesh fixation and 737 without). The analysis revealed no significant differences in recurrence rates (OR 2.80, 95% CI, 0.61-12.77) or chronic pain (VAS -0.17, 95% CI, 0.90-1.24) between mesh fixation and non-fixation (Riemenschneider et al., 2023).

Comparison between the Transabdominal Preperitoneal (TAPP) and Total Extraperitoneal (TEP) inguinal hernia repair in adults

Varcu et al. conducted a retrospective comparison of TAPP and TEP inguinal hernia repairs in adults. The study involved 70 patients, with 34 undergoing TAPP and 36 undergoing TEP repair. The results indicated no differences in postoperative complications or hematoma formation between the two procedures, and no recurrences were observed after a 24-month follow-up (Vărcu et al., 2016). Krishna et al. performed a prospective randomized controlled trial comparing TAPP and TEP repairs for inguinal hernia in adults. In this study, 100 patients were randomized, with 47 undergoing TAPP and 53 undergoing TEP. The TAPP group exhibited a higher incidence of scrotal edema (16% vs. 9%), whereas the TEP group had a higher seroma rate (37.8% vs. 18.3%). No differences were found in wound infection rates, and neither group experienced recurrences after 44 months of follow-up (Krishna et al., 2012). Bansal et al. conducted a prospective randomized study to compare chronic pain and quality of life between TAPP and TEP repairs. The study included 314 patients, with 154 undergoing TAPP repair and 160 undergoing TEP repair. The findings revealed no differences in chronic pain or quality of life between the two procedures (Bansal et al., 2013).

A Cochrane review by Andresen et al. compared Transabdominal Preperitoneal (TAPP) and Total Extraperitoneal (TEP) laparoscopic repair for inguinal hernia in adults. The review included 23 studies with a total of 3,447 patients, comprising 1,156 in the TAPP group and 1,110 in the TEP group. The analysis revealed no significant differences between the TAPP and TEP procedures in terms of adverse events (0.4% vs. 0.7%, OR 0.58, 95% CI 0.15-2.23), recurrence rates (1.2% vs. 1.1%, OR 1.14, 95% CI 0.49-2.26), and chronic pain (OR 0.62, 95% CI 0.20-1.97) (Andresen & Rosenberg, 2024). Additionally, a retrospective analysis by Cao et al. examined TAPP versus TEP for adult inguinal hernia repair, involving 686 patients, with 361 undergoing TAPP and 325 undergoing TEP. This study also found no significant differences in postoperative complications and recurrence rates between the two procedures (Cao et al., 2022).

Almutairi et al. conducted a systematic review and network meta-analysis of randomized controlled trials concerning the laparoscopic management of inguinal hernia. This review encompassed 10 studies involving 11,547 patients, and it found no differences in wound infection rates, seroma, and hematoma formation between the procedures (Almutairi et al., 2024). In a separate study, Köckerling et al. analyzed data from the hernia registry to compare the perioperative outcomes of Transabdominal Preperitoneal (TAPP) versus Total Extraperitoneal (TEP) repair in adults with primary inguinal hernia. This study prospectively assessed 17,587 patients, with 10,877 undergoing TAPP and 6,700 undergoing TEP, and found no significant differences in postoperative complications between the two procedures (Köckerling et al., 2015).

McCormack et al. conducted a systematic review comparing Transabdominal Preperitoneal (TAPP) and Total Extraperitoneal (TEP) repair for inguinal hernia in adults. This review included 10 studies and found no differences in postoperative complications and recurrence rates between the procedures. However, TAPP was linked to a higher risk of visceral and vascular injury, whereas TEP had a higher conversion rate (McCormack et al., 2005). Similarly, Bracale et al. performed a systematic review and meta-analysis comparing TAPP and

TEP repairs for inguinal hernia. This analysis encompassed 13 studies with a total of 1604 patients, of whom 395 underwent TAPP and 1209 underwent TEP repairs. The findings indicated no differences in postoperative complications and recurrence rates between the two procedures, although TAPP was associated with a slightly longer operative time (Bracale et al., 2012).

Wei et al. conducted a meta-analysis to evaluate the Transabdominal Preperitoneal (TAPP) approach in comparison to the Total Extraperitoneal (TEP) approach for inguinal hernia repair. This review incorporated 10 studies involving 1047 patients and identified no significant differences in complications (RR = 0.84, 95% CI, 0.67 to 1.06) or recurrence rates (RR = 1.18, 95% CI, 0.47 to 2.98) (Wei et al., 2015). Furthermore, Kitching et al. performed a meta-analysis and trial sequential analysis to compare glue versus tacker for mesh fixation in laparoscopic inguinal hernia repair. This analysis included 18 studies with a total of 2312 patients, comprising 1149 who underwent glue fixation and 1163 who underwent tacker fixation. The results demonstrated that glue fixation was associated with a reduction in hematoma (MD = -0.35, 95% CI, 0.17 to 0.73), postoperative pain (MD = -1.80, 95% CI, 2.71 to 0.89), and chronic pain (MD = -0.42, 95% CI, 0.27 to 0.64) (Kitching et al., 2025).

Chen et al. conducted an updated systematic review and meta-analysis of randomized controlled trials comparing Transabdominal preperitoneal (TAPP) and Total Extraperitoneal (TEP) repair for inguinal hernia in adults. The analysis included 16 studies with a total of 1519 patients, revealing no significant differences in complications, recurrence rates, or chronic pain between the two procedures. However, TEP was associated with a shorter hospital stay (MD -0.87, 95% CI, -1.67 to -0.07) but required longer operative time (MD 3.35, 95% CI, 0.16 to 6.54) (Chen et al., 2019). Naim et al. also conducted a systematic review and meta-analysis comparing TAPP and TEP for inguinal hernia repair. This study included 7 studies with 976 patients (TAPP: 533, TEP: 453) and found no differences in postoperative complications, recurrence rates, or chronic pain between the procedures. TAPP was associated with lower seroma rates (RR 0.67, 95% CI, 0.62 to 6.57) but higher scrotal edema (RR 1.42, 95% CI, 1.02 to 1.98) (Naim & Reza, 2026). Aiolfi et al. performed a systematic review and trial sequential analysis of randomized controlled trials comparing TAPP and TEP approaches for inguinal hernia repair. This analysis included 15 studies with 1359 patients (TAPP: 702, TEP: 657) and found no differences in postoperative pain, recurrence rates (RR 0.83, 95% CI, 0.35 to 1.96), or chronic pain (RR 1.51, 95% CI, 0.45 to 4.22) (Aiolfi et al., 2021).

Table 1

Study	Study Type	N=Numbers	Recurrence Rate	Chronic Pain
Bracale et al. (2012)	Systematic review & Meta-analysis	1604	No difference in recurrence between TAPP & TEP	No differences in chronic pain between TAPP & TEP
Chen et al. (2019)	Systematic review & Meta-analysis of randomized controlled trials	1519	No difference in recurrence between TAPP & TEP	No difference in chronic pain between TAPP & TEP
Aiolfi et al. (2021)	A systematic review and trial sequential analysis	1359	No differences in the recurrence rate between the procedures (RR-0.83,95% CI)	No differences in chronic pain between the procedures (RR-1.51,95% CI)
Andresen et al. (2024)	Cochrane Review	3447	No difference in the recurrence rate between procedures-OR-1.14,95% CI)	No difference in chronic pain between the procedures (OR-0.62,95% CI)

Table1 showing the recurrence rate and chronic pain between the TAPP and TEP inguinal hernia repairs.

Comparison of the Transabdominal Preperitoneal (TAPP) with the open inguinal hernia repair in adults

Haladu et al. conducted a systematic review and meta-analysis of randomized controlled trials comparing open and laparoscopic inguinal hernia repairs. This review encompassed 21 studies and found no significant differences in recurrence rates between the two methods. However, laparoscopic repairs were associated with a lower incidence of chronic pain (Haladu et al., 2022). Similarly, Patterson et al. performed a meta-analysis of outcomes following laparoscopic versus open inguinal hernia repairs, which included 58 studies with a total of 7,192 patients. Their findings indicated that laparoscopic repair was linked to reduced postoperative pain (RR = 0.74, 95% CI, 0.62-0.88) (Patterson et al., 2019). Furthermore, Bullen et al. conducted a systematic review and meta-analysis with trial sequential analysis comparing open versus laparoscopic mesh repair for unilateral inguinal hernia. This study included 12 studies with 3,966 patients (2,040 undergoing laparoscopic repair and 1,926 undergoing Lichtenstein repair). The results demonstrated that laparoscopic repair was associated with reduced postoperative and chronic pain (OR = 0.41, 95% CI, 0.30-0.56), with no significant differences in recurrence rates between the procedures (OR = 1.14, 95% CI, 0.51-2.55) (Bullen et al., 2019).

Butt et al. conducted a systematic review and meta-analysis of randomized controlled trials comparing the transabdominal preperitoneal (TAPP) approach with the Lichtenstein repair for primary unilateral inguinal hernia. This review included 17 studies and found that TAPP was associated with a reduced risk of surgical site infection (RR=0.36, 95% CI, 0.17-0.76), hematoma formation (RR = 0.27, 95% CI, 0.14-0.52), and chronic pain (RR = 0.42, 95% CI, 0.20-0.88). No differences in recurrence rates were observed between the two procedures (Butt & Rehman, 2026). Delgado et al. conducted a systematic review and meta-analysis of randomized controlled trials comparing the Shouldice and TAPP techniques for inguinal hernia repair. This study included 13 studies with a total of 2214 patients and found no differences in hematoma formation (RR 1.08, 95% CI 0.80-1.46) and recurrence rate (RR 0.94, 95% CI 0.66-1.35) between the procedures. However, the Shouldice repair was associated with higher chronic pain (RR 2.13, 95% CI 1.31-3.46) (Delgado & Pompeu, 2025).

Wellwood et al. conducted a randomized controlled trial to compare laparoscopic and open mesh repair for inguinal hernia in adults. The study involved 400 patients, with 200 undergoing transabdominal preperitoneal (TAPP) repair and 200 undergoing Lichtenstein repair. The findings indicated that postoperative pain was lower in the laparoscopic group compared to the open repair group, although the cost was higher for the laparoscopic procedure (Wellwood et al., n.d.). Sultan et al. conducted a multicenter short-term randomized comparative study to evaluate clinical outcomes of TAPP versus Lichtenstein repair for unilateral inguinal hernia. This study included 100 patients, with 49 undergoing TAPP and 51 undergoing Lichtenstein repair. The TAPP procedure was associated with reduced postoperative pain but required a

longer operative time (Sultan et al., 2022). Additionally, a retrospective cohort study by Sofi et al. comparing TAPP with Lichtenstein repair also concluded that TAPP was associated with reduced postoperative pain (Sofi et al., 2021).

Table 2

Study	Study Type	N=Numbers	Recurrence Rate	Chronic Pain
Bullen et al. (2019)	Systematic review & Meta-analysis	2019	No difference in the recurrence rate between procedures (OR = 1.14, 95% CI)	Laparoscopic repair was associated with reduced chronic pain (OR = 0.41, 95% CI)
Delgado et al. (2025)	Systematic review & Meta-analysis	2214	No differences in the recurrence rate between the procedures (RR = 0.94, 95% CI)	The Shouldice repair had higher chronic pain (RR = 2.13, 95% CI)
Butt et al. (2026)	Systematic Review & Meta-analysis	17 studies	No differences in the recurrence rate between the procedures	TAPP was associated with reduced chronic pain (RR 0.42, 95% CI)

Table 2 showing the comparison between the TAPP and open inguinal hernia repairs.

Conclusion

Transabdominal preperitoneal (TAPP) repair has become integral to contemporary adult inguinal hernia surgery. This procedure offers superior visualization of the groin anatomy, enabling the repair of unilateral, bilateral, and recurrent hernias, with recurrence rates comparable to those of open mesh repair. Evidence increasingly indicates that TAPP repair results in reduced chronic postoperative pain, expedited recovery, and enhanced patient satisfaction relative to traditional open methods. While the technique necessitates specialized training and a thorough understanding of posterior groin anatomy, it remains a safe and effective procedure when executed by skilled surgeons. Current international guidelines endorse TAPP as the preferred approach for bilateral, recurrent, and numerous primary inguinal hernias. Anticipated advancements in mesh technology, robotic surgery, and perioperative care are expected to further enhance the outcomes of TAPP repair.

Declaration

Conflict of interest: There is no conflict of interest.

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