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Review Article

Transabdominal Preperitoneal (TAPP) Inguinal Hernia Repair: An Update: Narrative Review Article

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Abstract: Inguinal hernia repair is among the most frequently performed general surgical procedures worldwide. The introduction of laparoscopic techniques has significantly transformed the management of adult inguinal hernias, with transabdominal preperitoneal (TAPP) repair emerging as a widely accepted minimally invasive approach. TAPP repair provides excellent visualization of the myopectineal orifice, facilitates identification of occult hernias, and allows bilateral repairs through the same access ports. TAPP repair has demonstrated outcomes comparable to open mesh repair regarding recurrence while offering advantages in postoperative pain, return to normal activities, and cosmetic results. However, the procedure requires advanced laparoscopic expertise and carries a small risk of visceral and vascular complications associated with entry into the peritoneal cavity. This review summarizes the TAPP procedure and compares it with the TEP repair and open inguinal hernia repairs like the Lichtenstein and Shouldice repairs.

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

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INTRODUCTION

Arregui *et al*., performed the first transabdominal preperitoneal (TAPP) repair in 1992. Upon entering the peritoneal cavity, the peritoneum was incised, the preperitoneal space was entered, and dissection was performed up to the transversalis fascia. After reducing the hernia sac, a 2.5 x 4.5-inch mesh was inserted and anchored with sutures to the transversus abdominis aponeurosis superiorly, the iliotibial tract inferiorly, and the transversus abdominis laterally. The peritoneum was then reapproximated. Arregui performed this on 52 patients and complications were noted in 3 patients and there was no recurrence(Arregui *et al*., 1992). The TAPP repair is the most commonly performed laparoscopic repair as it provides a wider surgical field to allow easier identification of anatomical structures. It can be performed for unilateral, bilateral, incarcerated, and obstructed inguinal hernias, but it has a risk of bowel and vascular injuries(Xu *et al*., 2023).

The HerniaSurge guidelines for the management of inguinal hernia by the Australasian Hernia Society have recommended the TAPP repair as a laparoscopic technique for the surgical management of inguinal hernia in adults based on the surgeon's skill, experience, and expertise(Tran, 2018). The TAPP repair is also associated with a reduced incidence of immediate postoperative pain, and the incidence of chronic pain is also reduced when compared with open inguinal hernia repairs, and these were highlighted in the updated guidelines for the Australasian Hernia Society(Stabilini *et al*., 2023).

This review article aims to examine the role of the transabdominal preperitoneal (TAPP) repair, looking at the indications and complications. We will compare the TAPP with other laparoscopic inguinal hernia repairs, such as the total extraperitoneal (TEP) repair. The TAPP repair will also be compared with the Lichtenstein and other open inguinal hernia repairs. 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 employed 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) for inguinal hernia repairs in adults. There were 31 patients in this study, and the mean duration of surgery was 60 minutes, and there was no recurrence noted(Thanh Xuan & Huu Son, 2020). A prospective study on the effectiveness of the Transabdominal Preperitoneal (TAPP) in inguinal hernia repair was conducted by Muschalla *et al*., There were 952 patients in this study, and the TAPP repair was performed in 98.02% of the cases. Early postoperative complications were seen in 2.8% of cases, and after a follow-up of 5 years, the recurrence rate was 0.4% and chronic pain was 0.59%(Muschalla *et al*., 2016). Schultz *et al*., conducted a prospective study on the Transabdominal Preperitoneal (TAPP) repair for inguinal hernia in adults. There were 1952 patients, and 2500 TAPP procedures were performed, and the complication rate was 3.56%, with hematoma formation being the most common complication. The recurrence rate from TAPP was 1.04%(Schultz *et al*., 2001).

Kapiris *et al*., performed the laparoscopic transabdominal preperitoneal (TAPP) repair for inguinal hernia in adults. There were 3017 patients in this study, and 3530 TAPP repairs were performed. The incidence of postoperative hematoma and seroma was 8%, and the recurrence rate was 0.16% following follow-up of 45 months(Kapiris *et al*., 2001). Mortensen *et al*., looked at the method of fixation of the mesh in the TAPP repair and how it influences the recurrence rate. This study was from the Danish Hernia Database, and there were 49,502 TAPP repairs, and the recurrence rate was 3.6% after a follow-up of 5.76 years. Tack fixation was associated with a higher recurrence rate when compared with glue fixation of the mesh(Mortensen *et al*., 2025).

Mayer et al. performed a registry-based analysis of whether mesh fixation is necessary in the TAPP repair for inguinal hernia in adults. 11,228 patients underwent TAPP repair from the Hernia Med Hernia registry, with 66.1% undergoing mesh fixation and 33.9% undergoing no mesh fixation. There were no differences in recurrence rates between mesh fixation and non-mesh fixation (0.8% vs 1.1%)(Mayer *et al*., 2016). Lovisetto *et al*., looked at the surgical phases and complications of the laparoscopic TAPP. A total of 1973 patients had undergone TAPP repair, and complications were seen in 3.7% of cases, with 1.7% being major complications and 2% being minor complications. The recurrence rate was 0.6% after a follow-up of 5 years(Lovisetto *et al*., 2007).

A randomized controlled clinical trial comparing the outcomes of mesh fixation in the transabdominal preperitoneal (TAPP) repair was conducted by Habeeb *et al*., There were 798 patients who were divided into 266 with mesh non-fixation, 266 with tacker mesh fixation, and 266 who underwent cyanoacrylate mesh fixation. There were no differences regarding postoperative complications and chronic pain between the procedures; mesh fixation with tackers is associated with an increased risk of postoperative complications(Habeeb *et al*., 2020). A systematic review and meta-analysis of randomized controlled trials on mesh fixation in the Transabdominal preperitoneal (TAPP) inguinal hernia repair was conducted by Riemenschneider *et al*., There were 7 studies with 1732 patients (995 with mesh fixation and 737 without mesh fixation). There were no differences regarding the recurrence rate (OR 2.80, 95% CI,0.61-12.77) and chronic pain (VAS -0.17, 95% CI, 0.90- 1.24) between fixation and non-fixation of mesh(Riemenschneider *et al*., 2023).

Comparison between the Transabdominal Preperitoneal (TAPP) and Total Extraperitoneal (TEP) Inguinal Hernia Repair in Adults

Varcuae *et al*., retrospectively compared the TAPP versus the TEP inguinal hernia repair in adults. 70 patients were divided into 34 who underwent TAPP and 36 who underwent TEP repair, and there were no differences regarding the postoperative complications and hematoma formation between the two procedures. No recurrence was noted after follow-up of 24 months(Vãrcuae *et al*., 2016). A prospective randomized controlled trial comparing the TAPP versus TEP repairs for inguinal hernia in adults was conducted by Krishna *et al*., 100 patients were randomized, with 47 who underwent the TAPP and 53 who underwent the TEP. The TAPP group had a higher incidence of scrotal edema (16% vs 9%), while the TEP group had a higher seroma rate (37.8% vs 18.3%). There were no differences in wound infection, and neither group had recurrences after 44 months of follow-up (Krishna *et al*., 2012). Bansal *et al*., conducted a prospective randomized study comparing chronic pain and quality of life between the TAPP and TEP repairs. A total of 314 patients were randomized, with 154 undergoing the TAPP repair and 160 who underwent the TEP repair. There were no differences regarding chronic pain and quality of life between the two procedures(Bansal *et al.,* 2013).

A Cochrane review comparing the Transabdominal Preperitoneal (TAPP) versus Total Extraperitoneal (TEP) laparoscopic repair for inguinal hernia repairs in adults was conducted by Andresen *et al*., There were 23 studies with 3447 patients (TAPP-1156 and TEP-1110), and there were no differences in the TAPP and TEP procedures regarding adverse events (0.4% vs0.7%, OR-0.58,95%CI,0.15-2.23), recurrence rates (1.2% vs1.1%, OR-1.14,95%CI,0.49-2.26), and chronic pain (OR-0.62,95%CI,0.20-1.97)(Andresen &

Rosenberg, 2024). Cao *et al*., conducted a retrospective analysis comparing transabdominal preperitoneal (TAPP) versus total extraperitoneal (TEP) for adult inguinal hernia. There were 686 patients in this study, with 361 undergoing TAPP and 325 undergoing TEP repairs. There were no differences regarding postoperative complications and recurrence rates between the procedures(Cao *et al*., 2022).

A systematic review and network meta-analysis of randomized controlled trials on the laparoscopic management of inguinal hernia was conducted by Almutairi *et al*., There were 10 studies with 11,547 patients in this review, and there were no differences regarding the wound infection rate, seroma, and hematoma formation between the procedures(Almutairi *et al*., 2024). Kockerling *et al*., conducted a study from the hernia registry comparing the perioperative outcomes of the Transabdominal preperitoneal (TAPP) versus the Total extraperitoneal (TEP) repair in primary inguinal hernia in adults. There were 17,587 patients who were prospectively assessed, with 10,877 undergoing TAPP and 6700 undergoing TEP. There were no significant differences regarding the postoperative complications between the procedures(Köckerling *et al*., 2015).

A systematic review comparing the Transabdominal preperitoneal (TAPP) versus the Total Extraperitoneal (TEP) repair for inguinal hernia in adults was conducted by McCormack *et al.*, There were 10 studies in this review, and there were no differences regarding postoperative complications and recurrence rates between the procedures, but TAPP was associated with a higher risk of visceral and vascular injury, while TEP was associated with a higher conversion rate(McCormack *et al*., 2005). A systematic review and meta-analysis comparing the transabdominal preperitoneal (TAPP) and the Total Extraperitoneal (TEP) repair for inguinal hernia repair was conducted by Bracale *et al*., There were 13 studies with 1604 patients, with 395 undergoing TAPP and 1209 undergoing TEP repairs. There were no differences regarding postoperative complications and recurrence rates between the procedures, but TAPP was associated with a slightly longer operative time(Bracale *et al*., 2012).

Wei *et al*., conducted a meta-analysis comparing the Transabdominal Preperitoneal (TAPP) versus Total Extraperitoneal (TEP) for inguinal hernia repair. There were 10 studies with 1047 patients in this review, and there were no differences regarding complications (RR=0.84, 95% CI, 0.67, 1.06) and recurrence rates (RR=1.18, 95% CI, 0.47, 2.98)(Wei *et al*., 2015). A meta-analysis and trial sequential analysis comparing glue versus tacker for mesh fixation in laparoscopic inguinal hernia repair was conducted by Kitching *et al*., There were 18 studies with 2312 patients (1149 with glue fixation and 1163 with tacker fixation). Glue fixation was associated with reduced hematoma (MD-0.35,95%CI,0.17-0.73), reduced postoperative pain (MD-1.80,95%CI,2.71-0.89), and chronic pain (MD-0.42,95%CI,0.27-0.64)(Kitching *et al*., 2025).

An updated systematic review and meta-analysis of randomized controlled trials comparing the Transabdominal preperitoneal (TAPP) and Total Extraperitoneal (TEP) repair for inguinal hernia in adults was conducted by Chen *et al.*, There were 16 studies with 1519 patients, and there were no differences regarding complications, recurrence rate, and chronic pain between the procedures. TEP was, however, associated with a shorter hospital stay (MD-0.87,95%CI,1.67-0.07), but longer operative time (3.35,95%CI,0.16-6.54)(Chen *et al*., 2019). A systematic review and meta-analysis comparing the Transabdominal preperitoneal (TAPP) versus Total Extraperitoneal (TEP) for inguinal hernia repair was conducted by Naim *et al*., There were 7 studies with 976 patients (TAPP-533, TEP-453), and there were no differences regarding postoperative complications, recurrence rates, and chronic pain between the procedures. TAPP was associated with lower seroma rates (RR 0.67, 95% CI, 0.62- 6.57), but higher scrotal edema (RR 1.42, 95% CI, 1.02-1.98)(Naim & Reza, 2026). A systematic review and trial sequential analysis of randomized controlled trials comparing the Transabdominal preperitoneal (TAPP) and Total Extraperitoneal (TEP) approaches for inguinal hernia repair was conducted by Aiolfi *et al*., There were 15 studies with 1359 patients (TAPP-702 and TEP-657). There were no differences regarding postoperative pain, recurrence rate (RR 0.83, 95% CI 0.35- 1).96), and chronic pain (RR 1.51, 95% CI 0.45-4.22)(Aiolfi *et al*., 2021).

Table I

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)

Study	Study Type	N=Numbers	Recurrence Rate	Chronic Pain
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)

Table 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

A systematic review and meta-analysis of randomized controlled trials of the open versus laparoscopic inguinal hernia repairs was conducted by Haladu *et al*., There were 21 studies in this review, and there were no differences regarding recurrence rates between the laparoscopic and open inguinal hernia repairs, but there was a reduced rate of chronic pain in the laparoscopic inguinal hernia repairs(Haladu *et al*., 2022). A meta-analysis of outcomes after laparoscopic versus open inguinal hernia repairs was conducted by Patterson *et al*., There were 58 studies with 7192 patients in this study, and laparoscopic inguinal hernia repair was associated with reduced postoperative pain (RR=0.74, 95% CI, 0.62-0.88)(Patterson *et al*., 2019). A systematic review and meta-analysis with trial sequential analysis comparing open versus laparoscopic mesh repair for unilateral inguinal hernia was conducted by Bullen *et al*., There were 12 studies with 3966 patients (2040 laparoscopic and 1926 Lichtenstein) who were included in this study, and the laparoscopic repair was associated with reduced postoperative pain and chronic pain (OR-0.41,95%CI,0.30-0.56). There were no differences regarding recurrence between the procedures (OR 1.14, 95% CI, 0.51-2.55)(Bullen *et al*., 2019).

A systematic review and meta-analysis of randomized controlled trials comparing the transabdominal preperitoneal (TAPP) versus Lichtenstein repair in primary unilateral inguinal hernia was conducted by Butt *et al*., There were 17 studies in this review, and 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). There were no differences in recurrence rates between the two procedures (Butt & Rehman, 2026). A systematic review and meta-analysis of randomized controlled trials comparing the Shouldice and TAPP for inguinal hernia repair was conducted by Delgado *et al*., There were 13 studies with 2214 patients in this study, and there were no differences regarding 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. The Shouldice repair was associated with higher chronic pain (RR 2.13, 95% CI 1.31-3.46)(Lucas Montero Delgado & Bernado Fontel Pompeu, 2025).

A randomized controlled trial comparing laparoscopic versus open mesh repair for inguinal hernia in adults was conducted by Wellwood *et al*., There were 400 patients who were randomized, with 200 who underwent TAPP and 200 who underwent the Lichtenstein repair. Postoperative pain was lower in the laparoscopic inguinal hernia group than in the open hernia repair group. The cost was, however, higher in the laparoscopic inguinal hernia group(Wellwood *et al*., 1998). A multicenter short-term randomized comparative study of clinical outcomes comparing the transabdominal preperitoneal (TAPP) versus Lichtenstein repair for unilateral inguinal hernia was conducted by Sultan *et al*., There were 100 patients in this study, with 49 patients undergoing TAPP and 51 undergoing the Lichtenstein repair. The TAPP repair was associated with reduced postoperative pain, but it was associated with a longer operative time(Sultan *et al*., 2022). A retrospective cohort study comparing the transabdominal preperitoneal (TAPP) repair with the Lichtenstein repair by Sofi *et al*., also concluded that the TAPP repair was associated with reduced postoperative pain(Sofi *et al*., 2021).

CONCLUSION

TAPP repair has become a cornerstone of modern adult inguinal hernia surgery. The procedure provides excellent visualization of groin anatomy, facilitates unilateral, bilateral, and recurrent hernia repair, and achieves recurrence rates comparable to open mesh repair. Accumulating evidence demonstrates reduced chronic postoperative pain, faster recovery, and improved patient satisfaction compared with conventional open approaches. Although the technique requires specialized training and familiarity with posterior groin anatomy, TAPP remains a safe and effective procedure when performed by experienced surgeons. Current international guidelines support its use as a preferred approach for bilateral, recurrent, and many primary inguinal hernias. Future advances in mesh technology, robotic surgery, and perioperative care are likely to further refine outcomes in TAPP repair.

Conflict of Interest: There is no conflict of interest

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