ENDOSCOPIC INGUINAL HERNIA REPAIR: EVALUATION OF EARLY POSTOPERATIVE OUTCOMES

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Abstract: Laparoscopic inguinal hernia repair has been established since the early 1990s as minimally invasive techniques gained prominence in general surgical practice. Inguinal hernias represent one of the most prevalent conditions in general surgery, accounting for approximately 80% of all anterior abdominal wall hernias. These hernias can substantially impair patient quality of life, causing pain, restricted physical activity, reduced work capacity, and limitations in performing daily tasks. Surgical intervention remains the only definitive treatment, with multiple operative approaches available, each associated with specific risks and clinical outcomes.

This study presents a combined retrospective and prospective analysis evaluating the clinical outcomes of laparoscopic inguinal hernia repair in a cohort of 80 patients. The analysis focused on intraoperative and early postoperative complications, postoperative pain management, and the time required for patients to return to work and resume normal activities. All participants were male patients aged 18 years or older, with diagnoses confirmed through standardized clinical assessment.

No major intraoperative complications were observed. Minor early postoperative complications occurred in six categories: urinary retention (2.5%), seroma formation (5.0%), wound hematoma (3.75%), hydrocele formation (2.5%), ischemic orchitis (1.25%), trocar-related complications (1.25%), and transient neurological symptoms including numbness or paresthesia (3.75%). Analgesic requirements were minimal, with an average consumption of 3.0 pills per patient during the immediate postoperative period. The mean time to return to work and normal daily activities was 3.5 ± 1.4 days, demonstrating rapid postoperative recovery.

The observed complication rates and recovery periods are comparable to or superior to those reported in prior studies evaluating both laparoscopic and open hernia repair techniques. These findings reinforce the safety, efficacy, and clinical reliability of laparoscopic inguinal hernia repair when performed by experienced surgeons. Key factors contributing to optimal outcomes include precise surgical technique, structured perioperative management, and careful patient selection.

Laparoscopic inguinal hernia repair represents a technically robust and clinically effective approach, characterized by low intraoperative and postoperative complication rates, minimal postoperative pain, and expedited return to daily and occupational activities. These advantages enhance overall patient well-being, quality of life, and satisfaction with surgical care. The evidence supports the continued adoption of laparoscopic techniques as a preferred approach in contemporary hernia surgery, emphasizing the critical role of surgical expertise, adherence to standardized protocols, and ongoing professional development to maintain high standards of patient outcomes.

Keywords: laparoscopic hernia repair, inguinal hernia, postoperative complications, recovery, surgical outcomes

1. INTRODUCTION

Inguinal hernias represent one of the most prevalent surgical pathologies, affecting approximately 3–7% of the global population, with a male-to-female ratio of roughly 10:1, primarily due to anatomical differences in the inguinal canal. Historically, open tissue-based suture repairs were the standard; however, the advent of prosthetic tension-free techniques has largely supplanted these methods, offering reduced recurrence rates and lower incidence of chronic postoperative pain.

Over the past two decades, laparoscopic hernia repair has become increasingly adopted, accounting for 16.8–41.0% of hernioplasties in the United States. Its minimally invasive nature contributes to lower rates of wound infection, expedited recovery, and reduced postoperative pain. The two principal laparoscopic approaches are transabdominal preperitoneal (TAPP) and total extraperitoneal (TEP) repair, both employing mesh to reinforce the myopectineal orifice, addressing indirect, femoral, and obturator hernia defects.

The present study aims to systematically assess perioperative complications associated with laparoscopic mesh repair of inguinal hernias, providing clinically relevant data on early recovery and supporting evidence-based surgical decision-making.

2. MATERIALS AND METHODS

This study utilized a combined retrospective and prospective design to evaluate outcomes of laparoscopic inguinal hernia repair. The patient cohort included individuals treated at the Department of General Surgery, Clinical Hospital

– Štip (Republic of North Macedonia), and the Department of Special Surgery, University Multidisciplinary Hospital UMBAL "St. George," Medical University – Plovdiv (Republic of Bulgaria).

The prospective component spanned December 2019 to December 2021, whereas the retrospective component included cases from January 2016 to December 2017. All procedures were performed under general anesthesia with patients in the supine position and a Foley catheter in place. A single prophylactic dose of third-generation cephalosporins was administered preoperatively.

Data collected encompassed patient demographics, operative details, and postoperative outcomes, including age, sex, ASA classification, operative duration, intraoperative and postoperative complications, length of hospital stay, and hernia recurrence.

Two laparoscopic techniques were employed: Transabdominal Preperitoneal (TAPP) and Totally Extraperitoneal (TEP) repair. Port placement varied according to technique: in TEP, ports were positioned in a linear fashion from the pubic bone to the umbilicus; in TAPP, ports were placed at the umbilicus and along the bilateral mid-clavicular lines.

In the TEP approach, the preperitoneal space was developed without breaching the peritoneum, whereas TAPP required creation and subsequent closure of a peritoneal flap extending from the medial umbilical ligament to the anterior superior iliac spine. A 10 × 15 cm polypropylene mesh was inserted to cover the entire myopectineal orifice, addressing direct, indirect, and femoral hernias, and was secured with a 5 mm tacker.

3. RESULTS

Patient demographics and hernia characteristics are summarized in **Table 1**.

Table 1: Demographic data of the patients and characteristics of the hernias

Variable	N%
Number of patients	80 (100)
Age, mean ± SD	45.6 ± 14.9
Sex	
Male	80 (100)
Female	0
Site of hernias	
Right inguinal	25 (31.25)
Left Inguinal	23 (28.75)
Bilateral	32 (40)

Source: Author Nikola Trokovski

All surgical procedures were performed under general endotracheal anesthesia.

Table 2: Dividing of patients by ASA

Classification by ASA	TAPP/TEP
ASA 1	47 (58,75)
ASA 2	31 (38.75)
ASA 3	2 (2.5)
ASA 4	0

Source: Author Nikola Trokovski

The mean operative time was 151.13 ± 32.0 minutes.

Early postoperative complications (within 30 days) were minimal and are detailed in **Table 3**.

Postoperative complications	**Operating method (TAPP/TEP) n%**
infection - light	4 (5)
hematoma on the wound	3 (3,75)
urine retention	2 (2,5)
hydrocele	2 (2,5)
paresthesia	3 (3,75)
neurological pain	3 (3,75)

trocar complications	1 (1,25)
total	16 (20)

Source: Author Nikola Trokovski

Minor surgical site infections occurred in four patients following laparoscopic repair, while postoperative hematomas were observed in three cases.

One patient presented with low-grade fever (up to 37.8°C), serous wound exudation, localized pain, and general malaise on postoperative days 3–5. Microbiological analysis of wound swabs was sterile. Secondary wound management included removal of suture material and placement of additional stitches, and clinical symptoms resolved within 5–6 days following administration of broad-spectrum antibiotics and NSAIDs.

Urinary retention was effectively managed with temporary catheterization and tamsulosin hydrochloride, with complete resolution of symptoms by postoperative day three. Hydrocele was diagnosed clinically and confirmed via ultrasound. Postoperative neurological pain was reported in three patients and successfully managed with analgesics and NSAIDs. No intraoperative injuries to adjacent structures were observed.

Table 4 summarizes postoperative pain scores during the immediate postoperative period.

Pain	Endoscopic operating method mean ± SD
1 hour	3.0 ± 2.6
2 hour	1.8 ± 2.7
3 hour	1.4 ± 2.0

Source: Author Nikola Trokovski

Overall, laparoscopic inguinal hernia repair demonstrated a low incidence of early postoperative complications, rapid recovery, and no major adverse intraoperative or postoperative events, supporting the safety and efficacy of this minimally invasive approach.

4. DISCUSSION

Laparoscopic hernioplasty demonstrates multiple clinical advantages over conventional open repair, including superior cosmetic outcomes, minimal postoperative wound pain, reduced hospital stay, and expedited return to daily and occupational activities (Ulutas et al., 2025). The findings of this study reinforce the current body of evidence indicating that laparoscopic repair constitutes a safe and efficacious approach for the management of inguinal hernias, demonstrating complication rates that align with those documented in contemporary surgical literature (Huerta et al., 2025; Khewater et al., 2024).

Recent controlled trials report seroma formation rates ranging from 0.5% to 38%, urinary retention from 0.4% to 8%, and persistent postoperative pain from 0.3% to 25%, consistent with the findings of this cohort (Chaouch et al., 2023; Dong et al., 2023; Thölix et al., 2025). The absence of major intraoperative or postoperative complications further emphasizes the safety profile of laparoscopic approaches, particularly when performed by experienced surgeons, despite some studies suggesting slightly higher perioperative risks compared to open procedures (Li et al., 2024; Arunthavanathan et al., 2025).

Previous large-scale studies provide a comparative context: MacFayden documented a 10.3% morbidity rate in 359 laparoscopic hernia repairs, Phillips reported 10% in 3,229 procedures, Geis observed 5.2% in 450 repairs, and Arregui reported 8.4%, with subsequent reports indicating 4.7–15.9% overall complication rates. These findings are consistent with recent systematic reviews comparing laparoscopic and robotic hernia repair outcomes (Khewater et al., 2024; Huerta et al., 2025). Major bleeding, though uncommon, may occur due to injury of the iliac or inferior epigastric vessels, particularly within the “triangle of doom,” necessitating prompt suture or clip control.

Ischemic orchitis and hydrocele remain relatively rare complications; in this series, ischemic orchitis occurred in 1.25% and hydrocele in 2.5% of patients. Seroma formation was observed in 5% of cases, with systemic antibiotics administered only when clinically indicated (Zeng et al., 2024). Postoperative neurological symptoms may arise from clip placement near the iliopubic tract or femoral vessels, affecting branches of the genitofemoral, femoral, or lateral femoral cutaneous nerves, typically resolving with conservative management (Peng et al., 2025). Notably, no bowel injuries were recorded, underscoring the safety of laparoscopic techniques in skilled hands.

Technical considerations, including meticulous closure of trocar insertion sites and controlled evacuation of pneumoperitoneum, are essential to prevent port-site herniation and minimize postoperative discomfort (Dong et al., 2023). Patient selection remains critical, particularly in individuals with prior abdominal surgeries, comorbid cardiovascular or pulmonary conditions, or obesity. While laparoscopic repair requires advanced instrumentation

and entails higher procedural costs, the benefits of reduced surgical trauma, shorter hospitalization, and faster recovery may justify the investment, enhancing overall patient outcomes (Arunthavanathan et al., 2025; Li et al., 2024).

5. CONCLUSION

The surgical management of inguinal hernias remains a complex challenge for surgeons, requiring comprehensive knowledge and proficiency in both conventional and endoscopic techniques. Laparoscopic hernioplasty has increasingly expanded its role worldwide and represents a safe and efficacious procedure when performed by experienced surgeons with specialized training. It is particularly advantageous in the management of bilateral and recurrent hernias, providing favorable outcomes in terms of postoperative pain, morbidity, and overall patient recovery. Minimally invasive surgery continues to demonstrate significant advancements and excellent results, especially in high-volume centers with skilled operators. Currently, many laparoscopic hernioplasties are performed on an outpatient basis, achieving rapid postoperative recovery and superior cosmetic results.

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