

CLINICAL OUTCOMES AND COMPLICATIONS FOLLOWING CONVENTIONAL HERNIOLPASTY FOR INGUINAL HERNIAS

Nikola Trokovski

Clinical Hospital Stip, Republic of North Macedonia, n.trokovski@yahoo.com

Abstract: The surgical treatment of inguinal hernias remains one of the most frequently performed procedures in general surgery. The selection of an appropriate surgical method should be based on an individualized, evidence-based approach that considers the patient's condition, anatomical factors, and surgeon experience. Among the variety of techniques available, conventional tension-free hernioplasty—particularly the Lichtenstein procedure—has emerged as the most widely accepted method. This approach involves the reconstruction of the posterior inguinal wall using a polypropylene mesh via an anterior, transinguinal route. Its low recurrence rates and complications have positioned it as the "gold standard" in inguinal hernia repair worldwide.

This study presents a combined retrospective and prospective analysis of patients undergoing open conventional hernioplasty, with a specific focus on intraoperative and early postoperative complications, recurrence, patient recovery, postoperative pain, and quality of life. A total of 182 patients were initially considered, with 180 included in the final analysis. All surgeries were performed at the Department of General Surgery, Clinical Hospital – Stip (North Macedonia), and the Clinic for Abdominal Surgery, Medical University – Plovdiv (Bulgaria).

From 180 patients, 165 were male and 17 were female, ranging in age from early adulthood to elderly. Preoperatively, 13.3% of patients reported groin pain requiring analgesic therapy. Postoperative monitoring revealed minor complications in a small proportion of patients, including surgical wound seroma (2.5%), hematoma (1.67%), hydrocele formation (1.67%), urinary retention (0.83%), and transient neurological symptoms such as numbness or paresthesia (2.5%). No major intraoperative complications, mesh infections, or mortalities were recorded. The average hospital stay was 3.8 ± 1.4 days, with a range of 2 to 7 days. Most patients resumed daily activities within two weeks of discharge, with only a few requiring extended convalescence.

The study findings confirm the reliability, safety, and efficiency of conventional hernioplasty for the treatment of inguinal hernias. The Lichtenstein technique, in particular, demonstrates consistently favorable outcomes, with recurrence rates reported in the literature ranging from 0.2% to 0.7% for primary hernias and up to 2% for recurrent cases. These results support the ongoing use of this technique in clinical practice. Nevertheless, proper patient selection, meticulous surgical technique, and postoperative follow-up are essential to minimize complications and improve long-term outcomes. The data also underscore the importance of continuous surgical training and quality control in maintaining high standards in hernia surgery.

Keywords: inguinal hernia, conventional hernioplasty, Lichtenstein technique, postoperative complications, surgical outcomes

1. INTRODUCTION

Inguinal hernia is the most common abdominal wall hernia, representing nearly 80% of all cases, with a global incidence of 3–7% and affecting over 500 million individuals. Its clinical significance lies in the high prevalence, risk of recurrence, and perioperative complications, which continue to challenge both elective and emergency surgical practice.

The introduction of synthetic meshes, particularly the tension-free Lichtenstein technique, has significantly improved outcomes by lowering recurrence rates and enhancing long-term results. Nevertheless, conventional open hernioplasty remains widely used due to its simplicity, cost-effectiveness, and proven safety, as it requires no specialized equipment and has decades of supporting evidence.

Given ongoing debate regarding technique selection—especially concerning complications, recovery, and quality of life—this study evaluates the outcomes of conventional open hernioplasty in the management of inguinal hernia.

2. MATERIALS AND METHODS

This study is based on two complementary descriptive investigations analyzing modern surgical approaches for inguinal hernia repair:

- A prospective study conducted between December 2016 and December 2017.
- A retrospective study covering January 2013 to December 2016.

All included patients had a clinical diagnosis of inguinal hernia, underwent surgical treatment, and were monitored during the postoperative period. Surgical interventions were carried out at two institutions: the Department of

General Surgery, Clinical Hospital in Štip, North Macedonia, and the Clinic for Abdominal Surgery, Department of Special Surgery, Medical University of Plovdiv, Bulgaria.

The technical units of observation were the healthcare institutions where cases were registered, while the logical units of analysis were patients treated within the specified timeframe and region:

- Clinical Hospital Štip (2013–2016).
- Medical University of Plovdiv (2016–2017).

3. STUDY VARIABLES

Baseline and perioperative factors

- Age and sex (analyzed as continuous variables).
- Primary symptoms, clinical signs, and hernia type.
- Somatic status, preoperative ASA (American Society of Anesthesiologists) classification, and type of anesthesia.
- Type and extent of surgical procedure (conventional open Lichtenstein hernioplasty).

Primary outcome measures

- Perioperative complications and mortality.
- Duration of surgery and length of hospital stay.
- Postoperative recovery and readmissions.
- Hernia recurrence.
- Acute and chronic postoperative pain.
- Health-related quality of life.

4. RESULTS

The study population comprised **182 patients** diagnosed with inguinal hernia and treated surgically. Of these, **165 were male (90.7%)** and **17 were female (9.3%)**, with a mean age of **55 ± 15 years** (range: 18–93 years). All patients presented with pronounced symptoms consistent with clinical examination findings and underwent operative management in inpatient hospital settings.

Regarding the type of anesthesia, the majority of procedures were performed under **spinal anesthesia (n = 136; 74.7%)**. **General endotracheal anesthesia** was applied in **43 patients (23.6%)**, while **local infiltration anesthesia with lidocaine** was used in **3 patients (1.6%)**.

Table 1. Distribution of patients by sex

Sex	Conventional Method	%
Male	165	90.1 %
Female	17	9.34 %
Total	182	100%

p-value > 0.05

Source: Author

Early postoperative complications were categorized into three primary groups:

1. **Wound-related complications** – including seroma, infiltrate, hematoma, and superficial wound infection.
2. **Ischemic complications** – such as hydrocele, orchostasis, epididymo-orchitis, and ligature neuropathy.
3. **Functional complications** – including inguinal discomfort, dysejaculation, and urinary retention.

Minor surgical wound infections were observed in **2 patients (1.1%)**, all of which were successfully managed with local treatment and antibiotic therapy. No severe intraoperative complications were recorded.

Inguinal hematoma occurred in **3 patients (1.65%)**; all cases were limited in extent and resolved under conservative management without the need for surgical revision.

Ischemic-vascular complications, including hydrocele, orchostasis, and epididymo-orchitis, were identified in **7 patients (3.85%)**.

Functional complications were infrequent. **Urinary retention** was documented in **3 patients (1.32%)**, each with preexisting prostatic hypertrophy; all cases required only temporary urinary catheterization. Postoperative complications in this study are presented in **Table 2**:

Table 2. Postoperative Complications-Conventional Method

Complication	Conventional Method	P
No complications	170 / 85%	0.000
Seroma	4 / 66,7%	
Hematoma	3 / 33,3%	
Wound infection	2 / 40%	
Orchostasis	3 / 43%	
Total	182 / 80,1%	

Source: Author

A total of 47 patients (25.8%) reported postoperative neuropathic pain. In all cases, symptoms were transient and successfully managed with analgesics and non-steroidal anti-inflammatory drugs (NSAIDs).

No intraoperative injuries to adjacent structures were documented. Specifically, there were no cases of bowel, bladder, intra-abdominal organ, or major vascular damage. Importantly, no major iatrogenic intraoperative complications occurred across the entire cohort of 182 patients.

Despite the advanced age and multiple comorbidities present in several patients, no perioperative mortality was observed.

Postoperative pain intensity was systematically evaluated during the first few hours after surgery using a standardized numerical rating scale (NRS). The results of pain assessment are summarized in Table 3.

Table 3 Postoperative Pain Scores (First couple of Hours) – Conventional Method

Pain	Conventional operative Method
1st hour	2.8 ±1.8
2nd hour	1.6 ±1.5
3rd hour	1.3 ±1.7

Mann-Whitney U test: $p < 0.005$

Source: Author

Pain levels demonstrated a consistent decline during the early postoperative period, with a **statistically significant improvement ($p < 0.005$)**. These findings underscore the effectiveness of the surgical technique not only in achieving anatomical correction but also in enhancing **patient comfort and promoting accelerated recovery**.

5. DISCUSSION

Complication rates in inguinal hernia surgery vary depending on patient characteristics, anesthesia type, and surgical circumstances. They are generally higher in elderly patients, with prolonged operative times, and especially in emergency cases. The role of anesthesia is important: Koyama et al. (2021) reported fewer complications under local anesthesia in ASA III–IV patients, while Lydeking et al. (2020) found no significant differences in mortality or complications between younger and older patients undergoing Lichtenstein hernioplasty.

The Lichtenstein method has become the most reliable standard due to its safety and reproducibility, with relatively few short-term complications (Navid et al., 2023; Zieren et al., 2000). Serious intraoperative injuries such as bowel trauma remain rare and are usually linked to incarcerated or strangulated hernias (Asbah et al., 2024; Sbacco et al., 2024).

Mortality in elective inguinal hernia repair is very low. Large registry studies report rates well under 1%, with only a modest increase in elderly patients. In contrast, mortality rises sharply in emergencies, particularly when bowel resection is required. In the Danish registry, rates increased up to 7%, while in Sweden, mortality rose seven- to twenty-fold in such cases. Women face higher risks due to the greater frequency of femoral hernias and anatomical differences in the inguinofemoral region (Henriksen et al., 2021; Sbacco et al., 2024).

Short-term complications also depend on surgical technique and perioperative care. Data from the Swedish Hernia Registry showed 30-day complication rates of 7.8% and mortality of 0.1% after open anterior prosthetic hernioplasty, with hematomas (7.7%), wound infections (1.4%), severe pain (0.8%), urinary retention (0.6%), and reoperations (0.5%) being the most common (Henriksen et al., 2021).

Long-term complications are less frequent but clinically relevant. Testicular atrophy occurs in up to 1.4% of cases, regardless of mesh type (Bringman et al., 2003). Concerns about infertility remain unproven (Hallen et al., 2008). Chronic pain and sexual dysfunction deserve attention: Aasvang et al. (2006) reported 9.8% of patients with moderate to severe pain during sexual activity and 2.8% with resulting dysfunction. Eklund et al. (2009) documented persistent testicular pain in 0.7% and sexual pain in 1.1% of patients five years after Lichtenstein repair. Overall, conventional open hernioplasty demonstrates excellent outcomes, particularly in specialized centers with experienced surgeons. Despite its routine nature, inguinal hernia repair carries risks that demand skill and precision. Continuous training, individualized perioperative management, and careful patient selection are essential for maintaining low complication rates and improving long-term quality of life.

6. CONCLUSION

Continuous training of surgeons and precise execution of herniorrhaphy techniques are essential for optimal outcomes. Open mesh hernioplasty is simple, reliable, minimally traumatic, and cost effective method, associated with low complication and recurrence rates. It provides shorter hospital stay, faster recovery, and improved long-term quality of life, ensuring high patient satisfaction.

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