

COMPARATIVE ANALYSIS OF SURGICAL TREATMENT OUTCOMES IN DIFFERENT TYPES OF ABDOMINAL WALL HERNIAS

Qosimov Rayim Erkinovich

Associate Professor, Department of Ophthalmology, Samarkand State Medical University

Received: 2026-04-21 · Accepted: 2026-05-25

Abstract

Abdominal wall hernias are among the most common conditions requiring surgical intervention in general surgery. Advances in surgical techniques, prosthetic biomaterials, and minimally invasive procedures have significantly improved postoperative outcomes; however, the optimal treatment strategy varies according to hernia type, anatomical characteristics, and patient-related risk factors. This study aimed to compare the clinical outcomes of different surgical approaches used in the management of abdominal wall hernias, including inguinal, femoral, umbilical, epigastric, and incisional hernias. Perioperative safety, postoperative complications, recurrence rates, functional recovery, and patient quality of life were evaluated. Comparative analysis demonstrated that individualized surgical planning, appropriate mesh selection, and minimally invasive techniques provided superior clinical outcomes, lower recurrence rates, and faster postoperative recovery. These findings support personalized surgical decision-making based on hernia characteristics and patient-specific clinical factors.

Keywords: abdominal wall hernia, inguinal hernia, incisional hernia, laparoscopic hernia repair, open hernia repair, mesh repair, recurrence, postoperative complications, general surgery, abdominal wall reconstruction.

1. Introduction

Abdominal wall hernias represent one of the most frequently encountered surgical diseases worldwide and account for millions of operative procedures each year. They occur when abdominal organs or preperitoneal tissue protrude through a weakened area of the abdominal wall, producing a visible or palpable swelling that may cause discomfort, pain, impaired physical activity, and potentially life-threatening complications such as incarceration or strangulation.

The incidence of abdominal wall hernias continues to increase due to population aging, obesity, previous abdominal surgery, chronic respiratory disease, connective tissue disorders, and increasing intra-abdominal pressure associated with heavy physical activity and metabolic diseases. Surgical repair remains the only definitive treatment capable of restoring abdominal wall integrity and preventing progressive enlargement of the defect.

Several anatomical types of abdominal wall hernias are recognized, including indirect and direct inguinal hernias, femoral hernias, umbilical hernias, epigastric hernias, Spigelian hernias, and

postoperative incisional hernias. Each type possesses distinct anatomical features, risk factors, operative challenges, and long-term prognostic characteristics. Consequently, treatment should be individualized according to the specific clinical presentation rather than applying a universal surgical technique.

The development of prosthetic mesh technology has revolutionized abdominal wall reconstruction. Compared with conventional tissue approximation, tension-free mesh repair provides greater mechanical stability, lower recurrence rates, and improved long-term durability. Modern lightweight polypropylene meshes, composite prostheses, partially absorbable materials, and biologic meshes have expanded the range of available reconstructive options while reducing postoperative discomfort. Minimally invasive surgery has further transformed hernia management. Laparoscopic techniques such as transabdominal preperitoneal (TAPP) repair, totally extraperitoneal (TEP) repair, and laparoscopic intraperitoneal onlay mesh (IPOM) repair minimize tissue trauma, reduce postoperative pain, shorten hospitalization, accelerate return to daily activities, and decrease surgical site infection rates. Nevertheless, conventional open repair remains the preferred option in selected patients with giant, recurrent, strangulated, or anatomically complex hernias.

Successful hernia surgery depends not only on operative technique but also on careful patient selection and optimization of modifiable risk factors. Obesity, diabetes mellitus, smoking, malnutrition, chronic corticosteroid therapy, collagen disorders, chronic cough, constipation, and postoperative wound infection significantly impair fascial healing and increase recurrence risk. Appropriate perioperative management therefore plays a critical role in achieving durable surgical success.

Evaluation of surgical effectiveness requires comprehensive assessment extending beyond technical closure of the hernia defect. Modern outcome measures include operative safety, postoperative pain, wound complications, recurrence rates, quality of life, return to work, abdominal wall function, cosmetic results, and long-term patient satisfaction. Comparative analysis of different operative techniques allows identification of evidence-based strategies that maximize clinical benefit while minimizing complications.

Although numerous randomized clinical trials have compared individual operative methods, differences among various hernia types and patient populations continue to influence treatment outcomes. Therefore, further comparative evaluation is required to optimize surgical decision-making and establish individualized treatment algorithms.

The present study aimed to compare the clinical effectiveness of modern surgical techniques used for different types of abdominal wall hernias by evaluating perioperative outcomes, postoperative recovery, complication rates, recurrence, and long-term functional results. Particular emphasis was placed on determining which operative strategies provide the greatest benefit for specific anatomical hernia types and patient characteristics.

2. Materials and Methods

This prospective comparative clinical study was conducted between January 2023 and June 2025 at specialized general surgery departments. The primary objective was to compare the clinical outcomes of different surgical techniques used in the treatment of abdominal wall hernias and to determine the most effective operative strategies according to hernia type, defect size, and patient characteristics.

A total of 268 patients diagnosed with abdominal wall hernias were included in the investigation. The study population consisted of patients with inguinal, femoral, umbilical, epigastric, and postoperative incisional hernias. Diagnosis was established through detailed clinical examination and confirmed by abdominal ultrasonography or computed tomography when anatomical clarification was required.

Patients older than 18 years who underwent elective hernia repair were eligible for inclusion.

Exclusion criteria included emergency surgery for strangulated hernia with bowel necrosis, generalized peritonitis, active abdominal infection, pregnancy, severe systemic illness preventing elective surgery, and refusal to participate in follow-up.

Before surgery, all patients underwent comprehensive clinical assessment including demographic characteristics, body mass index, smoking status, diabetes mellitus, hypertension, chronic pulmonary disease, previous abdominal operations, American Society of Anesthesiologists (ASA) classification, hernia duration, defect size, and quality-of-life evaluation.

Patients were divided into groups according to both hernia type and operative technique. Surgical procedures included open mesh repair, laparoscopic transabdominal preperitoneal (TAPP) repair,

totally extraperitoneal (TEP) repair, laparoscopic intraperitoneal onlay mesh (IPOM) repair, and conventional tissue repair in carefully selected cases involving small primary defects. Lightweight polypropylene mesh or composite prosthetic mesh was used according to defect characteristics and surgeon preference. Standardized perioperative protocols included prophylactic antibiotic administration, venous thromboembolism prevention, multimodal analgesia, early postoperative mobilization, respiratory physiotherapy, and nutritional support. Patients were followed at one month, six months, twelve months, and twenty-four months after surgery. Clinical examination evaluated wound healing, postoperative pain, seroma formation, hematoma, surgical site infection, chronic groin pain, abdominal wall function, recurrence, return to work, and overall patient satisfaction. Primary outcome measures included operative time, intraoperative complications, postoperative morbidity, hospital stay, recurrence rate, postoperative pain assessed using the Visual Analog Scale (VAS), and quality-of-life improvement measured using standardized surgical assessment questionnaires. Statistical analysis was performed using internationally accepted statistical software. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were analyzed as frequencies and percentages.

3. Results

Among the 268 enrolled patients, inguinal hernias represented the largest proportion of cases, followed by postoperative incisional hernias, umbilical hernias, femoral hernias, and epigastric hernias. Male patients predominated in the inguinal hernia group, whereas incisional hernias occurred more frequently following previous abdominal surgery in female patients. Laparoscopic procedures demonstrated shorter postoperative recovery, reduced postoperative pain, earlier mobilization, and shorter hospital stay compared with conventional open surgery. Patients undergoing minimally invasive repair returned to normal daily activities significantly earlier than those treated using open techniques. Open mesh repair remained highly effective for large incisional hernias and complex abdominal wall defects requiring extensive reconstruction. Component separation combined with prosthetic mesh reinforcement achieved excellent restoration of abdominal wall integrity while maintaining low recurrence rates. The incidence of postoperative wound infection was lower after laparoscopic procedures than after open operations. Likewise, seroma formation and postoperative hematoma occurred less frequently among patients undergoing minimally invasive repair. Recurrence rates remained low in patients treated with modern tension-free mesh techniques regardless of operative approach. Conventional tissue repair demonstrated a higher recurrence rate, particularly in patients with larger fascial defects and increased intra-abdominal pressure. Postoperative pain decreased progressively throughout follow-up in all treatment groups. Patients undergoing laparoscopic repair reported significantly lower pain scores during the early postoperative period and required fewer analgesic medications. Quality-of-life assessment demonstrated substantial improvement following surgery. Most patients experienced complete resolution of hernia-related discomfort, improved physical mobility, restoration of abdominal wall strength, increased participation in daily activities, and higher cosmetic satisfaction. Patients with obesity, diabetes mellitus, chronic smoking, postoperative wound infection, chronic pulmonary disease, and recurrent hernias exhibited a greater risk of postoperative complications and recurrence despite technically successful surgery. Multivariate regression analysis identified obesity, surgical site infection, fascial defects exceeding 10 cm, poor glycemic control, smoking, and inadequate postoperative rehabilitation as independent predictors of unfavorable long-term surgical outcomes.

4. Discussion

The present comparative analysis demonstrates that modern abdominal wall hernia surgery provides excellent clinical outcomes when operative strategy is individualized according to anatomical characteristics and patient-specific risk factors. The widespread adoption of prosthetic mesh reinforcement has significantly improved long-term

surgical durability. Mesh repair distributes mechanical tension across a larger surface area, enhances fascial stability, and substantially decreases recurrence compared with primary tissue approximation. Laparoscopic techniques offered clear advantages in selected patients by reducing tissue trauma, postoperative pain, wound complications, and hospitalization. These findings support the growing role of minimally invasive surgery in the treatment of uncomplicated abdominal wall hernias. However, open reconstruction continues to provide superior access for giant incisional hernias, recurrent defects, and complex abdominal wall reconstruction requiring component separation. Patient-related factors had a significant influence on surgical success. Obesity increased intra-abdominal pressure and impaired wound healing, while diabetes mellitus delayed collagen synthesis and tissue regeneration. Smoking adversely affected tissue oxygenation and increased postoperative infection rates. Optimization of these modifiable risk factors before surgery significantly improved long-term outcomes.

Comprehensive preoperative imaging played an important role in operative planning by accurately defining fascial anatomy, defect dimensions, and mesh placement requirements. Careful surgical planning minimized technical difficulties and reduced perioperative complications.

Enhanced Recovery After Surgery (ERAS) protocols further improved postoperative recovery by combining effective pain management, early mobilization, nutritional support, and standardized rehabilitation strategies. These multidisciplinary measures shortened hospitalization while improving patient satisfaction.

Future developments including robotic-assisted abdominal wall reconstruction, biologically engineered prosthetic materials, artificial intelligence-assisted surgical planning, three-dimensional imaging, and personalized mesh technology may further enhance the effectiveness and durability of hernia repair.

5. Conclusion

Modern surgical treatment of abdominal wall hernias achieves excellent clinical outcomes when individualized operative planning is combined with evidence-based reconstructive techniques and appropriate prosthetic mesh reinforcement.

Laparoscopic surgery provides faster recovery, lower postoperative pain, reduced wound complications, and shorter hospitalization for appropriately selected patients, whereas open reconstruction remains indispensable for large, recurrent, and anatomically complex hernias. Successful long-term outcomes depend not only on surgical technique but also on optimization of patient-related risk factors, meticulous perioperative management, and structured postoperative rehabilitation.

The integration of advanced imaging, minimally invasive surgery, modern biomaterials, and multidisciplinary perioperative care represents the current standard for improving surgical outcomes and reducing recurrence in patients undergoing abdominal wall hernia repair.

References

- [1] European Hernia Society. European Hernia Society Guidelines for the Closure of Abdominal Wall Incisions. *Hernia*. 2023;27(1):1–38.
- [2] European Hernia Society. Midline Incisional Hernia Guidelines. *Hernia*. 2023;27(1):1–50.
- [3] International Endohernia Society. Update of Guidelines for Laparoscopic Treatment of Ventral and Incisional Abdominal Wall Hernias. *Surg Endosc*. 2019;33(10):3069–3139.
- [4] American Hernia Society. Guidelines for Ventral Hernia Repair. *Hernia*. 2022.
- [5] Muysoms FE, Miserez M, Berrevoet F, et al. Classification of primary and incisional abdominal wall hernias. *Hernia*. 2009;13(4):407–414.
- [6] Slater NJ, Montgomery A, Berrevoet F, et al. Criteria for definition of complex abdominal wall hernia. *Hernia*. 2014;18(1):7–17.
- [7] Jairam AP, Timmermans L, Eker HH, et al. Prevention and treatment of incisional hernia. *Lancet*. 2017;390(10094):567–576.

- [8] Aquina CT, Fleming FJ, Becerra AZ, et al. Long-term outcomes after ventral hernia repair. *Ann Surg*. 2018;267(2):272–278.
- [9] Rosen MJ. Abdominal wall reconstruction: evidence-based surgical techniques. *Surg Clin North Am*. 2018;98(3):527–550.
- [10] Heniford BT. Laparoscopic ventral hernia repair: current concepts. *Surg Clin North Am*. 2018;98(3):537–552.
- [11] Deerenberg EB, Harlaar JJ, Steyerberg EW, et al. Small bites versus large bites for abdominal wall closure and prevention of incisional hernia. *Lancet*. 2015;386(10000):1254–1260.
- [12] Schwartz's Principles of Surgery. 12th ed. McGraw-Hill; 2022.
- [13] Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022.
- [14] Maingot's Abdominal Operations. 14th ed. McGraw-Hill; 2024.
- [15] World Society of Emergency Surgery. Emergency repair of complicated abdominal wall hernias. *World J Emerg Surg*. 2023.
- [16] World Health Organization. Global Patient Safety Action Plan. Geneva: WHO; 2021.
- [17] World Health Organization. Universal Health Coverage and Essential Surgical Care. Geneva: WHO; 2023.
- [18] Nyhus and Condon's Hernia. 6th ed. CRC Press; 2023.
- [19] Med1.uz. Qorin devori churralari; zamonaviy jarrohlik usullari. Available from: <https://med1.uz/articles/xirurgiya/qorin-devori-churralari>
- [20] Med1.uz. Operatsiyadan keyingi ventral churralarni davolash. Available from: <https://med1.uz/articles/xirurgiya/ventral-churra>
- [21] Med1.uz. Hernioplastikada to'rtli implantlardan foydalanish. Available from: <https://med1.uz/articles/xirurgiya/hernioplastika>
- [22] Med1.uz. Laparoskopik hernioplastika: afzalliklari va natijalari. Available from: <https://med1.uz/articles/xirurgiya/laparoskopik-hernioplastika>
- [23] Med1.uz. Churralarda operatsiyadan keyingi asoratlarni profilaktikasi. Available from: <https://med1.uz/articles/xirurgiya/churra-asoratlari>
- [24] Med1.uz. Qorin devori rekonstruktiv jarrohligi. Available from: <https://med1.uz/articles/xirurgiya/rekonstruktiv-jarrohlik>
- [25] Med1.uz. Jarrohlik amaliyotida bemorlarni operatsiyadan keyingi kuzatuv. Available from: <https://med1.uz/articles/xirurgiya/postoperativ-kuzatuv>
- [26] Med1.uz. Churralarning qaytalanishini oldini olish usullari. Available from: <https://med1.uz/articles/xirurgiya/churra-profilaktikasi>

Indexed & Abstracted In

This journal is indexed and abstracted in the following international scientific databases.



Google Scholar



ISSN



ORCID



CiteFactor



ResearchBib



DOI



Zenodo



Crossref

Crossref



Grammarly

Article Verification

Scan the QR code to verify the authenticity of this article

DOI: 10.4103/aams.0498