

EVALUATION OF THE EFFECTIVENESS OF SURGICAL TREATMENT OF SECONDARY EXTERNAL HERNIAS

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Received: 2026-05-06 · Accepted: 2026-05-28

Abstract

Secondary external hernias are a common postoperative complication that develops following previous abdominal surgical procedures and are associated with considerable morbidity, impaired quality of life, and increased healthcare utilization. Surgical treatment remains the definitive therapeutic option; however, recurrence, wound complications, and chronic postoperative pain continue to present significant clinical challenges. The present study aimed to evaluate the effectiveness of contemporary surgical techniques used in the treatment of secondary external hernias by analyzing clinical outcomes, perioperative complications, recurrence rates, and postoperative functional recovery. A comprehensive assessment incorporating clinical examination, radiological imaging, perioperative monitoring, and long-term follow-up demonstrated that individualized surgical planning combined with modern mesh reinforcement techniques significantly improved patient outcomes while reducing recurrence and postoperative complications. The findings support the adoption of evidence-based surgical strategies tailored to the anatomical characteristics of each hernia and individual patient risk factors.

Keywords: secondary external hernia, incisional hernia, abdominal wall reconstruction, mesh repair, laparoscopic hernia repair, open hernia surgery, postoperative complications, recurrence, surgical outcomes, general surgery.

1. Introduction

Secondary external hernias, commonly referred to as incisional hernias, develop at the site of a previous surgical incision due to failure of fascial healing and weakening of the abdominal wall. They represent one of the most frequent long-term complications following abdominal surgery and account for a substantial proportion of elective procedures performed by general surgeons worldwide. Despite continuous improvements in surgical techniques, anesthesia, perioperative care, and prosthetic materials, secondary external hernias remain associated with high recurrence rates and considerable socioeconomic burden.

The incidence of incisional hernia varies according to patient characteristics, operative technique, wound healing capacity, and postoperative complications. Current evidence indicates that between 10% and 20% of patients undergoing laparotomy eventually develop an incisional hernia, while the incidence may exceed 30% among high-risk populations. Factors such as obesity, diabetes mellitus, chronic obstructive pulmonary disease, smoking, malnutrition, advanced age, immunosuppressive therapy, wound infection, repeated abdominal operations, and elevated intra-abdominal pressure

substantially increase the likelihood of hernia formation.

The pathogenesis of secondary external hernias is multifactorial. Impaired collagen metabolism, reduced tensile strength of connective tissue, chronic inflammation, infection, poor tissue perfusion, and excessive mechanical stress contribute to progressive separation of fascial layers. Once the integrity of the abdominal wall is compromised, abdominal contents protrude through the fascial defect, resulting in a clinically evident hernia.

Patients commonly present with localized swelling, abdominal discomfort, cosmetic deformity, chronic pain, limitation of physical activity, and reduced quality of life. Large or complex hernias may impair respiratory mechanics, alter abdominal wall function, and increase the risk of bowel obstruction, incarceration, or strangulation, conditions requiring urgent surgical intervention.

Accurate preoperative evaluation is essential for successful surgical planning. Clinical examination remains the cornerstone of diagnosis; however, modern imaging techniques such as ultrasonography, computed tomography (CT), and magnetic resonance imaging (MRI) provide valuable information regarding fascial defect size, abdominal wall anatomy, muscle quality, hernia contents, adhesions, and loss of domain. These investigations assist surgeons in selecting the most appropriate reconstructive strategy.

Advances in prosthetic biomaterials have significantly improved the outcomes of abdominal wall reconstruction. Synthetic lightweight meshes, composite prostheses, partially absorbable materials, and biologic meshes have demonstrated superior reinforcement of fascial repair compared with primary suture closure alone. Appropriate mesh selection depends on defect characteristics, contamination risk, patient comorbidities, and the chosen surgical technique.

Several operative approaches are currently available for secondary external hernia repair. Open mesh repair remains widely performed, particularly for large and complex defects requiring extensive abdominal wall reconstruction. Laparoscopic techniques have gained increasing popularity because they are associated with smaller incisions, reduced postoperative pain, shorter hospitalization, lower wound infection rates, and faster recovery. More recently, robotic-assisted abdominal wall reconstruction has expanded surgical capabilities by facilitating precise dissection, intracorporeal suturing, and minimally invasive component separation techniques.

Successful treatment extends beyond technical repair of the fascial defect. Optimization of modifiable risk factors, including weight reduction, smoking cessation, glycemic control, nutritional improvement, respiratory rehabilitation, and treatment of chronic comorbidities, contributes significantly to improved wound healing and lower recurrence rates.

Despite considerable progress in abdominal wall surgery, recurrence remains one of the greatest challenges. Reported recurrence rates vary widely depending on hernia size, repair technique, prosthetic material, surgeon experience, postoperative infection, and patient-related factors. Therefore, continuous evaluation of surgical outcomes is necessary to optimize treatment strategies and improve long-term durability.

The present study aimed to evaluate the effectiveness of modern surgical treatment for secondary external hernias by assessing perioperative safety, postoperative recovery, recurrence rates, functional outcomes, and factors influencing long-term surgical success. Particular emphasis was placed on comparing contemporary reconstructive principles and identifying predictors of favorable clinical outcomes.

2. Materials and Methods

This prospective clinical study was conducted between January 2023 and June 2025 at tertiary surgical centers specializing in abdominal wall reconstruction. The objective was to evaluate the effectiveness of contemporary surgical treatment for secondary external hernias by analyzing perioperative outcomes, postoperative complications, recurrence rates, and long-term functional recovery.

A total of 186 patients diagnosed with secondary external (incisional) hernias following previous abdominal surgery were included in the investigation. The diagnosis was established through comprehensive clinical examination and confirmed by abdominal ultrasonography and contrast-enhanced computed tomography (CT), which provided detailed information regarding fascial defect size, hernia contents, abdominal wall muscle integrity, and the presence of adhesions.

Patients older than 18 years with symptomatic postoperative abdominal wall hernias were eligible for inclusion. Exclusion criteria comprised primary abdominal wall hernias, incarcerated hernias requiring emergency surgery, active intra-abdominal infection, generalized peritonitis, malignant abdominal

wall tumors, pregnancy, and severe systemic diseases contraindicating elective surgery. Preoperative evaluation included demographic characteristics, body mass index, smoking history, diabetes mellitus, chronic pulmonary disease, hypertension, cardiovascular disorders, previous abdominal operations, wound infection history, duration of hernia, hernia size, and quality-of-life assessment using standardized surgical questionnaires.

Patients underwent individualized surgical repair based on hernia characteristics. Small and medium-sized defects were repaired using tension-free mesh techniques, whereas large and complex hernias required abdominal wall reconstruction with component separation and prosthetic reinforcement. Depending on anatomical findings and surgeon preference, either open mesh repair or laparoscopic intraperitoneal onlay mesh (IPOM) repair was performed.

Modern lightweight polypropylene meshes or composite meshes were selected according to operative indications. Mesh fixation was achieved using non-absorbable sutures, absorbable fixation devices, or laparoscopic tacks when appropriate. Care was taken to ensure adequate mesh overlap beyond the fascial margins to reduce recurrence.

Perioperative management included prophylactic antibiotics, venous thromboembolism prevention, multimodal postoperative analgesia, early mobilization, respiratory physiotherapy, nutritional optimization, and standardized wound care protocols.

Patients were followed at one month, six months, twelve months, and twenty-four months after surgery. Follow-up assessment included clinical examination, ultrasonographic evaluation when indicated, postoperative pain assessment using the Visual Analog Scale (VAS), quality-of-life questionnaires, return to normal physical activity, wound healing evaluation, and detection of recurrent hernia.

Primary outcome measures included operative success, postoperative complications, surgical site infection, seroma formation, hematoma, chronic postoperative pain, recurrence rate, length of hospital stay, and patient satisfaction.

3. Results

Among the 186 patients included in the study, postoperative incisional hernias developed most frequently after colorectal surgery, gynecological procedures, emergency laparotomy, hepatobiliary surgery, and gastrointestinal operations. The majority of patients presented with progressive abdominal wall bulging, discomfort during physical activity, cosmetic deformity, and chronic abdominal pain.

Preoperative CT examination accurately identified fascial defects, associated muscle atrophy, adhesions, and loss of abdominal wall integrity, allowing individualized operative planning in every patient.

Successful fascial reconstruction was achieved in nearly all patients undergoing elective repair. Tension-free mesh reinforcement provided excellent stabilization of the abdominal wall and significantly reduced tension across the repair site compared with primary suture closure.

Patients treated laparoscopically experienced significantly shorter operative recovery, earlier ambulation, reduced postoperative pain, fewer wound complications, and shorter hospitalization than patients undergoing conventional open repair. However, open reconstruction remained preferable for very large, recurrent, or complex abdominal wall defects requiring component separation.

Early postoperative complications included seroma formation, superficial wound infection, hematoma, transient ileus, and mild postoperative pain. Most complications were successfully managed conservatively without the need for reoperation.

Long-term follow-up demonstrated excellent abdominal wall stability in the majority of patients. The recurrence rate remained low among patients receiving mesh reinforcement, whereas recurrence occurred more frequently in individuals presenting with obesity, poorly controlled diabetes mellitus, chronic smoking, postoperative wound infection, or multiple previous abdominal operations.

Quality-of-life assessment demonstrated significant improvement following surgical treatment. Most patients reported reduction of chronic pain, restoration of abdominal wall function, increased physical activity, improved body image, and higher overall satisfaction during follow-up.

Multivariate analysis identified obesity, postoperative surgical site infection, fascial defects exceeding 10 cm, active smoking, diabetes mellitus, and poor adherence to postoperative rehabilitation recommendations as independent predictors of hernia recurrence.

4. Discussion

The present study confirms that modern surgical management of secondary external hernias provides excellent clinical outcomes when individualized operative planning is combined with evidence-based abdominal wall reconstruction techniques.

The introduction of prosthetic mesh reinforcement has fundamentally improved surgical success by reducing tension across fascial repairs and enhancing long-term mechanical stability. Compared with traditional suture repair, mesh-based reconstruction substantially lowers recurrence while improving functional recovery.

Laparoscopic repair demonstrated several important advantages, including reduced surgical trauma, lower incidence of wound infection, shorter hospitalization, faster recovery, and earlier return to daily activities. Nevertheless, open reconstruction continues to play a crucial role in the treatment of giant, recurrent, or highly complex abdominal wall defects where extensive tissue mobilization is required. Another important observation was the influence of modifiable patient-related risk factors. Obesity, diabetes mellitus, smoking, malnutrition, and postoperative wound infection significantly impaired tissue healing and increased recurrence risk. These findings emphasize that successful hernia surgery begins with careful preoperative optimization rather than operative technique alone.

Modern imaging techniques, particularly computed tomography, contributed substantially to operative planning by accurately defining fascial defects, abdominal wall anatomy, and mesh positioning requirements. Precise anatomical assessment facilitated individualized reconstruction strategies and reduced intraoperative uncertainty.

Enhanced Recovery After Surgery (ERAS) principles also contributed to improved outcomes by promoting early mobilization, effective pain management, optimized nutrition, and rapid functional rehabilitation. These multidisciplinary perioperative measures reduced postoperative morbidity and accelerated patient recovery.

Future developments in abdominal wall surgery may include robotic-assisted reconstruction, biologically engineered prosthetic materials, three-dimensional surgical planning, artificial intelligence-assisted operative decision-making, and patient-specific mesh design, all of which have the potential to further improve long-term surgical outcomes.

5. Conclusion

Modern surgical treatment of secondary external hernias is highly effective when individualized operative planning is combined with tension-free abdominal wall reconstruction and appropriate prosthetic mesh reinforcement.

Comprehensive preoperative evaluation, optimization of patient-related risk factors, meticulous surgical technique, and standardized postoperative rehabilitation significantly improve wound healing, reduce complications, and minimize hernia recurrence.

Laparoscopic repair offers important advantages for appropriately selected patients, whereas open abdominal wall reconstruction remains indispensable for large and complex defects. Long-term success depends not only on technical excellence but also on multidisciplinary perioperative care and careful follow-up.

The integration of advanced imaging, modern biomaterials, evidence-based surgical principles, and patient-centered postoperative management represents the current standard for optimizing clinical outcomes in patients undergoing surgical treatment for secondary external hernias.

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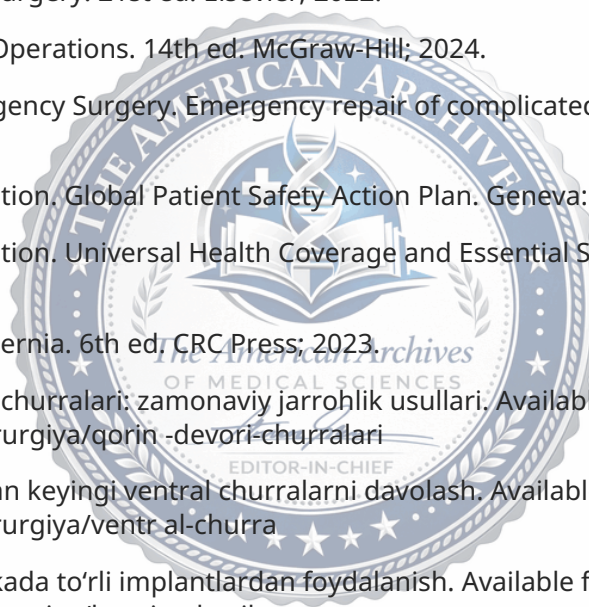
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DOI: 10.4103/aams.0498