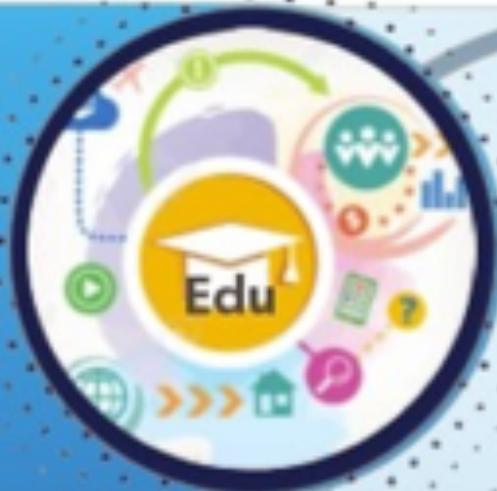




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# Journal of Educational and Scientific Medicine



**Issue 4 | 2025**



OAK.UZ  
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Ministry of the Republic of Uzbekistan

**ISSN: 2181-3175**

# Optimizing Strategies for Recurrent Ventral Hernia Repair

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## ABSTRACT

*Recurrent ventral hernias in elderly patients remain a significant clinical problem due to anatomical deterioration, reduced tissue quality, and the cumulative effects of previous surgical interventions. Conventional repair strategies often lack personalization and fail to address the specific risks in this vulnerable patient group. This review presents the rationale, structure, and clinical outcomes of a risk-based, anatomy-informed surgical algorithm for laparoscopic repair of recurrent ventral hernias in elderly and senile patients. Based on a cohort of 176 individuals, including both retrospective and prospective groups, a three-level scoring model was developed to guide the choice of surgical access, mesh type, and fixation method. Implementation of the model led to improved outcomes, including a significant reduction in recurrence and postoperative complications. Literature comparisons support the need for integrating individualized strategies into standard surgical practice for this high-risk population.*

**Keywords:** ventral hernia, recurrence, elderly, laparoscopy, mesh repair, anatomical risk factors, stratified surgery

## INTRODUCTION

Recurrent ventral hernias represent one of the most persistent and technically challenging problems in abdominal wall surgery. While primary hernia repair is widely standardized, recurrences—especially in elderly patients—continue to demonstrate suboptimal outcomes, with reported recurrence rates ranging from 15% to over 30% depending on the technique used, the anatomical complexity, and the patient's condition [1, 2]. Age-related degeneration of the abdominal wall, sarcopenia, comorbid diseases, and im-

paired wound healing significantly reduce the success of conventional hernioplasty in this population [3, 4].

Elderly and senile patients form a particularly vulnerable group in this context. Comorbidities such as diabetes mellitus, chronic obstructive pulmonary disease, hypertension, and cardiovascular disease are prevalent, and many patients have already undergone one or more prior surgical interventions [5]. The quality of the remaining tissues, especially the aponeurosis and muscle layers, is often compromised, with frequent findings of thinning, diastasis, or scarring that complicate effective mesh fixation and integration [6]. Moreover, this patient

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cohort often presents with higher ASA (American Society of Anesthesiologists) risk scores, increasing perioperative risk and necessitating a careful, individualized approach to surgical planning [7].

While international guidelines—such as those proposed by the European Hernia Society (EHS) and the HerniaSurge Group—offer classification frameworks and outline standard procedures for ventral hernia repair [8, 9], they provide limited guidance for tailoring surgical tactics to elderly patients with recurrent defects. Most recommendations remain generalized and do not account for detailed anatomical or functional stratification, which is essential when managing previously operated and structurally compromised abdominal walls.

The need for an individualized, anatomy-informed and risk-stratified approach is evident. Emerging studies have highlighted the importance of morphometric parameters such as aponeurosis thickness, the presence and degree of rectus diastasis, residual mesh position, and the extent of intra-abdominal adhesions in guiding surgical decisions [10, 11]. Yet, no universal scoring model has been widely adopted in clinical practice, particularly for elderly patients undergoing laparoscopic hernia repair.

In this review, we present the rationale, development, and implementation of a comprehensive stratification system and algorithm for individualized laparoscopic hernia repair in elderly patients with recurrent ventral hernias. This approach was built upon both retrospective analysis ( $n = 89$ ) and prospective clinical data ( $n = 87$ ), collected over a 15-year period in a regional multidisciplinary surgical center. The goal was to evaluate whether preoperative risk assessment based on clinical, anatomical, and technical criteria could improve decision-making, reduce the recurrence rate, and enhance overall surgical outcomes.

### **Approaches to Risk Stratification and Surgical Planning**

**R**isk stratification and individualized surgical planning have emerged as critical components in the management of recurrent ventral hernias, especially in elderly and multimorbid patients. Modern literature highlights the multifactorial nature of hernia recurrence, wherein both anatomical factors and systemic patient conditions play essential roles. Multiple classification systems and scoring models have been proposed to structure decision-making, yet few have been widely implemented in clinical routine [1, 2].

One of the earliest attempts to standardize hernia repair was the European Hernia Society (EHS) classifica-

tion, which focused primarily on defect location and size [3]. While useful for primary hernias, it lacks sensitivity for complex recurrent cases and does not account for patient-specific risk factors such as tissue quality or prior surgical history. More recent efforts, including the Ventral Hernia Working Group (VHWG) classification and HerniaSurge guidelines, expanded the scope to include wound contamination and comorbidities but still do not provide concrete guidance for anatomical stratification [4, 5].

Several authors have proposed morphometric parameters to assist in individualized planning. For instance, aponeurosis thickness, width of diastasis, and degree of scar tissue formation have all been associated with recurrence risk [6, 7]. In elderly patients, these variables are compounded by structural degeneration of the abdominal wall, making reliable tissue fixation more difficult and increasing the likelihood of postoperative complications [8]. Franz et al. discussed the role of collagen dysregulation and matrix remodeling in hernia formation, underscoring the biological fragility in older adults [9].

Imaging modalities such as ultrasound and computed tomography (CT) with 3D reconstruction have been increasingly used for preoperative evaluation. These tools enable surgeons to assess defect size, location, aponeurotic integrity, and the presence of previous mesh materials [10]. In cases with suspected vascular compromise or massive scarring, CT angiography can be used to safely guide surgical dissection zones [11].

Despite growing recognition of the need for structured risk assessment, the integration of such models into clinical decision-making remains limited. Tastaldi et al. recently demonstrated that algorithm-driven hernia repair reduced postoperative complications and improved surgical outcomes, particularly in high-risk patients [12]. However, universal adoption of such strategies is hampered by the lack of consensus on the ideal combination of anatomical, functional, and technical parameters.

From a tactical standpoint, the choice of surgical approach must be closely aligned with the patient's risk profile. Standard IPOM (intraperitoneal onlay mesh) and IPOM-plus techniques are suitable for low-risk patients with preserved aponeurotic structure [13]. In contrast, eTEP (extended totally extraperitoneal approach) and TAR (transversus abdominis release) are more appropriate for patients with extensive diastasis, poor tissue quality, or complex recurrence patterns [14, 15]. Mesh selection and fixation method should also be tailored: biologic or barrier-coated meshes may be pre-

ferred in contaminated fields or where prior infections occurred, while lightweight polypropylene meshes are often sufficient for primary repairs [16, 17].

A growing body of work supports the development of digital decision-support tools based on scoring systems that incorporate these variables. Such tools can enhance objectivity, facilitate standardization, and reduce surgeon-dependent variability in outcomes [18, 19]. However, the literature continues to show wide variation in practice patterns, underlining the need for further multicenter trials and expert consensus.

In summary, while numerous approaches to stratification and individualized hernia repair exist, their implementation in everyday surgical practice remains inconsistent. Future models must be practical, evidence-based, and adaptable to different healthcare settings, particularly when treating elderly patients with complex recurrent hernias.

### **Current Evidence and Outcomes in Recurrent Hernia Surgery**

The management of recurrent ventral hernias remains one of the most debated topics in modern herniology. Despite the growing availability of minimally invasive techniques and advanced mesh materials, outcomes in elderly patients—especially those with prior surgical failures—remain suboptimal. The literature consistently reports that recurrent hernia repair is associated with higher complication rates, greater technical complexity, and increased recurrence risk compared to primary hernia repair [1, 2].

Numerous studies have sought to identify independent risk factors for failure in recurrent hernia surgery. Henriksen et al. conducted a prospective cohort study involving over 1,200 patients and identified wound infection, large defect size, and previous mesh infection as primary contributors to incisional hernia recurrence [3]. Similarly, Christoffersen et al. showed that laparoscopic repair, although superior in postoperative recovery, may be associated with higher recurrence rates if not preceded by appropriate anatomical evaluation [4].

Importantly, the choice of surgical technique plays a pivotal role in recurrence prevention. Comparative trials such as those by Pędziwiatr et al. and Belyansky et al. demonstrate that techniques such as eTEP and TAR offer better outcomes in patients with prior mesh failure, wide diastasis, or aponeurotic thinning [5, 6]. TAR, in particular, allows for complete retrorectus dissection and medialization of the abdominal wall, enabling a tension-free repair even in large or complex defects [7].

Mesh selection and fixation method also significantly influence long-term outcomes. Lightweight macroporous polypropylene meshes are commonly used in low-risk patients, while two-layer barrier-coated or biologic meshes may be necessary in previously infected fields or contaminated wounds [8, 9]. Novitsky et al. highlighted that large-pore polypropylene meshes provide excellent integration and low infection rates when implanted in well-vascularized, uninfected planes [10]. In contrast, biologic meshes have shown limited effectiveness in preventing recurrence but are still indicated in selected high-risk scenarios [11].

Beyond technical factors, patient-related risk factors—including advanced age, obesity, malnutrition, and immunosuppression—correlate strongly with complications and re-recurrence [12, 13]. Studies such as those by Baucom et al. emphasize that surgical decision-making in elderly patients must balance recurrence risk against perioperative vulnerability [14].

Several expert groups have attempted to synthesize this evidence into consensus guidelines. The Hernia-Surge Group, for example, issued comprehensive international recommendations that encourage individualized strategy selection based on defect size, contamination status, and patient profile [15]. However, many of these guidelines remain qualitative in nature, lacking quantitative scoring models that could guide intraoperative choices in real time.

In this context, recent work has turned toward the creation of algorithmic frameworks that combine anatomical, clinical, and technical parameters to personalize surgical strategy. Tastaldi et al. proposed a decision-making algorithm based on mesh type, fixation strength, and tissue quality, reporting significantly improved outcomes in a multicenter cohort [16]. Our own institutional experience supports the view that combining morphometric analysis with a point-based scoring system allows for more rational surgical planning and greater reproducibility of success.

Another notable trend is the growing role of digital tools in supporting preoperative decision-making. Interactive platforms that incorporate scoring systems, defect mapping, and mesh library databases are beginning to emerge as adjuncts to clinical judgment [17, 18]. These tools can standardize evaluation, reduce variability, and improve inter-surgeon consistency, particularly in complex cases involving recurrent hernias in elderly patients.

Finally, outcome evaluation must also include patient-reported parameters such as pain reduction, quality of

life, and functional recovery. While recurrence is the primary metric in surgical literature, factors such as chronic pain, wound complications, and physical limitations after surgery significantly affect overall success [19]. Rosen et al. emphasize that durable repair must be accompanied by a low complication burden and satisfactory quality of life in elderly patients [20].

### CONCLUSION

**R**ecurrent ventral hernia repair in elderly patients remains a complex and evolving field of surgical practice. Age-related anatomical deterioration, comorbidities, and the technical consequences of prior failed repairs demand a departure from traditional, one-size-fits-all approaches. The evidence reviewed in this article supports the integration of stratified surgical planning, combining morphometric evaluation, individualized risk assessment, and tailored operative techniques.

Although international guidelines have provided valuable frameworks, the practical implementation of personalized hernia management still varies widely. The development of scoring systems and algorithmic tools based on real-time anatomical and clinical data offers a promising pathway toward more consistent and reproducible outcomes. Techniques such as eTEP and TAR, along with careful mesh selection and fixation strategies, have demonstrated superiority in selected high-risk scenarios, particularly in patients with compromised abdominal wall architecture.

The literature also underscores the growing importance of digital decision-support platforms and multidisciplinary collaboration in complex cases. As the demographic profile of surgical patients continues to shift toward an older population, adapting hernia surgery to the needs of elderly individuals must become a central priority.

In summary, an evidence-based, risk-informed, and anatomy-driven approach is essential to improve long-term success in recurrent ventral hernia repair among the elderly. Standardization through personalization—not simplification—represents the future direction of this domain.

### Conflict of Interest

The authors declare no conflict of interest related to this publication.

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## QAYTUVCHI CHURRALARNI DAVOLASH STRATEGIYASI

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Buxoro ko'p tarmoqli tibbiyot markazi

Toshkent Tibbiyot Akademiyasi

### ANNOTATSIYA

Qayt etuvchi ventral churralar, ayniqsa keksa va qarigan bemorlarda, murakkab xirurgik muammo bo'lib qolmoqda. Avvalgi muvaffaqiyatsiz operatsiyalar, to'qimalar degeneratsiyasi va somatik kasalliklar ushbu guruhdagi natijalarga jiddiy ta'sir ko'rsatadi. Maqolada churrani davolashda xavf darajasini aniqlovchi ball tizimi asosida individual jarrohlik yondashuvini ishlab chiqish va uning samaradorligi ko'rib chiqiladi. 2010–2025 yillar davomida 176 bemor asosida ishlab chiqilgan ushbu model laparoskopik yondashuv, to'r turi va fiksatsiya usulini optimallashtirish imkonini berdi. Xulosa shuki, keksa bemorlar uchun churrani davolashda anatomik va individual yondashuv eng maqbul natijalarga olib keladi.

**Kalit so'zlar:** qayt etuvchi churra, keksa bemorlar, laparoskopiya, to'r, xavfni baholash, individual yondashuv

## ОПТИМИЗАЦИЯ ТАКТИКИ ПРИ РЕЦИДИВНЫХ ВЕНТРАЛЬНЫХ ГРЫЖАХ

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### АННОТАЦИЯ

Рецидивные вентральные грыжи у пациентов пожилого и старческого возраста представляют собой серьёзную проблему абдоминальной хирургии. Анатомические изменения, отягощённый соматический фон и последствия предшествующих неудачных вмешательств существенно осложняют выбор тактики и ухудшают результаты лечения. В обзоре систематизированы современные подходы к индивидуализированной тактике лапароскопической герниопластики на основе стратификации риска. Представлена модель балльной оценки, включающая морфометрические и клинические параметры, что позволяет прогнозировать исход и выбирать оптимальную методику пластики. Обобщение международного опыта подтверждает необходимость анатомически обоснованного и персонализированного подхода к лечению рецидивных грыж у пожилых пациентов.

**Ключевые слова:** рецидивная грыжа, пожилые пациенты, лапароскопия, сетчатый имплант, стратификация риска, индивидуализированная хирургия