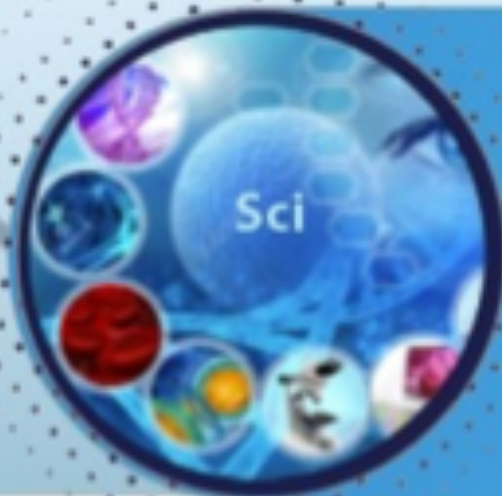
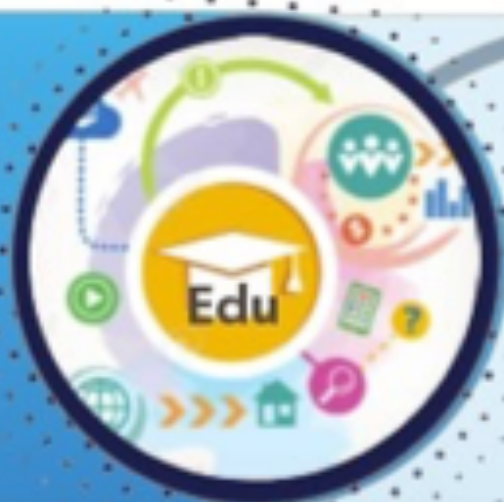




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Surgical Treatment of Hiatal Hernia: indications, techniques, and outcomes

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ABSTRACT

Surgical treatment remains the mainstay of management for symptomatic or complicated hiatal hernias. Advances in minimally invasive techniques have improved postoperative recovery and reduced morbidity, but the optimal surgical approach continues to evolve. This review discusses current indications for surgery, procedural selection based on hernia type, and technical considerations in laparoscopic repair, including cruroplasty, fundoplication, and mesh reinforcement. Attention is given to preoperative evaluation, recurrence prevention, and the management of complex or recurrent hernias. Outcomes, complications, and quality-of-life data are critically reviewed, with emphasis on tailoring surgical strategies to patient-specific anatomy and risk profile.

Keywords: Hiatal hernia, surgery, laparoscopic repair, fundoplication, cruroplasty, recurrence, mesh, esophageal surgery

INTRODUCTION

Hiatal hernias represent a common anatomical abnormality of the diaphragmatic esophageal hiatus, and while many cases remain asymptomatic, a substantial proportion eventually require surgical correction due to the development of significant gastroesophageal reflux, obstructive symptoms, or life-threatening complications. With the evolution of modern surgery, particularly minimally invasive techniques, the threshold for surgical intervention has been lowered, and outcomes have substantially improved. However, the choice of surgical strategy, the decision regarding the use of mesh, and the

approach to fundoplication or esophageal lengthening remain subjects of ongoing debate [1].

Surgical treatment is generally indicated in patients with symptomatic sliding hiatal hernias (Type I) refractory to medical therapy, or in those with paraesophageal hernias (Types II–IV) due to the risks of volvulus, obstruction, or strangulation—even when asymptomatic [2]. The primary goals of surgery are to restore normal anatomy, reinforce the esophageal hiatus, and correct the associated reflux mechanism, which is often compromised by hernia-related anatomical disruption. In most cases, this is accomplished through laparoscopic hiatal

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hernia repair, involving crural approximation (cruroplasty), fundoplication to restore the lower esophageal sphincter (LES) barrier, and, when indicated, mesh reinforcement of the hiatus [3].

The most commonly performed anti-reflux procedure in conjunction with hernia repair is Nissen fundoplication, a 360-degree wrap of the gastric fundus around the distal esophagus, which has shown durable efficacy in controlling GERD symptoms and preventing recurrence [4]. Alternatives such as Toupet (270° posterior) or Dor (anterior) funduplications may be preferred in patients with impaired esophageal motility or prior foregut surgery. The choice between these techniques is influenced by manometric findings, hernia size, patient comorbidities, and surgeon experience.

Laparoscopic repair has become the standard of care for most hiatal hernias due to its advantages over open surgery, including reduced postoperative pain, shorter hospital stay, and faster return to daily activities [5]. However, the procedure is technically demanding, particularly in the setting of giant paraesophageal hernias, requiring expertise in mediastinal dissection, esophageal mobilization, and hiatal reconstruction. The use of mesh to reinforce the crural repair remains controversial, balancing the potential benefit in recurrence prevention with the risk of erosion, infection, and dysphagia [6].

Despite advances in technique, long-term durability remains a challenge, with recurrence rates ranging from 10% to 30% depending on hernia size, surgical approach, and patient factors. Therefore, appropriate patient selection, preoperative optimization, and intraoperative decision-making are key determinants of success. Additionally, management of recurrent or failed hiatal hernia repair requires tailored strategies, often involving revision surgery or alternative reconstructive options [7].

This review provides an evidence-based synthesis of current concepts in the surgical treatment of hiatal hernia, highlighting indications, procedural options, perioperative considerations, and outcome data. Emphasis is placed on individualized operative planning to optimize both symptom control and anatomical integrity, with a view toward durable long-term results.

Surgical Indications and Preoperative Assessment

Surgical treatment of hiatal hernia is primarily indicated in patients who exhibit persistent or progressive symptoms despite optimal medical therapy, or in those at high risk of life-threatening complications due to the

anatomical configuration of the hernia. The type of hernia—sliding versus paraesophageal—as well as symptom severity, response to pharmacologic treatment, and the presence of associated pathology such as gastroesophageal reflux disease (GERD), Barrett’s esophagus, or iron-deficiency anemia, all play a critical role in determining surgical necessity [8].

For Type I sliding hernias, which are strongly associated with GERD, the primary indication for surgery is refractory reflux, particularly in patients who are young, unwilling to commit to lifelong acid suppression, or who experience side effects from proton pump inhibitors (PPIs). Additional indications include regurgitation, aspiration, or the presence of esophagitis and stricture formation despite medical therapy. In such cases, surgical repair aims not only to restore anatomical alignment of the gastroesophageal junction but also to augment the antireflux barrier, most commonly through fundoplication [9].

Paraesophageal hernias (Types II–IV) represent a different surgical scenario, often warranting repair even in the absence of classical GERD symptoms. These hernias pose a risk of volvulus, incarceration, or strangulation, which can result in gastric ischemia or perforation—a condition associated with significant morbidity and mortality. Therefore, current guidelines recommend surgical correction in all medically fit patients with symptomatic paraesophageal hernias, and prophylactic repair in select asymptomatic individuals, especially those under 70 years of age or with evidence of progressive herniation [10].

Preoperative evaluation begins with a detailed history and physical examination, aimed at correlating symptoms with imaging and functional studies. Esophagogastroduodenoscopy (EGD) is essential to assess mucosal integrity, rule out neoplastic changes, and document the presence of esophagitis, Barrett’s metaplasia, or Cameron ulcers. In large or mixed hernias, EGD also helps evaluate the extent of intrathoracic stomach and the reducibility of the hernia contents [11].

Barium contrast studies remain the gold standard for anatomical definition, enabling visualization of hernia size, organ content, reducibility, and presence of volvulus or obstruction. These studies are particularly helpful in delineating paraesophageal hernias and assessing esophageal length, an important consideration for the need for esophageal lengthening procedures [12].

High-resolution manometry is critical for assessing esophageal body motility and lower esophageal sphincter

function. It informs the choice of fundoplication technique—complete (Nissen) versus partial (Toupet or Dor)—and may uncover motility disorders such as achalasia or diffuse esophageal spasm that contraindicate standard fundoplication. 24-hour pH monitoring is useful in atypical presentations or when GERD is suspected but not endoscopically apparent [13].

Additional preoperative considerations include nutritional assessment, cardiopulmonary risk stratification, and management of comorbidities such as obesity, diabetes, or chronic lung disease, which may influence both surgical planning and postoperative recovery. For elderly or frail patients, decision-making must weigh the risks of elective surgery against the potential for emergency presentation with gastric volvulus or strangulation, which carries a far worse prognosis [14].

In summary, surgical indications for hiatal hernia are guided by a combination of anatomical, functional, and symptomatic criteria. Comprehensive preoperative assessment ensures accurate diagnosis, appropriate procedure selection, and optimization of patient safety and outcomes.

Laparoscopic surgery has become the gold standard for the repair of hiatal hernias due to its reduced postoperative morbidity, shorter hospital stay, lower pain scores, and faster recovery when compared to open approaches. The core principles of surgical correction include adequate hernia sac reduction, restoration of intra-abdominal esophageal length, reconstruction of the diaphragmatic crura (cruroplasty), and antireflux procedure, usually in the form of fundoplication [15].

The procedure begins with careful dissection and mobilization of the hernia sac from the mediastinum. In large or Type III and IV hernias, this step can be challenging due to dense adhesions, vascular proximity, or intrathoracic herniation of organs. Complete hernia reduction is critical to restore normal anatomy and prevent recurrence. In many cases, esophageal mobilization is needed to achieve at least 2.5–3 cm of intra-abdominal esophageal length. If this cannot be obtained, an esophageal lengthening procedure, most commonly Collis gastroplasty, is indicated [16].

Reconstruction of the diaphragmatic hiatus is achieved through posterior cruroplasty, typically with non-absorbable sutures. In large hernias or patients with poor tissue quality, reinforcement with synthetic or biologic mesh may be considered. The use of mesh remains controversial: while some studies suggest a reduction in recurrence rates, others report complications such as

mesh erosion, esophageal stricture, and dysphagia. As a result, mesh is usually reserved for giant hernias, recurrent cases, or where the crura cannot be approximated without tension [17].

The choice of fundoplication technique depends on patient-specific factors such as esophageal motility and GERD severity. The most commonly performed is the Nissen fundoplication, a 360° wrap of the gastric fundus around the distal esophagus, which offers excellent reflux control and long-term durability. However, in patients with impaired esophageal peristalsis, a partial posterior (Toupet, 270°) or anterior (Dor, 180°) fundoplication may be preferred to reduce the risk of postoperative dysphagia [18]. Several randomized trials have demonstrated comparable reflux control between complete and partial wraps, but with slightly better functional outcomes in the latter, especially regarding belching and gas-bloat symptoms [19].

In paraesophageal hernias, particular attention must be paid to complete hernia sac excision and full mediastinal dissection, which help reduce recurrence and ensure adequate esophageal mobilization. Some authors recommend routine placement of a temporary gastrostomy or gastropexy in elderly or frail patients to reduce the risk of early postoperative herniation or volvulus, although this is not universally practiced [20].

Emerging technologies, such as robot-assisted hiatal hernia repair, offer enhanced visualization and dexterity, which may be particularly useful in reoperative cases or when performing complex reconstructions. However, their superiority over conventional laparoscopy remains under investigation, and cost-effectiveness is yet to be established [21].

Intraoperative complications, though rare, include esophageal or gastric perforation, bleeding from short gastric vessels, and vagal nerve injury. Postoperative complications such as dysphagia, gas bloat syndrome, and wrap migration must be anticipated and managed accordingly. Routine use of intraoperative endoscopy can help confirm wrap position and tightness and detect inadvertent injury.

In conclusion, laparoscopic hiatal hernia repair, with or without fundoplication and mesh reinforcement, is a safe and effective intervention when tailored to individual anatomy and physiology. Meticulous surgical technique, careful patient selection, and judicious use of adjuncts such as mesh or lengthening procedures are central to optimizing outcomes and minimizing complications.

Postoperative Outcomes, Recurrence, and Long-Term Considerations

Postoperative outcomes following surgical repair of hiatal hernias are generally favorable, particularly with the widespread adoption of minimally invasive techniques. Most patients experience significant improvement or complete resolution of preoperative symptoms, including reflux, regurgitation, dysphagia, and postprandial discomfort. Symptom relief is most predictable in sliding hernias associated with gastroesophageal reflux disease (GERD), whereas paraesophageal hernias may present a more complex postoperative trajectory due to anatomical distortion, comorbid conditions, and advanced patient age [22].

Short-term outcomes are typically assessed by complication rates, hospital stay, and patient-reported symptom improvement. The overall perioperative complication rate ranges from 5% to 15%, with dysphagia being the most commonly reported complaint in the early postoperative period. In most cases, this resolves within weeks to months and responds to dietary modification and conservative measures. However, persistent or progressive dysphagia may require endoscopic dilation or, rarely, surgical revision. Other early complications include pneumothorax, seroma formation, gastric or esophageal injury, and bleeding, though these are uncommon in experienced hands [23].

Recurrence of the hiatal hernia remains one of the most important long-term considerations. Recurrence rates vary widely in the literature, reported between 10% and 30%, depending on factors such as hernia size, use of mesh, technical precision, and patient-specific risks (e.g., obesity, chronic cough, heavy lifting). Most recurrences are asymptomatic and discovered incidentally on imaging. However, symptomatic recurrence—manifesting as reflux, regurgitation, or obstructive symptoms—may necessitate further intervention, including revisional surgery [24].

Several strategies have been investigated to reduce recurrence. These include complete mediastinal sac excision, ensuring adequate esophageal mobilization, minimizing tension on the crural closure, and, when appropriate, reinforcement with mesh. Randomized trials on mesh use have yielded mixed results; while some show reduced radiographic recurrence, they do not always correlate with improved symptoms, and long-term mesh-related complications remain a concern [25].

Functional outcomes and quality of life following surgery are generally excellent. Most patients report high

levels of satisfaction with symptom control and decreased reliance on acid-suppressive medications. However, some may experience gas-bloat syndrome, inability to belch, or flatulence, particularly after Nissen fundoplication. In such cases, partial fundoplication techniques may offer a better functional profile with similar antireflux efficacy [26].

Long-term follow-up is important, particularly in patients with large or recurrent hernias, or those with underlying esophageal pathology such as Barrett's esophagus. Periodic endoscopic evaluation may be warranted to assess mucosal healing and detect late complications. Nutritional guidance, weight control, and management of comorbid conditions (e.g., chronic lung disease or constipation) play a supportive role in maintaining surgical success and minimizing the risk of recurrence [27].

In summary, surgical repair of hiatal hernia provides excellent symptom control and functional restoration when performed with attention to anatomical detail and patient-specific variables. Vigilant postoperative care, recurrence surveillance, and patient education are essential to preserving the long-term benefits of intervention.

CONCLUSION

Surgical repair of hiatal hernia is a highly effective intervention that offers durable symptom relief, improved quality of life, and prevention of serious complications in appropriately selected patients. The success of surgery depends on accurate preoperative assessment, careful intraoperative technique, and individualized selection of procedural elements—including the type of fundoplication, use of mesh, and need for esophageal lengthening.

Laparoscopic approaches have become the gold standard due to their excellent safety profile and faster recovery times, though their application requires technical expertise, particularly in large or complex hernias. Prevention of recurrence remains a major focus, with ongoing research into optimal crural closure methods and mesh reinforcement strategies.

Long-term outcomes are generally favorable when surgery is tailored to patient-specific anatomy and physiology. Future directions include refinement of robotic techniques, improved perioperative risk stratification, and long-term comparative studies to guide best practices. Ultimately, a multidisciplinary and patient-centered approach is essential for achieving optimal results in the surgical management of hiatal hernia.

Conflict of Interest

The author declares no conflict of interest related to this publication.

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DIAFRAGMA CHURRASINI JARROHLIK YO‘LI BILAN DAVOLASH: KO‘RSATMALAR, USULLAR VA NATIJALAR

Isomutdinov A.Z.

Mintaqaviy ko‘p tarmoqli klinika

ANNOTATSIYA

Simptomatik yoki asoratlangan diafragma hiatali churrasini davolashda jarrohlik asosiy usul hisoblanadi. So‘nggi yillarda minimal invaziv texnikalarning rivojlanishi reabilitatsiya muddatini qisqartirdi va asoratlar sonini kamaytirdi, biroq optimal jarrohlik yondashuvi hali ham bahsli mavzulardan biri bo‘lib qolmoqda. Ushbu maqolada amaldagi jarrohlik ko‘rsatmalari, churraning turiga qarab tanlanadigan protseduralar va laparoskopik tuzatishda texnik jihatlar—kruraplastika, fundoplikatsiya va tor joylarni mustahkamlash uchun to‘r (mesh) qo‘llanilishi yoritiladi. Oldindan baholash, churraning qaytalanishining oldini olish va murakkab/retsdiv holatlarni boshqarish masalalariga alohida e‘tibor qaratiladi. Amaliy natijalar, asoratlar va hayot sifati ko‘rsatkichlari tahlil qilinadi; jarrohlik strategiyasi bemorning anatomiyasi va xavf profiliga moslashtirilishi ta‘kidlanadi.

Kalit so‘zlar: Hiatali churra, jarrohlik, laparoskopik tuzatish, fundoplikatsiya, kruraplastika, churraning qaytalanishi, to‘r, qizilo‘ngach jarrohligi

ХИРУРГИЧЕСКОЕ ЛЕЧЕНИЕ ГРЫЖИ ПИЩЕВОДНОГО ОТВЕРСТИЯ ДИАФРАГМЫ: ПОКАЗАНИЯ, МЕТОДЫ И РЕЗУЛЬТАТЫ

Исомутдинов А.З.

Областная многопрофильная клиника

АННОТАЦИЯ

Хирургическое вмешательство остаётся основным методом лечения симптомных и осложнённых грыж пищевода отверстия диафрагмы. Развитие малоинвазивных технологий улучшило послеоперационное восстановление и снизило частоту осложнений, однако выбор оптимальной тактики всё ещё вызывает споры. В статье рассматриваются современные показания к хирургии, выбор процедуры в зависимости от типа грыжи, технические аспекты лапароскопической коррекции, включая круропластику, фундопликацию и применение сетчатых имплантов. Особое внимание уделено предоперационной оценке, профилактике рецидивов и ведению сложных/повторных случаев. Критически анализируются исходы, осложнения и показатели качества жизни, подчёркивается важность индивидуализации хирургической тактики в зависимости от анатомических и клинических особенностей пациента.

Ключевые слова: Грыжа пищевода отверстия, хирургия, лапароскопическая коррекция, фундопликация, круропластика, рецидив, сетка, хирургия пищевода