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SURGICAL TREATMENT OF HIASOPHAGEAL HERNIAS

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Abstract. Unlike traditional methods, which focus primarily on mechanical suturing of the hernia defect, the developed approach takes into account the severity of axial displacement, cardia geometry, the state of the antireflux valve mechanism, and esophageal motility, allowing for the development of a personalized surgical strategy.
Keywords: Hiatal hernia, surgical treatment.

Relevance. With the increasing surgical activity for hiatal hernia (HH), especially laparoscopic procedures, demands for technical precision, reduction in complications, and prevention of recurrence are increasing (4,7). The availability of high-tech mesh implants, various fundoplication techniques, and flexible esophageal fixation algorithms require a rethinking of the criteria for their use depending on the specific clinical situation (6,8).

The introduction of endovideosurgery in the treatment of esophageal hernias (EHH) has significantly expanded the indications for minimally invasive surgical interventions. Currently, laparoscopic fundoplication (LF) is the procedure of choice in the surgical treatment of gastroesophageal reflux disease (GERD) associated with EHH and ranks second among elective laparoscopic interventions on the gastrointestinal tract (GIT) [1, 18].

To date, more than 100 different surgical procedures have been proposed for the correction of EHH and its complications [17]. This large number of techniques is explained by surgeons' dissatisfaction with both immediate and long-term postoperative results, as well as the need for a differentiated approach to choosing a particular EHH repair technique [2,6]. In recent years, numerous reports have emerged of complications, often uncharacteristic of traditional antireflux surgery. The incidence of early and late postoperative complications varies significantly depending on the surgeon's experience, surgical technique, and the thoroughness of patient monitoring. According to global statistics, their incidence can reach 17% [3,5,9,10]. The most serious complication, often requiring reoperation, is recurrent GERD and

hiatal hernia, which occurs in 5-15% of cases [1,11,12,13,14]. Despite the significant volume of material devoted to this issue, there is no consensus on the diagnosis, prevention, and treatment methods for recurrent gastroesophageal reflux (GER) and failure of antireflux surgery in general. Failure of antireflux surgery is generally defined as recurrent GERD and/or the development of new symptoms associated with anatomical abnormalities of the esophagogastric region [2,15]. Frequent causes of failure include complications such as migration and incarceration of the fundoplication cuff (FC), secondary paraesophageal hernia of the diaphragmatic orifice, "telescope" phenomenon, "hourglass syndrome," as well as postoperative bleeding and perforation of hollow organs [3, 16].

The success rate of repeat surgeries is significantly lower than that of primary surgeries. The success rate of reconstructive procedures ranges from 23% to 89%. Second and third reconstructions traditionally have lower success rates, decreasing to 20% with each subsequent operation [3,]. A thorough analysis of antireflux surgery failures plays a significant role in their prevention. By eliminating the causes of laparoscopic fundoplication errors, the incidence of complications can be significantly reduced [1,18].

The high prevalence and polymorphism of clinical forms of HH, the ongoing controversy surrounding the choice of surgical approach, the insufficient stratification of treatment approaches, and the high rate of unsatisfactory outcomes make research into optimizing the surgical treatment of various forms of HH extremely relevant and in demand (1,2,3,5,8). This research is consistent with the priority areas of development in abdominal surgery, addresses the objectives of reducing disability and improving quality of life for patients, and also creates the preconditions for the standardization and personalization of surgical care in this area.

The objective of the study was to develop a modified surgical method for the treatment of esophageal hernias.

Materials and Methods. In accordance with the study methodology, patients were divided into two groups: a control group (63 patients; 49.2%), operated on between 2015 and 2019 using a traditional technique (posterior cruroraphy and, in some cases, Nissen fundoplication); and a study group (65 patients; 50.8%), who underwent surgery between 2020 and 2025 using a modified technique and an algorithmically based choice of the intervention scope.

Results and Discussion. This study presents a modified surgical technique developed by us, aimed at eliminating not only the anatomical defect but also stabilizing the key functional elements of the hernia. Furthermore, we formulate principles and propose an algorithm for its application, taking into account the severity of axial displacement,

motor impairments, anatomical geometry, and compensatory mechanisms identified during preoperative examination.

High correlation coefficients were also observed with increasing gastric migration (r=0.612), Hill valve dysfunction (r=0.578), and the presence of pathological acid exposure in the distal esophagus (r=0.604).

Barrett hernia type also showed a significant correlation (r=0.531), particularly with the transition from types I-II to III-IV. These data indicate that anatomical and functional abnormalities of the esophageal motility have predictive value for an unfavorable postoperative course and can be used as a basis for choosing an extended or modified surgical intervention**.**

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To objectively identify the causes of unsatisfactory results of standard surgical correction for hiatal hernia, a correlation analysis was conducted to determine the relationship between the anatomical and functional characteristics of the hernia and the recurrence rate at long-term follow-up. This approach avoided subjective interpretation and moved from isolated observations to statistically confirmed relationships. The analysis included parameters are obtained preoperatively using a comprehensive instrumental assessment, namely, EGDFS, CT, manometry, pH-metry, as well as clarification of the hernia type according to the Barrett and Hill classifications (Figure 1). The strongest correlation with the 12-month recurrence rate was found for esophageal motility disorders (r=0.665), highlighting the importance of assessing peristaltic activity when choosing the extent of surgery.

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International practice shows that despite the widespread prevalence of posterior cruroraphy, the recurrence rate after standard intervention remains significant,

especially in mixed forms of posterior hernia and in patients with severe diaphragmatic dysfunction. Attempts to supplement crurorаphy with gastropexy or use mesh implants have often lacked systematic justification for the extent of the intervention depending on the specific morphological type of hernia. In this context, the proposed technique is distinguished by its comprehensive structure and functional selectivity of its components.

The advantages of the proposed modified technique can be summarized as follows:

- pathogenetic focus, where each stage of the intervention is correlated with the specific mechanism of posterior hernia formation: crurorаphy with subalarcotic sutures to stabilize the diaphragmatic orifice; gastropexy to prevent cranial displacement of the cardia; and a "saddle" implant to strengthen the area against the background of reduced tissue resistance. - biomechanical stability of the resulting complex: the use of sutures that distribute the load along an arcuate trajectory eliminates linear tension, reducing the risk of dehiscence and recanalization; the mesh implant does not circumferentially occlude the esophagus, minimizing the risk of dysphagia and cicatricial deformity.
- personalization of the intervention: the technique is not dogmatic, and its elements are applied differentially, depending on the type of hernia, the degree of gastric displacement, and the severity of functional impairment, ensuring flexibility of the approach.
- technological reproducibility: all manipulations can be performed using a standard laparoscopic approach, without the use of expensive or scarce materials; the technique is easily adapted to the technical conditions of a general surgical department.

Thus, the modified procedure represents a clinically justified and anatomically adapted treatment method capable of restoring the physiological parameters of the esophageal septum.

CONCLUSIONS:

1. The main reasons for the unsatisfactory results of traditional surgical treatments for esophageal hernias are the failure to consider the morphofunctional characteristics of the disease and the use of a standardized approach regardless of hernia type, degree of migration, or valve mechanism status.
2. Unlike traditional methods, which focus primarily on mechanical suturing of the hernia defect, the developed approach takes into account the severity of axial displacement, cardia geometry, the state of the antireflux valve mechanism, and esophageal motility, enabling the development of a personalized surgical approach.

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