



Development and Clinical Validation of an Integrated Morphofunctional Risk Stratification Algorithm for Predicting Surgical Outcomes in Patients with Hiatal Hernia

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Abstract

Laparoscopic Nissen fundoplication is a widely used surgical technique for the treatment of hiatal hernia. However, variability in clinical outcomes suggests a potential influence of anatomical and functional characteristics of the disease. To evaluate the clinical outcomes of laparoscopic Nissen fundoplication in patients with hiatal hernia and to analyze their relationship with morphofunctional features. A retrospective–prospective observational study included 63 patients who underwent laparoscopic hiatal hernia repair with posterior cruroplasty and Nissen fundoplication. Patients were stratified according to anatomical type of hernia. Clinical, endoscopic, and imaging data were

analyzed. Outcomes were assessed at 10, 30 days, and at 3 and 12 months after surgery. Axial hernias were associated with a predominance of reflux symptoms, while paraesophageal and mixed forms more frequently presented with dysphagia and retrosternal pain. At 10 days after surgery, good outcomes were observed in 50.0% of patients with axial hernias compared with 11.1% in mixed forms, while unsatisfactory outcomes reached 55.6% in mixed hernias. At 12 months, good outcomes were maintained in 75.0% of axial hernias and 62.5% of paraesophageal hernias, whereas unsatisfactory outcomes persisted in 22.2% of patients with mixed hernias. Anatomical complexity was consistently associated with less favorable outcomes ($p < 0.05$). Laparoscopic Nissen fundoplication provides stable clinical results in patients with less complex anatomical forms of hiatal hernia. Variability of outcomes is associated with morphofunctional characteristics of the disease and should be considered in clinical evaluation.

Keywords:

hiatal hernia; Nissen fundoplication; laparoscopic surgery; dysphagia; surgical outcomes; esophageal motility

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Introduction

Hiatal hernia (HH) is one of the most common anatomical disorders of the upper gastrointestinal tract and is characterized by the displacement of the stomach through the esophageal hiatus of the diaphragm into the thoracic cavity. The prevalence of HH increases with age and is estimated to affect up to 50–60% of individuals over 60 years of age, although many patients remain asymptomatic. Clinically significant hiatal hernia is strongly associated with gastroesophageal reflux disease (GERD), chronic esophagitis, Barrett's esophagus, dysphagia, chest pain, and deterioration of quality of life. The disease develops as a consequence of progressive weakening of the phrenoesophageal ligament, enlargement of the diaphragmatic hiatus, degeneration of connective tissue, obesity, elevated intra-abdominal pressure, and age-related changes affecting the esophagogastric junction. These structural alterations impair the physiological antireflux barrier, resulting in abnormal gastroesophageal reflux and progressive functional disturbances of the esophagus [1–3].

The pathophysiology of hiatal hernia is considerably more complex than a simple anatomical displacement of the stomach. The disease involves progressive remodeling of the esophagogastric junction, alterations in diaphragmatic crural architecture, reduced competence of the lower esophageal sphincter, disruption of the angle of His, and impaired esophageal clearance. These morphofunctional changes contribute to considerable variability in clinical manifestations. While some patients present predominantly with heartburn and acid regurgitation, others experience dysphagia, retrosternal pain, respiratory symptoms, or chronic anemia associated with large paraesophageal hernias. Consequently, the severity of symptoms does not always correlate with the anatomical size of the hernia, indicating that multiple anatomical and functional mechanisms participate in disease progression [3,4].

Laparoscopic fundoplication, particularly the Nissen technique combined with posterior cruroplasty, remains the standard surgical treatment for symptomatic hiatal hernia in patients with persistent reflux symptoms, large hernias, or complications of GERD. During the last two decades, minimally invasive surgical techniques have significantly improved postoperative recovery, reduced hospital stay, and achieved excellent long-term symptom control. Nevertheless, despite technical advances and standardized operative procedures, postoperative outcomes remain heterogeneous. Some patients experience complete symptom resolution, whereas others develop persistent dysphagia, recurrent reflux, gas-bloat syndrome, or anatomical recurrence requiring additional treatment [2,5].

Accumulating evidence suggests that postoperative outcomes are influenced by numerous factors extending beyond surgical technique alone. Patient age, body mass index, duration of disease, hernia size, degree of gastric migration, esophageal shortening, quality of diaphragmatic crura, esophageal motility disorders, and associated connective tissue degeneration have all been identified as clinically relevant determinants of surgical success. These observations indicate that anatomical classification alone cannot adequately explain the variability in postoperative recovery and long-term clinical results [5–8].

Particular attention has recently been directed toward morphofunctional assessment of hiatal hernia. Modern diagnostic evaluation combines upper gastrointestinal endoscopy, computed tomography, contrast radiography, and high-resolution esophageal manometry to characterize both anatomical abnormalities and functional impairment. Parameters such as hiatal defect size, degree of gastric migration, lower esophageal sphincter competence, esophageal motility, and severity of reflux esophagitis provide valuable information for preoperative planning and postoperative prognosis. Integration of these parameters allows a more comprehensive understanding of disease severity than anatomical classification alone [6–9].

Recent experimental and clinical investigations have also focused on the biological mechanisms underlying connective tissue remodeling in hiatal hernia. Alterations in extracellular matrix metabolism, collagen organization, and inflammatory signaling pathways are increasingly recognized as important contributors to weakening of the diaphragmatic hiatus. Consequently, several investigators have proposed tissue-remodeling biomarkers—including matrix metalloproteinases (MMPs), transforming growth factor- β (TGF- β), inflammatory cytokines, and collagen-related molecules—as potential predictors of recurrence and postoperative healing. However, these biomarkers remain under investigation and have not yet been incorporated into routine clinical practice. Accordingly, current surgical decision-making continues to rely primarily on comprehensive clinical, anatomical, and functional assessment rather than laboratory biomarker profiling.

Recent studies have emphasized the growing importance of individualized risk stratification in upper gastrointestinal surgery. Instead of relying solely on anatomical classification, contemporary predictive models increasingly combine demographic variables, clinical presentation, imaging findings, and functional investigations to estimate postoperative outcomes. Such integrated approaches may improve patient selection, facilitate individualized surgical planning, and optimize postoperative follow-up. Nevertheless, clinically validated prediction models specifically developed for patients undergoing laparoscopic repair of hiatal hernia remain relatively limited, particularly in populations with diverse morphofunctional characteristics [8–11].

Several clinical studies have demonstrated that surgical outcomes after fundoplication are influenced by multiple factors, including esophageal motility, size of the hiatal defect, structural characteristics of the hernia, and preoperative functional impairment [9–12]. While the Nissen procedure provides reliable reflux control in many patients, differences in postoperative functional outcomes, including dysphagia and persistent reflux symptoms, continue to be observed. These findings suggest that successful surgical reconstruction depends not only on operative technique but also on the underlying morphofunctional characteristics of the disease.

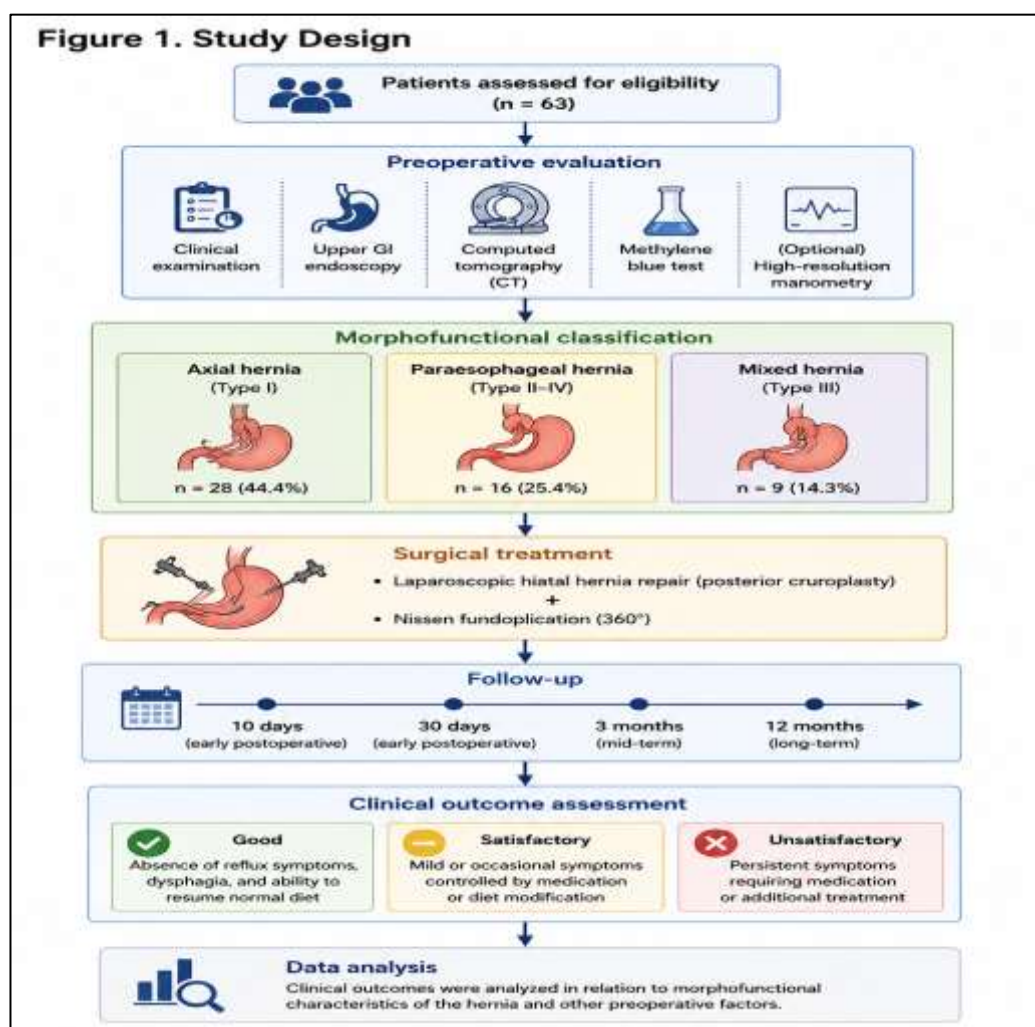
Therefore, comprehensive evaluation of anatomical complexity together with functional characteristics may provide a more accurate estimation of postoperative prognosis than assessment of either parameter alone. Identification of patients at increased risk for less favorable outcomes could facilitate individualized perioperative management and improve long-term clinical results.

The present study aimed to evaluate the clinical outcomes following laparoscopic Nissen fundoplication in patients with hiatal hernia and to determine their relationship with morphofunctional characteristics of the disease, providing the basis for a clinically applicable risk stratification approach in surgical decision-making.

Material and Methods

The study was designed as a retrospective–prospective observational analysis of patients with hiatal hernia who underwent surgical treatment between 2017 and 2024. A total of 63 patients were included. All patients underwent laparoscopic repair consisting of posterior cruroplasty combined with Nissen fundoplication. The study aimed to evaluate clinical outcomes in relation to anatomical and functional characteristics of the disease.

The overall study workflow is presented in Figure 1. Patients underwent standardized preoperative clinical and instrumental assessment followed by laparoscopic hiatal hernia repair and scheduled postoperative follow-up at 10 days, 30 days, 3 months, and 12 months.



Inclusion criteria comprised adult patients with a confirmed diagnosis of hiatal hernia who were referred for surgical treatment due to persistent symptoms or complications of the disease. Patients with previous esophageal or gastric surgery, malignant disease of the upper gastrointestinal tract, or incomplete follow-up data were excluded from the analysis.

Patients were stratified according to the anatomical type of hiatal hernia and the degree of gastric migration into the thoracic cavity. Based on intraoperative findings and preoperative imaging, hernias were categorized as axial, paraesophageal, or mixed. An additional stratification was performed according to the extent of gastric displacement, including cardiac, cardiophrenic, and subtotal or total migration patterns.

Preoperative assessment included clinical evaluation, esophagogastroduodenoscopy, and computed tomography with morphometric measurement of the hiatal defect. Functional evaluation was performed using a methylene blue test in all patients as a surrogate assessment of gastroesophageal reflux. High-resolution esophageal manometry was performed in selected patients when technically feasible and was used as an adjunct method for functional assessment of the esophagus, without being included as a mandatory component of preoperative evaluation across the entire cohort. Esophageal mucosal changes were classified according to the Los Angeles classification, and the competence of the gastroesophageal valve was assessed using the Hill classification.

All procedures were performed laparoscopically. After mobilization of the distal esophagus and reduction of the hernia contents into the abdominal cavity, posterior cruroplasty was performed using non-absorbable sutures. A 360-degree Nissen fundoplication was then constructed around the distal esophagus. The operative technique was applied in a standardized manner across the cohort, with minor adjustments based on intraoperative anatomical findings.

Postoperative outcomes were evaluated at 10, 20, and 30 days, as well as at 3, 6, and 12 months after surgery. Clinical results were classified as good, satisfactory, or unsatisfactory. A good outcome was

defined as complete resolution of symptoms without the need for ongoing medical therapy. A satisfactory outcome included mild or occasional symptoms not requiring regular treatment. An unsatisfactory outcome was defined as persistent or clinically significant symptoms requiring medical therapy or negatively affecting quality of life.

Postoperative complications were assessed according to the Clavien-Dindo classification. Functional outcomes and patient-reported satisfaction were evaluated during follow-up visits using structured clinical assessment, and quality-of-life parameters were recorded when available.

Statistical analysis was performed using standard methods. Continuous variables were expressed as mean $\pm$ standard deviation, and categorical variables were presented as absolute values and percentages. Comparative analysis between subgroups was performed using the chi-square test or Fisher's exact test where appropriate. A p-value of less than 0.05 was considered statistically significant.

Ethical approval for the study was obtained from the local institutional review board prior to data collection. The study was conducted in accordance with the principles of the Declaration of Helsinki. All patients provided informed consent for surgical treatment, and all data were analyzed in an anonymized form. The retrospective component involved analysis of existing clinical data, while the prospective component was conducted within routine clinical practice without additional interventions.

Results

Baseline characteristics

A total of 63 patients with hiatal hernia were included in the study. According to anatomical classification, axial hernias were identified in 28 patients (44.4%), paraesophageal in 16 (25.4%), and mixed forms in 9 (14.3%). Clinical presentation differed significantly depending on the type of hernia (Table 1).

Table 1. Baseline clinical and instrumental characteristics of patients

PARAMETER	Axial (n=28)	Paraesophageal (n=16)	Mixed (n=9)
Heartburn, n (%)	24 (85.7%)	9 (56.3%)	5 (55.6%)
Retrosternal pain, n (%)	12 (42.9%)	10 (62.5%)	6 (66.7%)
Dysphagia, n (%)	4 (14.3%)	7 (43.8%)	5 (55.6%)
Regurgitation, n (%)	10 (35.7%)	4 (25.0%)	3 (33.3%)
≥ 1 symptom, n (%)	27 (96.4%)	15 (93.8%)	9 (100%)
Mean number of symptoms	2.1	2.5	3.0
Esophagitis ($\geq$ LA A), n (%)	21 (75.0%)	9 (56.3%)	5 (55.6%)
Hill grade $\geq$ III, n (%)	19 (67.9%)	12 (75.0%)	8 (88.9%)
Positive methylene blue test, n (%)	15 (53.6%)	11 (68.8%)	8 (88.9%)
Hiatal defect size, cm (M $\pm$ SD)	2.9 $\pm$ 0.6	4.1 $\pm$ 0.9	5.4 $\pm$ 1.1
Motility disorders*, n (%)	6 (21.4%)	7 (43.8%)	5 (55.6%)

* assessed in available cases

Heartburn was more frequently observed in patients with axial hernias (24/28, 85.7%) compared with paraesophageal (9/16, 56.3%) and mixed hernias (5/9, 55.6%) ($\chi^2=6.12$, $p=0.047$). In contrast, dysphagia was significantly more common in mixed hernias (5/9, 55.6%) compared with axial forms (4/28, 14.3%) ($\chi^2=7.01$, $p=0.030$). Retrosternal pain was more prevalent in paraesophageal (10/16, 62.5%) and mixed hernias (6/9, 66.7%) compared with axial forms (12/28, 42.9%), although this difference did not reach statistical significance ($\chi^2=2.41$, $p=0.299$).

At least one symptom was present in 61 of 63 patients (96.8%). The mean number of symptoms increased from 2.1 in axial hernias to 3.0 in mixed forms, indicating a higher symptom burden in more complex anatomical variants.

Instrumental assessment demonstrated a progressive increase in anatomical and functional impairment with hernia complexity (Table 1). The mean hiatal defect size increased from 2.9 $\pm$ 0.6 cm in axial hernias to 5.4 $\pm$ 1.1 cm in mixed forms ($p<0.05$). Esophageal motility disorders were identified more frequently in paraesophageal (7/16, 43.8%) and mixed hernias (5/9, 55.6%) compared with axial forms (6/28, 21.4%) ($\chi^2=4.98$, $p=0.083$).

Overall, these findings indicate a clear association between anatomical complexity and both clinical severity and functional impairment.

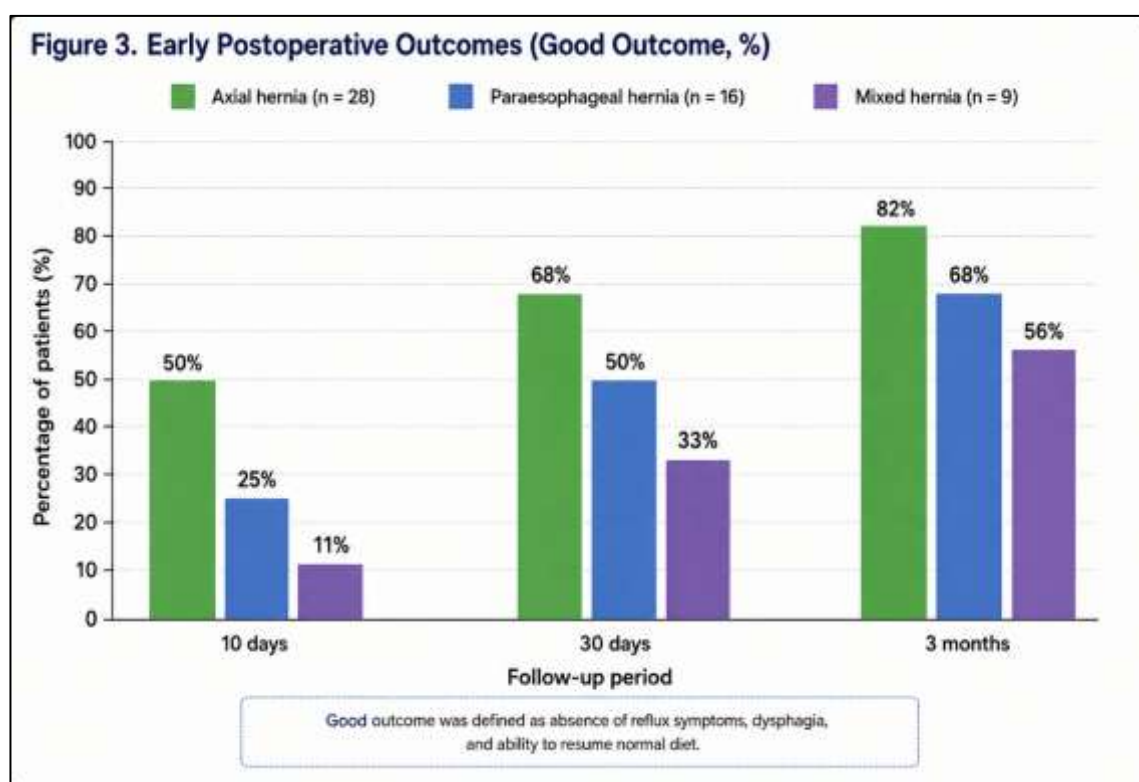
Early postoperative outcomes

Early postoperative outcomes were closely associated with anatomical type of hernia (Table 2).

Table 2. Early postoperative outcomes

Hernia type	Good (10 d)	Unsatisfactory (10 d)	Good (30 d)	Unsatisfactory (30 d)
Axial (n=28)	14 (50.0%)	3 (10.7%)	19 (67.9%)	0 (0%)
Paraesophageal (n=16)	4 (25.0%)	4 (25.0%)	8 (50.0%)	2 (12.5%)
Mixed (n=9)	1 (11.1%)	5 (55.6%)	3 (33.3%)	2 (22.2%)
Total (n=63)	19 (30.2%)	12 (19.0%)	30 (47.6%)	4 (6.3%)

The distribution of favorable early postoperative outcomes according to anatomical type of hiatal hernia is illustrated in Figure 3. Patients with axial hernias demonstrated the highest proportion of good clinical outcomes throughout the early postoperative period, whereas mixed hernias showed slower functional recovery.



At 10 days after surgery, good outcomes were more frequently observed in patients with axial hernias (14/28, 50.0%) compared with paraesophageal (4/16, 25.0%) and mixed forms (1/9, 11.1%). Conversely, unsatisfactory outcomes were more common in mixed hernias (5/9, 55.6%) compared with axial forms (3/28, 10.7%) ($\chi^2=9.84$, $p=0.007$).

By day 30, clinical improvement was observed across all groups. Good outcomes were achieved in 19 of 28 patients (67.9%) with axial hernias and in 8 of 16 (50.0%) with paraesophageal hernias. In contrast, patients with mixed hernias demonstrated good outcomes in only 3 of 9 cases (33.3%), while unsatisfactory outcomes persisted in 2 of 9 (22.2%) ($\chi^2=6.92$, $p=0.031$).

Postoperative complications were recorded in 12 of 63 patients (19.0%), including grade II complications in 7 patients (11.1%) and grade III in 5 patients (7.9%) according to the Clavien–Dindo classification. Complications were more frequently observed in patients with paraesophageal and mixed hernias compared with axial forms, although this difference did not reach statistical significance ($p=0.084$).

These findings indicate that early postoperative recovery is influenced by anatomical complexity of the hernia.

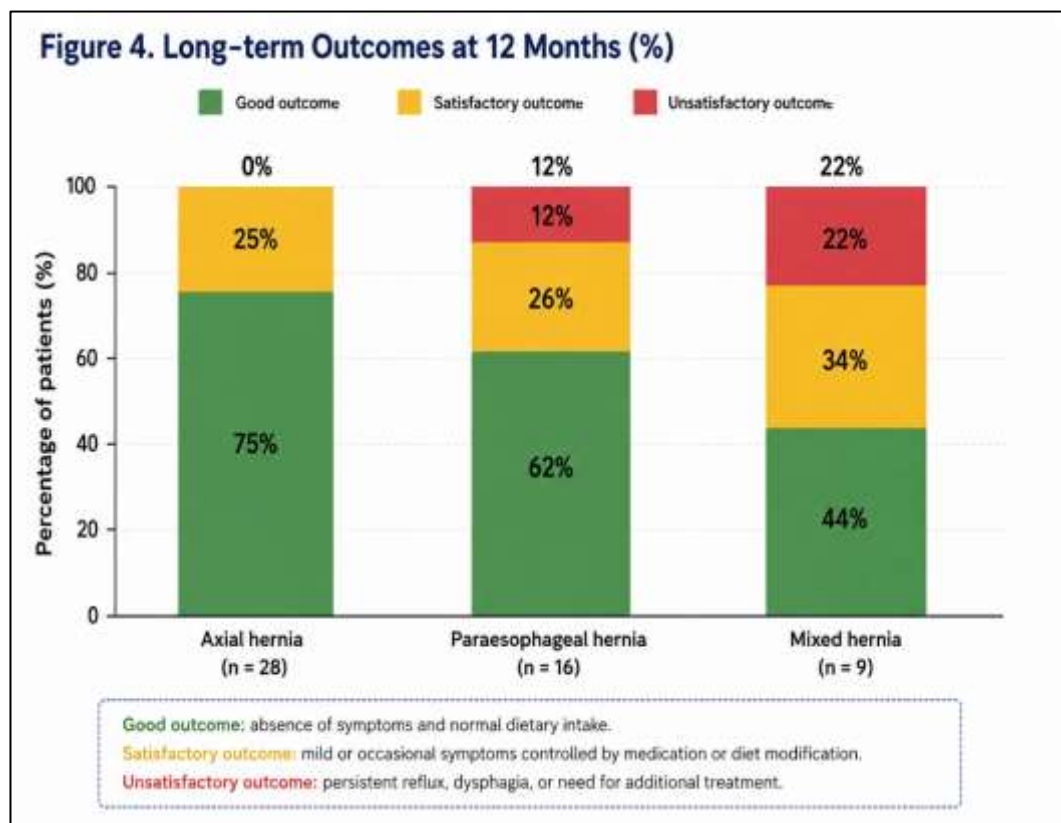
Long-term outcomes

Long-term outcomes demonstrated persistent differences between anatomical subgroups (Table 3). At 3 months after surgery, good outcomes were observed in 20 of 28 patients (71.4%) with axial hernias and in 9 of 16 (56.3%) with paraesophageal hernias. In contrast, only 3 of 9 patients (33.3%) with mixed hernias achieved good outcomes, while unsatisfactory results remained in 2 of 9 cases (22.2%) ($\chi^2=6.41$, $p=0.041$).

Table 3. Long-term outcomes

Hernia type	Good (3 months)	Unsatisfactory (3 months)	Good (12 months)	Unsatisfactory (12 months)
Axial (n=28)	20 (71.4%)	0 (0%)	21 (75.0%)	0 (0%)
Paraesophageal (n=16)	9 (56.3%)	2 (12.5%)	10 (62.5%)	2 (12.5%)
Mixed (n=9)	3 (33.3%)	2 (22.2%)	4 (44.4%)	2 (22.2%)
Total (n=63)	32 (50.8%)	4 (6.3%)	35 (55.6%)	4 (6.3%)

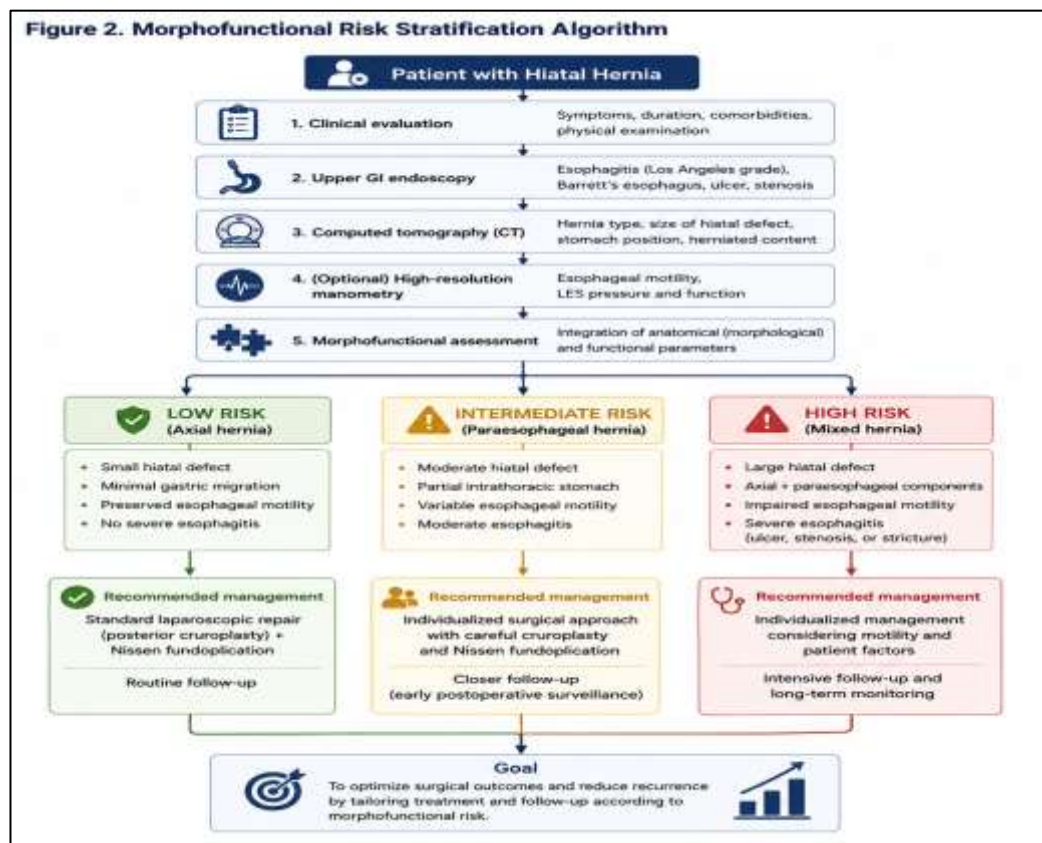
Long-term postoperative outcomes at 12 months are summarized in Figure 4. Patients with axial hernias maintained the highest proportion of good outcomes, whereas mixed hernias demonstrated a greater frequency of satisfactory and unsatisfactory results.



At 12 months, this pattern persisted, with stable outcomes in patients with axial and paraesophageal hernias, whereas mixed hernias were associated with a higher proportion of residual symptoms (Table 3). Differences between subgroups approached statistical significance ($\chi^2=5.92$, $p=0.052$).

These results demonstrate that anatomical complexity remains a determining factor for long-term clinical outcomes.

Based on the findings of the present study, a morphofunctional risk stratification algorithm was developed (Figure 2). The algorithm integrates anatomical classification with clinical and functional assessment to facilitate individualized surgical planning and postoperative follow-up.



Discussion

The present study demonstrates that laparoscopic Nissen fundoplication provides favorable clinical outcomes in a substantial proportion of patients with hiatal hernia, particularly in anatomically less complex forms, while outcomes in more complex anatomical variants remain less predictable.

The observed differences between anatomical subtypes emphasize that hiatal hernia should not be considered a homogeneous clinical entity. Progressive enlargement of the hiatal defect is accompanied by alterations in esophagogastric junction geometry, impaired diaphragmatic support, and deterioration of the antireflux barrier. These structural changes may explain why patients with more advanced anatomical forms demonstrate greater postoperative variability despite technically standardized surgical repair. Similar observations have been reported in recent clinical studies evaluating individualized surgical planning for complex hiatal hernias.

The present findings also support the concept that recurrence and persistent postoperative symptoms are influenced by multiple interacting factors rather than by anatomical size alone. Connective tissue quality, chronic inflammatory remodeling, patient age, obesity, and duration of disease have all been proposed as additional contributors to long-term surgical success. Therefore, comprehensive preoperative assessment remains essential for accurate patient selection and individualized operative planning.

In the current cohort, patients with axial hernias showed the most favorable early and long-term results, whereas mixed hernias were associated with a higher proportion of persistent symptoms. This pattern was stable across all follow-up periods and suggests that outcome variability is not random but follows a reproducible morphofunctional gradient. A similar relationship between anatomical complexity and surgical outcomes has been described in previous studies, where structural characteristics of the hernia were identified as key determinants of clinical results [9].

The influence of anatomical factors is further supported by data on recurrence and postoperative function. In a large cohort study including 862 patients, Nguyen et al. demonstrated that both anatomical features and patient-related factors significantly affect recurrence rates after paraesophageal hernia repair [10]. These findings are consistent with the present results, where

patients with mixed hernias demonstrated unsatisfactory outcomes in up to 22.2% of cases at 12 months, compared with no unsatisfactory outcomes in axial hernias.

Technical aspects of hiatal repair represent another important factor influencing outcomes. The role of cruroplasty and the use of reinforcement materials have been extensively investigated. Systematic reviews have suggested that mesh reinforcement in large hiatal defects may reduce recurrence rates, although its routine use remains controversial [11,12]. In the present study, an increase in hiatal defect size was associated with less favorable clinical outcomes, supporting the relevance of defect size as a determinant of postoperative results.

Functional characteristics of the esophagus also appear to contribute to postoperative variability. In the current study, esophageal motility disorders were more frequently observed in patients with complex hernias, which may partly explain the persistence of symptoms such as dysphagia. This is supported by a systematic review demonstrating that esophageal motility parameters are associated with postoperative dysphagia after fundoplication [13]. The interaction between anatomical reconstruction and pre-existing functional impairment may therefore play a role in postoperative adaptation.

Modern preoperative evaluation increasingly integrates anatomical imaging with functional investigations, including upper gastrointestinal endoscopy, computed tomography, contrast radiography, and high-resolution manometry. Such multimodal assessment provides complementary information regarding esophageal clearance, lower esophageal sphincter competence, and the extent of gastric migration. The present study confirms that combining these parameters offers greater clinical value than relying on anatomical classification alone.

An important implication of the present findings is the potential role of morphofunctional risk stratification. Patients with axial hernias consistently demonstrated excellent postoperative outcomes, whereas mixed hernias exhibited greater clinical variability throughout follow-up. These observations formed the basis for the integrated morphofunctional risk stratification algorithm proposed in the present study, which may facilitate individualized perioperative management and postoperative surveillance in routine surgical practice.

Previous studies have also highlighted that functional outcomes after hiatal hernia repair may vary depending on the underlying anatomical condition. Raichurkar et al. reported that patients undergoing paraesophageal hernia repair may exhibit variable postoperative esophageal function, including persistent dysphagia and altered motility patterns [14]. In the present study, similar findings were observed in patients with mixed hernias, where a higher rate of residual symptoms was noted during follow-up.

Despite these differences, the overall effectiveness of laparoscopic Nissen fundoplication remains well established. Multiple studies have confirmed its safety and efficacy when performed using standardized techniques [15,16]. The present results do not contradict this evidence but rather demonstrate that clinical outcomes may vary across different anatomical subgroups.

Taken together, these findings suggest that anatomical and functional characteristics influence the interaction between the reconstructed antireflux barrier and the esophagogastric junction. The persistence of symptoms in certain patient groups may therefore reflect differences in this interaction rather than technical failure of the procedure.

Several limitations of the study should be acknowledged. The sample size was relatively limited, particularly in the subgroup of patients with mixed hernias, which may affect the statistical power of subgroup analyses. The study was conducted in a single center, potentially limiting the generalizability of the findings. In addition, functional assessment was not uniform across the cohort, as high-resolution manometry was not performed in all patients, which may have influenced the interpretation of postoperative functional outcomes. The observational design also limits the ability to establish causal relationships.

Nevertheless, the study provides a structured analysis of clinical outcomes in relation to morphofunctional characteristics and highlights reproducible patterns of variability following laparoscopic Nissen fundoplication.

Overall, the present study demonstrates that morphofunctional assessment represents a clinically relevant approach for predicting postoperative outcomes following laparoscopic Nissen fundoplication. Rather than considering anatomical classification in isolation, integration of anatomical complexity with functional characteristics may improve surgical decision-making,

optimize postoperative follow-up strategies, and contribute to more personalized management of patients with hiatal hernia.

Conclusion

Laparoscopic Nissen fundoplication remains an effective and reliable surgical treatment for patients with hiatal hernia, providing favorable short- and long-term clinical outcomes, particularly in patients with less complex anatomical forms of the disease. In the present study, patients with axial hiatal hernias consistently demonstrated superior postoperative recovery, whereas mixed hernias were associated with a higher incidence of persistent symptoms and less favorable functional outcomes during follow-up.

The findings demonstrate that postoperative outcomes are closely associated with the morphofunctional characteristics of hiatal hernia rather than with the surgical procedure alone. Anatomical complexity, hiatal defect size, esophageal motility disturbances, and the degree of gastric migration collectively influence postoperative adaptation and long-term clinical results. These observations emphasize the importance of comprehensive preoperative assessment integrating both anatomical and functional parameters.

Based on the clinical findings, an integrated morphofunctional risk stratification approach was developed to facilitate individualized surgical planning and postoperative follow-up. The proposed algorithm may assist surgeons in identifying patients at increased risk of less favorable outcomes, optimizing perioperative decision-making, and improving long-term management strategies for patients with hiatal hernia.

Although the present study was conducted in a single center with a relatively limited number of patients, it provides clinically relevant evidence supporting the role of morphofunctional assessment in predicting surgical outcomes after laparoscopic hiatal hernia repair. Future multicenter prospective studies involving larger patient populations and incorporating advanced functional investigations, and potentially biological markers of tissue remodeling, may further refine individualized risk prediction models and strengthen personalized surgical management.

In conclusion, the integration of morphofunctional characteristics into routine preoperative evaluation represents a practical and clinically applicable strategy for improving patient selection, optimizing surgical planning, and enhancing postoperative outcomes following laparoscopic Nissen fundoplication.

Author Contributions

All Authors contributed equally.

Conflict of Interest

The authors declared that no conflict of interest.

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