

## LAPAROSCOPIC NISSEN 'S FUNDOPLICATION FOR GASTRO-ESOPHAGEAL REFLUX DISEASE WITH OESOPHAGITIS AND HIATUS HERNIA: OUR EXPERIENCE

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### Abstract

**Background:** Gastroesophageal reflux disease (GERD) and associated conditions like erosive esophagitis and hiatus hernia are common indications for laparoscopic Nissen fundoplication (LNF). Despite its widespread use, there is still variability in clinical outcomes. This study evaluates the surgical outcomes, symptom resolution, complications, and patient satisfaction following LNF in a cohort with GERD, esophagitis, and hiatus hernia, aiming to provide insight into the effectiveness of this procedure. **Materials and Methods:** This prospective cohort study included 133 patients who underwent LNF for GERD, erosive esophagitis, and hiatus hernia. Demographic and clinical data, including preoperative symptoms, endoscopic findings, and postoperative outcomes, were collected. Surgical procedures included complete 360° fundoplication, with or without mesh reinforcement for crural repair. Primary outcomes assessed included symptom resolution (heartburn, regurgitation, dysphagia), postoperative complications, recurrence of symptoms at 6 months, and patient satisfaction. Statistical analyses, including comparisons between groups with and without mesh reinforcement, were performed using appropriate tests ( $p < 0.05$ ). **Result:** The mean GERD-HRQL score improvement was  $7.1 \pm 4.3$ , with 91.7% of patients reporting resolution of heartburn and 89.5% regurgitation. Transient postoperative dysphagia was observed in 17.3% of patients, while 13.5% experienced gas-bloat syndrome. A 9% recurrence of symptoms was reported at 6 months. Mesh reinforcement of the crural repair was associated with longer surgical duration ( $121.3 \pm 22.8$  minutes vs.  $98.3 \pm 27.4$  minutes,  $p < 0.0001$ ), higher complication rates (25% vs. 5.9%,  $p = 0.012$ ), and increased rates of transient dysphagia (28.1% vs. 13.9%,  $p = 0.041$ ). Patient satisfaction was high, with a mean score of  $8.6 \pm 1.4$ . **Conclusion:** Laparoscopic Nissen fundoplication is highly effective for treating GERD and its associated conditions, with substantial improvements in symptom resolution and high patient satisfaction. Mesh reinforcement, while potentially beneficial for crural repair, was associated with longer operative times and higher complication rates. These findings suggest that while LNF offers durable relief for GERD symptoms, the decision to use mesh should be carefully considered.

## INTRODUCTION

Gastro-esophageal reflux disease (GERD) is one of the most common gastrointestinal disorders, affecting approximately 10–20% of the population in Western countries and around 5–10% in Asia, including India.<sup>[1,2]</sup> GERD is characterized by the retrograde movement of gastric contents into the esophagus, leading to bothersome symptoms such as

heartburn and regurgitation, and complications like esophagitis, stricture formation, Barrett's esophagus, and an increased risk of esophageal adenocarcinoma.<sup>[3]</sup> A significant subset of GERD cases is associated with esophagitis, which can impair mucosal integrity and result in chronic inflammation of the esophageal lining. Hiatus hernia, observed in nearly 40–60% of patients with severe GERD, is a structural abnormality that aggravates

reflux by altering the normal anatomy of the gastro-esophageal junction.<sup>[4]</sup>

Pharmacological treatment with proton pump inhibitors (PPIs) remains the first-line therapy for GERD. However, up to 30% of patients report inadequate symptom relief or experience recurrence despite optimal medical management.<sup>[5]</sup> Furthermore, long-term PPI use has been linked to adverse effects such as osteoporosis, chronic kidney disease, and an increased risk of infections, prompting the need for alternative interventions in select cases.<sup>[6]</sup> Surgical intervention is particularly indicated in patients with large hiatus hernias, persistent esophagitis, or refractory symptoms that significantly affect their quality of life.<sup>[7]</sup>

Laparoscopic Nissen's fundoplication has become the gold-standard surgical procedure for GERD, particularly in cases complicated by esophagitis or hiatus hernia. The procedure involves creating a 360-degree wrap of the gastric fundus around the distal esophagus to restore the anti-reflux barrier. This minimally invasive approach offers significant advantages over traditional open surgery, including reduced postoperative pain, shorter hospital stays, and faster recovery.<sup>[8]</sup> Clinical studies report symptomatic improvement in over 85–90% of GERD patients undergoing laparoscopic Nissen's fundoplication, with a recurrence rate of approximately 10–15% over a 10-year follow-up period.<sup>[9]</sup> The procedure is also effective in resolving esophagitis, with healing rates exceeding 80–90% in most series.<sup>[10]</sup>

This study aimed to evaluate our experience with laparoscopic Nissen's fundoplication in patients with GERD complicated by esophagitis and hiatus hernia. Specifically, we assess the efficacy of the procedure in symptom control, esophagitis resolution, and recurrence rates, along with perioperative outcomes and complications. By sharing our findings, we aim to contribute to the existing evidence supporting laparoscopic fundoplication as a safe and effective treatment modality for GERD with structural complications.

## MATERIALS AND METHODS

**Study Design and Setting:** This was a retrospective observational study conducted in the department of General Surgery, at a tertiary care center of Andaman & Nicobar Islands, India specializing in advanced laparoscopic surgeries. The study included all patients who underwent laparoscopic Nissen's fundoplication for gastro-esophageal reflux disease (GERD) with esophagitis and hiatus hernia between January 2014 and December 2023. The study was approved by the Institutional Ethics Committee, and all patients provided written informed consent prior to surgery.

**Study Population:** The study included adult patients aged 18 years or older who were diagnosed with GERD based on clinical and diagnostic criteria. Eligible patients exhibited persistent GERD

symptoms despite optimal medical therapy, defined as proton pump inhibitor (PPI) use for a minimum of 8 weeks without adequate symptom relief. The presence of esophagitis was confirmed through upper gastrointestinal endoscopy and graded according to the Los Angeles (LA) classification system. Hiatus hernia was diagnosed using endoscopy, barium swallow imaging, or both. Patients with contraindications to general anesthesia, previous anti-reflux surgery, or significant comorbid conditions that precluded surgical intervention were excluded. Additionally, patients lost to follow-up within six months after surgery were excluded from the analysis.

**Preoperative Assessment:** All patients underwent a comprehensive preoperative evaluation to confirm the diagnosis, assess surgical suitability, and document baseline characteristics. A detailed history of GERD symptoms, including heartburn, regurgitation, dysphagia, and extra-esophageal manifestations, was recorded. Symptom severity and impact on daily life were quantified using the GERD-Health Related Quality of Life (GERD-HRQL) score. Endoscopic examination was performed to evaluate the presence and severity of esophagitis and to confirm hiatus hernia. In selected patients, barium swallow imaging was utilized to visualize the size and type of hiatus hernia. Esophageal manometry and 24-hour pH monitoring were conducted in patients with atypical symptoms or prior to surgery to assess lower esophageal sphincter pressure and confirm pathological acid exposure.

**Surgical Technique:** Laparoscopic Nissen's fundoplication was performed under general anesthesia using a standardized five-port technique. After pneumoperitoneum was established, the abdominal cavity was inspected, and the esophageal hiatus was exposed. The hernia sac was dissected and carefully reduced into the abdominal cavity. Diaphragmatic crural repair was performed using non-absorbable sutures to approximate the crura, ensuring restoration of the normal esophageal hiatus anatomy. A 360-degree fundic wrap was created by mobilizing the gastric fundus, passing it posterior to the esophagus, and suturing it anteriorly in an end-to-end fashion. In patients with large hiatus hernias or weak crura, the repair was reinforced using a synthetic mesh to prevent recurrence. Care was taken to ensure that the wrap was loose enough to prevent dysphagia while maintaining effective reflux control. Operative time, intraoperative complications, and the need for mesh reinforcement were meticulously recorded.

**Postoperative Care and Follow-Up:** Postoperatively, patients were monitored closely for complications, including dysphagia, bloating, or wrap migration. Pain management and early mobilization were integral to the recovery process. A liquid diet was initiated on the first postoperative day, and patients were transitioned to a soft diet within two weeks. Patients were discharged when they tolerated oral intake and demonstrated clinical

stability. Follow-up visits were scheduled at one month, three months, and six months postoperatively. At each follow-up, symptom resolution was assessed using the GERD-HRQL score, and recurrence of reflux symptoms was documented. Endoscopy was performed in patients with persistent or recurrent symptoms to evaluate the integrity of the fundoplication and the resolution of esophagitis.

**Data Collection:** Data were collected from electronic medical records, operative notes, and follow-up clinic visits. Baseline demographic information, including age, sex, body mass index (BMI), and comorbidities, was documented. Preoperative variables included the duration of GERD symptoms, severity of esophagitis (graded using the LA classification), and size of the hiatus hernia. Operative details such as the duration of surgery, intraoperative complications, and the use of mesh reinforcement were recorded. Postoperative outcomes included hospital stay, resolution of symptoms, recurrence rates, and complications such as dysphagia or bloating.

**Statistical Analysis:** Data were analyzed using SPSS software (version 20.0, IBM Corp.). Continuous variables were expressed as mean  $\pm$  standard deviation, while categorical variables were presented as frequencies and percentages. Changes in GERD-HRQL scores from baseline to follow-up were analyzed using paired t-tests, with a p-value  $<0.05$  considered statistically significant. Subgroup analysis was performed to compare outcomes in patients with large versus small hiatus hernias and those requiring mesh reinforcement versus those without.

## RESULTS

The study included 133 participants with a mean age of  $45.8 \pm 12.4$  years, predominantly male (58.6%). The mean BMI was  $27.2 \pm 4.5$  kg/m<sup>2</sup>, and the average duration of GERD symptoms was  $6.7 \pm 3.1$  years. Comorbidities were common, with diabetes mellitus in 31.6%, hypertension in 26.3%, and obesity (BMI  $\geq 30$ ) in 14.3%. A history of smoking and alcohol consumption was reported in 35.3% and 38.3% of participants, respectively. Most patients had sliding hiatus hernias (77.4%) with an average size of  $2.9 \pm 1.1$  cm, and LA Grade A (43.6%) and Grade B (33.1%) esophagitis were the most frequent endoscopic findings. Extra-esophageal symptoms included cough (21.8%), chest pain (16.5%), and hoarseness (13.5%) [Table 1].

Preoperative investigations revealed a mean GERD-HRQL score of  $25.4 \pm 8.7$ , indicating significant impairment in quality of life. Endoscopic findings

showed the presence of erosive esophagitis in 81.2% of patients, while 11.3% had Barrett's esophagus. Esophageal manometry demonstrated a mean LES pressure of  $6.8 \pm 2.5$  mmHg, with impaired esophageal body peristalsis in 24.1% of cases. On 24-hour pH monitoring, patients exhibited a mean of  $54.3 \pm 15.6$  reflux episodes, acid exposure time of  $9.1 \pm 3.2\%$ , and an elevated mean DeMeester score of  $38.4 \pm 10.7$ . Barium swallow imaging confirmed gastroesophageal reflux in 90.2% of patients and showed a mean hiatus hernia size of  $2.9 \pm 1.1$  cm [Table 2].

The mean duration of surgery was  $105.9 \pm 24.7$  minutes, with all patients undergoing complete (360°) fundoplication. Crural repair was performed using simple sutures in 75.9% of cases, while 24.1% required mesh reinforcement, primarily with synthetic mesh (19.5%). Intraoperative complications were minimal, including bleeding (3.0%), perforation (1.5%), and other minor issues (2.3%). Conversion to open surgery occurred in 1.5% of cases, and the mean hiatal defect size was  $3.4 \pm 1.2$  cm [Table 3].

The mean hospital stay was  $3.2 \pm 1.1$  days, with significant GERD-HRQL score improvement ( $7.1 \pm 4.3$ ). Symptom resolution rates were high, with heartburn and regurgitation improving in 91.7% and 89.5% of patients, respectively. Postoperative complications included transient dysphagia in 17.3% of patients and gas-bloat syndrome in 13.5%, while wrap migration occurred in 2.3%. Endoscopic evaluation revealed complete healing of esophagitis in 86.5% of cases. Symptom recurrence at six months was observed in 9.0%, and the readmission rate was 3.8% [Table 4].

The subgroup analysis comparing patients with and without mesh reinforcement revealed no significant difference in GERD-HRQL score improvement ( $6.5 \pm 4.1$  vs.  $7.3 \pm 4.4$ ,  $p = 0.108$ ). However, the mean duration of surgery was significantly longer in the mesh reinforcement group ( $121.3 \pm 22.8$  vs.  $98.3 \pm 27.4$  minutes,  $p < 0.0001$ ). Transient postoperative dysphagia was more common in the mesh group (28.1% vs. 13.9%,  $p = 0.041$ ), as was the overall complication rate (25.0% vs. 5.9%,  $p = 0.012$ ). Recurrence of symptoms at six months was significantly higher among patients with mesh reinforcement (18.8% vs. 5.9%,  $p = 0.022$ ) [Table 5]. At follow-up (6 months), 87.9% of patients were symptom-free, while persistent dysphagia was noted in 7.5% of cases. Recurrent symptoms, including heartburn or regurgitation, were reported by 9.0% of patients, and surgical reintervention was required in 1.5%. Patient satisfaction was high, with a mean score of  $8.6 \pm 1.4$  on a 10-point scale [Table 6].

**Table 1: Baseline Characteristics of Patients Undergoing Laparoscopic Nissen's Fundoplication for GERD with Esophagitis and Hiatus Hernia (n = 133).**

| Variable    | Mean $\pm$ SD / Frequency (%) |
|-------------|-------------------------------|
| Age (years) | $45.8 \pm 12.4$               |
| Gender      |                               |
| Male        | 78 (58.6%)                    |

|   |             |
|---|-------------|
| Female                                    | 55 (41.4%)  |
| Body Mass Index (BMI, kg/m <sup>2</sup> ) | 27.2 ± 4.5  |
| Duration of GERD Symptoms (years)         | 6.7 ± 3.1   |
| Comorbidities                             |             |
| Diabetes Mellitus                         | 42 (31.6%)  |
| Hypertension                              | 35 (26.3%)  |
| Obesity (BMI ≥30)                         | 19 (14.3%)  |
| Other (Asthma, Cardiovascular Disease)    | 16 (12.0%)  |
| Smoker                                    | 47 (35.3%)  |
| Alcohol Consumption                       | 51 (38.3%)  |
| LA Grade of Esophagitis                   |             |
| Grade A                                   | 58 (43.6%)  |
| Grade B                                   | 44 (33.1%)  |
| Grade C                                   | 24 (18.0%)  |
| Grade D                                   | 7 (5.3%)    |
| Type of Hiatus Hernia                     |             |
| Sliding Hernia                            | 103 (77.4%) |
| Paraesophageal Hernia                     | 30 (22.6%)  |
| Size of Hiatus Hernia (cm)                | 2.9 ± 1.1   |
| Extra-esophageal Symptoms                 |             |
| Cough                                     | 29 (21.8%)  |
| Hoarseness                                | 18 (13.5%)  |
| Chest Pain                                | 22 (16.5%)  |

**Table 2: Preoperative Investigations of Patients Undergoing Laparoscopic Nissen's Fundoplication (n = 133).**

| Investigation                                 | Mean ± SD / Frequency (%) |
|---|---------------------------|
| GERD-HRQL Score                               | 25.4 ± 8.7                |
| Endoscopic Findings                           |                           |
| Presence of Erosive Esophagitis               | 108 (81.2%)               |
| Barrett's Esophagus                           | 15 (11.3%)                |
| Esophageal Manometry                          |                           |
| LES Pressure (mmHg)                           | 6.8 ± 2.5                 |
| Esophageal Body Peristalsis (Normal/Impaired) |                           |
| Normal  | 101 (75.9%)               |
| Impaired                                      | 32 (24.1%)                |
| 24-hour pH Monitoring                         |                           |
| Number of Reflux Episodes                     | 54.3 ± 15.6               |
| Acid Exposure Time (% of 24 hours)            | 9.1 ± 3.2                 |
| DeMeester Score                               | 38.4 ± 10.7               |
| Barium Swallow Imaging                        |                           |
| Hiatus Hernia Size (cm)                       | 2.9 ± 1.1                 |
| Presence of Gastroesophageal Reflux           | 120 (90.2%)               |

**Table 3: Intraoperative Parameters and Outcomes of Laparoscopic Nissen's Fundoplication (n = 133).**

| Parameter                      | Mean ± SD / Frequency (%) |
|--------------------------------|---------------------------|
| Duration of Surgery (minutes)  | 105.9 ± 24.7              |
| Type of Fundoplication         |                           |
| Complete (360°)                | 133 (100%)                |
| Partial                        | 0 (0%)                    |
| Crural Repair                  |                           |
| Simple Sutures                 | 101 (75.9%)               |
| Reinforced with Mesh           | 32 (24.1%)                |
| Type of Mesh Used              |                           |
| Synthetic                      | 26 (19.5%)                |
| Biologic                       | 6 (4.5%)                  |
| Complications (Intraoperative) |                           |
| Bleeding                       | 4 (3.0%)                  |
| Perforation                    | 2 (1.5%)                  |
| Others                         | 3 (2.3%)                  |
| Conversion to Open Surgery     | 2 (1.5%)                  |
| Hiatal Defect Size (cm)        | 3.4 ± 1.2                 |

**Table 4: Postoperative Outcomes of Laparoscopic Nissen's Fundoplication (n = 133).**

| Outcome                        | Mean ± SD / Frequency (%) |
|--------------------------------|---------------------------|
| Length of Hospital Stay (days) | 3.2 ± 1.1                 |
| GERD-HRQL Score Improvement    | 7.1 ± 4.3                 |
| Symptom Resolution             |                           |
| Heartburn                      | 122 (91.7%)               |
| Regurgitation                  | 119 (89.5%)               |
| Dysphagia                      | 15 (11.3%)                |
| Complications (Postoperative)  |                           |

|                                      |             |
|--------------------------------------|-------------|
| Transient Dysphagia                  | 23 (17.3%)  |
| Gas-Bloat Syndrome                   | 18 (13.5%)  |
| Wrap Migration                       | 3 (2.3%)    |
| Endoscopic Healing of Esophagitis    |             |
| Complete Healing                     | 115 (86.5%) |
| Partial Healing                      | 18 (13.5%)  |
| Recurrence of Symptoms (at 6 months) | 12 (9.0%)   |
| Readmission Rate                     | 5 (3.8%)    |

**Table 5: Comparison of Outcomes Based on Crural Reinforcement Method.**

| Subgroup                            | Mesh Reinforcement (n=32) | Mesh Reinforcement (n=101) | p-value |
|-------------------------------------|---------------------------|----------------------------|---------|
|                                     | Mean ± SD / Frequency (%) |                            |         |
| GERD-HRQL Score Improvement         | 6.5 ± 4.1                 | 7.3 ± 4.4                  | 0.108   |
| Duration of Surgery (minutes)       | 121.3 ± 22.8              | 98.3 ± 27.4                | <0.0001 |
| Postoperative Dysphagia (Transient) | 9 (28.1%)                 | 14 (13.9%)                 | 0.041   |
| Complication Rate                   | 8 (25.0%)                 | 6 (5.9%)                   | 0.012   |
| Recurrence of Symptoms at 6 Months  | 6 (18.8%)                 | 6 (5.9%)                   | 0.022   |

**Table 6: Long-Term Outcomes of Laparoscopic Nissen's Fundoplication (n = 133).**

| Outcome   | Mean ± SD / Frequency (%) |
|---|---------------------------|
| Symptom-Free Patients                           | 117 (87.9%)               |
| Persistent Dysphagia                            | 10 (7.5%)                 |
| Recurrent Symptoms (Heartburn or Regurgitation) | 12 (9.0%)                 |
| Surgical Reintervention Required                | 2 (1.5%)                  |
| Patient Satisfaction (Scale: 1-10)              | 8.6 ± 1.4                 |

## DISCUSSION

Our study assessed the outcomes of laparoscopic Nissen's fundoplication (LNF) in patients with gastroesophageal reflux disease (GERD), esophagitis, and hiatus hernia. The results demonstrate significant symptomatic improvement, a high rate of patient satisfaction, and a low rate of complications. These findings are consistent with previous research, which has established LNF as an effective procedure for managing GERD and associated complications.

### Symptomatic Improvement and Quality of Life:

The mean GERD-HRQL score improvement of  $7.1 \pm 4.3$  in our study is consistent with findings from studies by Castellijn et al., and Su et al., who reported mean improvements of  $6.9 \pm 4.2$  and  $6.8 \pm 4.5$ , respectively, following LNF.<sup>[11,12]</sup> Our study demonstrated a significant reduction in the primary symptoms of GERD, including heartburn (91.7%) and regurgitation (89.5%), with 87.9% of patients being symptom-free at follow-up. This aligns with the results of a large-scale study by Park et al., which reported a symptom-free rate of 85–90% in patients undergoing laparoscopic fundoplication for GERD.<sup>[13]</sup> The high rates of symptom resolution in our cohort reflect the effectiveness of LNF in addressing the underlying pathophysiology of GERD, primarily by restoring the competence of the lower esophageal sphincter (LES) and preventing reflux.

The restoration of LES pressure observed in our study (mean of  $6.8 \pm 2.5$  mmHg) is consistent with findings from previous studies that have shown similar improvements in LES function post-surgery. For example, a study by Boris et al., showed that LNF led to a significant increase in LES pressure, correlating with clinical symptom improvement.<sup>[14]</sup>

These improvements in LES function help explain the high rates of symptom resolution observed in our cohort.

**Postoperative Complications:** Postoperative complications were relatively minimal but included transient dysphagia (17.3%) and gas-bloat syndrome (13.5%), which are well-documented complications of LNF.<sup>[15]</sup> The rate of transient dysphagia in our cohort is consistent with the literature, where it typically ranges from 10% to 20% following LNF.<sup>[16]</sup> A study by Nikolic et al., reported a dysphagia rate of 18% in a similar cohort of patients undergoing LNF for GERD and esophagitis, which highlights the commonality of this complication and the need for careful postoperative management.<sup>[17]</sup> The higher incidence of transient dysphagia in the mesh-reinforced subgroup (28.1%) compared to the non-mesh group (13.9%) suggests that the mesh may contribute to a higher degree of tissue manipulation, leading to temporary dysphagia. The findings of Hoffmann et al., also suggest that mesh reinforcement can lead to increased dysphagia, likely due to the increased rigidity and tension in the hiatus repair site.<sup>[18]</sup>

In our study, the overall complication rate was 9.0%, which is comparable to the findings of Wang et al., who reported a complication rate of 8–10% in patients undergoing LNF for GERD.<sup>[19]</sup> However, mesh reinforcement was associated with a significantly higher complication rate (25.0%) compared to the non-mesh group (5.9%) ( $p = 0.012$ ). These findings suggest that mesh reinforcement, while potentially beneficial in reinforcing the crural repair, may increase the likelihood of complications, including dysphagia, esophageal perforation, and infection. This is consistent with the findings of Bueno Garcia Reyes et al., who reported higher

complication rates with mesh use in LNF, and recommended careful consideration of its use.<sup>[20]</sup>

**Surgical Duration and Outcomes with Mesh Reinforcement:** One of the significant findings in our study was the increased duration of surgery in the mesh-reinforced group ( $121.3 \pm 22.8$  minutes vs.  $98.3 \pm 27.4$  minutes in the non-mesh group,  $p < 0.0001$ ). The longer surgical time likely reflects the added complexity of mesh placement, including the need for meticulous dissection and fixation to avoid tension or migration. A similar study by Wilson et al., found that mesh reinforcement increased surgical time by an average of 25–30 minutes.<sup>[21]</sup> This additional operative time must be balanced against the potential benefits of mesh reinforcement, which may improve the long-term durability of the repair, but at the cost of increased complication rates and a longer recovery period.

**Recurrence of Symptoms and Reintervention:** Recurrence of symptoms at six months was observed in 9.0% of our patients, which is consistent with the recurrence rate reported in the literature, which ranges from 7% to 12%.<sup>[22]</sup> Studies by Kessing et al., and Hillman et al., also found recurrence rates of 8–10% following LNF, particularly in patients with a long duration of GERD or more severe esophageal damage.<sup>[23,24]</sup> In our study, 1.5% of patients required surgical reintervention, which is in line with the 1–2% reoperation rate reported in large cohort studies, including the work by Markar et al. (2018), who found reoperation rates of 1.4% following LNF for complicated GERD.<sup>[25]</sup> These low reoperation rates suggest that, for the vast majority of patients, LNF offers a durable solution to GERD, even in the presence of esophagitis and hiatus hernia.

**Patient Satisfaction:** Patient satisfaction was high in our cohort, with a mean score of  $8.6 \pm 1.4$  on a 10-point scale. This is consistent with the findings of Hua et al., who reported high satisfaction rates (over 85%) following LNF for GERD in their study.<sup>[26]</sup> The high patient satisfaction in our study reflects the significant symptomatic relief experienced by patients, as well as the overall improvement in quality of life following surgery. The successful resolution of heartburn, regurgitation, and other GERD-related symptoms likely contributes to the overall satisfaction, as shown in previous studies by Jaruvongvanich et al., and Iqbal et al., who reported similar satisfaction rates in patients undergoing antireflux surgery.<sup>[27,28]</sup>

**Limitations and Future Directions:** While our study provides valuable insights into the outcomes of LNF in a cohort with GERD, esophagitis, and hiatus hernia, there are several limitations to consider. First, the relatively short follow-up period of six months does not capture long-term outcomes such as late recurrence of symptoms or the need for reoperation. Longer-term follow-up would provide more comprehensive data on the durability of the procedure. Second, our study is observational, and the lack of randomization or comparison with other surgical approaches (e.g., laparoscopic Toupet

fundoplication) limits the ability to draw definitive conclusions about the superiority of one technique over another. Future randomized controlled trials comparing different surgical techniques, as well as studies evaluating long-term outcomes, are necessary to optimize surgical strategies and improve patient care.

## CONCLUSION

In conclusion, laparoscopic Nissen's fundoplication is an effective and durable treatment for GERD, esophagitis, and hiatus hernia, with high rates of symptom resolution, patient satisfaction, and minimal complications. However, mesh reinforcement should be used cautiously, as it may increase the complication rate and surgical duration. Further research is needed to refine the use of mesh and to evaluate long-term outcomes, particularly recurrence rates and reoperation needs.

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