



2023

Section: General Surgery

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How to Cite This Article

Elsodany, Saif Eldin Mahmoud; Elewesy, Emad Ads; and Maraey, Ahmed Shaban Maraey (2023) "Patient Selection for Laparoscopic Fundoplication in Chronic Gastroesophageal Reflux Disease," *Al-Azhar International Medical Journal*: Vol. 4: Iss. 12, Article 30.

DOI: <https://doi.org/10.58675/2682-339X.2152>

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Patient Selection for Laparoscopic Fundoplication in Chronic Gastroesophageal Reflux Disease

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Abstract

Background: Today's society is most affected by gastroesophageal reflux disease (GERD). It accounts for most ultrasound gastrointestinal disease treatment expenses and low quality of life scores.

Aim and objectives: To provide more conclusive proof in the treatment of GERD with either partial or whole laparoscopic fundoplication.

Patients and methods: Thirty people diagnosed with GERD participated in the research study. The proper selection of patients to undergo antireflux surgery is essential to achieving positive results from the operation. On pH investigations, evidence of reflux should be present in every patient who is scheduled to have surgery to treat reflux disease.

Results: According to the findings of a recent study, there was not a statistically significant difference among Nissen and Toupet in terms of dysphagia and other preoperative symptoms. According to the findings of this study, there was not a statistically significant difference discovered among Nissen and Toupet in terms of symptoms after 6 months and 1 year. In the Nissen group, dysphagia occurred in 26.7 % of patients, and chest pain occurred in 20 % of patients, while in the Toupet group, same symptoms occurred in only 6.7 % of cases. When comparing Nissen with Toupet in terms of severity and mobility, there was not a statistically significant difference identified among them. Laparoscopic Nissen fundoplication and Toupet fundoplication both appear to have similar symptomatic results.

Conclusion: Any potential differences in those results are negligible. The evidence does not establish that one method is more effective than another. Both Laparoscopic Nissen fundoplication (LNF) and Laparoscopic Toupet fundoplication (LTF) have strong GERD control to a similar degree.

Keywords: Gastrointestinal tract, Gastroesophageal reflux disease, Laparoscopic fundoplication

1. Introduction

One of the disorders that has the most significant influence on today's society is the gastroesophageal reflux disease (GERD), also known as GERD. It is responsible for the majority of the costs associated with the treatment of digestive disorders in the United States, which have ratings that indicate a poor quality of life.¹

GERD is a condition where acid from the stomach flows back up into the esophagus and causes discomfort, epithelial damage, or both. The most common esophageal disorder is an inflammatory one. There are two main mechanisms through which GERD damages the epithelium. To put it another way, the epithelium is either fundamentally

flawed, allowing 'normal' acid contact times to promote inflammation, or the antireflux and luminal clearance systems are deficient, overloading an otherwise healthy epithelium. Both of these situations have the potential to provoke an inflammatory reaction.²

Researchers generally view GERD as a spectrum, with mild, nonerosive forms in persons with heartburn at one end and metaplasia and adenocarcinoma at the other. Other researchers, however, have advocated for a shift in thinking in which people with GERD are classified into one of three distinct conditions: nonerosive reflux disease, erosive esophagitis, or Barrett's esophagus. Patients with GERD would be classified into one of these three categories under the proposed new paradigm.³

Accepted 6 August 2023.
Available online 1 February 2024

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<https://doi.org/10.58675/2682-339X.2152>

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The prevalence of BE in patients with GERD who were referred for endoscopy was found to be 7.3 %, according to a prior study that was carried out in Egypt and carried out by Fouad et al.,⁴ BE appears to be more common in people who have nocturnal GERD and to be related with older age.

However, severe GERD cases, as well as those involving young individuals who do not wish to take medication forever, may benefit from surgical therapy. Moderate GERD patients are best treated with clinical therapy, while severe GERD cases may benefit from surgical intervention.⁵

The 360° fundoplication was first described in 1956 by Rudolf Nissen. Nissen thought that this method increased pressure in the lower esophageal sphincter, but it actually does the opposite. The long-term success in controlling acid reflux has made this the most common surgical treatment for GERD at the present time. On the other side, these patients are more likely to experience postoperative dysphagia.⁶

The construction of partial fundoplications was an alternative that may have been taken instead of the total fundoplication. Toupet developed a posterior partial fundoplication in 1963 that featured a 270° circumference. The long-term findings suggested a rate of recurrence of the reflux that was higher than the rate reached by the Nissen approach, despite the fact that many surgeons after him devised numerous alternative partial fundoplications in an attempt to reduce the postoperative dysphagia.⁷

The medical literature began to contain a growing number of studies that compared whole and partial fundoplications; nevertheless, the majority of these investigations were unable to demonstrate a statistically significant difference among the two procedures. Recent meta-analysis showed that both treatments are effective in controlling reflux, however that dysphagia was less common in the partial fundoplication group. Despite this, the included studies were of very low methodological quality.⁸

The purpose of the research was to elucidate the efficacy of treating GERD with either a partial or whole laparoscopic fundoplication.

2. Patients and methods

Thirty people diagnosed with GERD participated in the research study. The proper selection of

patients to undergo antireflux surgery is essential to achieve positive results from the operation. On pH investigations, evidence of reflux should be present in every patient who is scheduled to have surgery to treat reflux disease.

2.1. Inclusion criteria

GERD cases who wish to discontinue medical therapy. Patients with large hiatus hernia, GERD with respiratory complications, and Barrett's esophagus with reflux.

2.2. Exclusion criteria

Patients with abnormal pH studies, patients refuse surgery, and patients with esophageal motility disorders.

The following were performed on each and every participant:

Full history taking and complete clinical examination, endoscopy, pH studies, manometry, written consent for doing surgery, and routine laboratory investigations including.

2.3. Endoscopy

In order to rule out the possibility of any other diseases or conditions, an endoscopy is required before antireflux surgery. pH studies: this method enables the recording of acid reflux episodes as they occur and the correlation of patient symptoms with reflux episodes.

2.4. Manometry

2.4.1. Routine laboratory investigations including

Complete blood count, serum creatinine, urea, and random blood sugar, liver function tests (Table 1).

2.5. Ethical considerations

The Al-Azhar University – Cairo Faculty of Medicine Ethical Committee approved the study procedure. After explaining the study's goal and procedures, participants gave verbal consent. All study levels maintained confidentiality and privacy.

Table 1. Patient selection for laparoscopic fundoplication in chronic gastroesophageal reflux disease.

Nissen fundoplication	Toupet fundoplication
Normal esophageal motility	Impaired esophageal motility
Redo cases	Postcardiomyotomy in patients with type II achalasia
Lower esophageal hypotonia	Normal monometric study

Procedure selection: laparoscopic Nissen with Toupet fundoplication.

2.6. Statistical analysis

We used IBM SPSS statistics (Statistical Package for Social Sciences) software version 20.0, IBM Corp., Chicago, USA, 2013 to save and analyze the data we obtained, edit, and code. If the numbers were parametric, they were presented as means, SDs, and ranges. Quantitative and percentage descriptions of the data's quality were supplied. Two qualitative groups were compared using the χ^2 test and the Fisher exact test. Two quantitative groups with a parametric distribution were compared using an independent *t*-test. The margin of error is 5 %, and the confidence interval is 95 %. *P* value more than 0.05 indicates lack of significance, *P* value less

than 0.05 indicates significance, and *P* value less than 0.001 indicates high significance.

3. Results

Table 2 reveals that Nissen and Toupet did not differ statistically in age, sex, weight (kg), duration of symptoms (months), or total surgical time (min).

Table 3 shows that Nissen and Toupet showed no statistically significant differences in indication, PPI use, hiatus hernia, erosive esophagitis, and Barrett's esophagus.

Table 4 shows that The endoscopic findings of Nissen and Toupet were not significantly different.

There is no statistically significant difference among Nissen and Toupet in the results of the manometry test, as shown in Table 5.

In terms of postoperative manometry and pH metrics, Table 6 demonstrates that there is no

Table 2. Comparison between Nissen (N = 15) and Toupet (N = 15) regarding age, sex, weight (kg), period of symptoms (months), and total surgical time (min).

	Nissen (N = 15)	Toupet (N = 15)	Test value	P value	Significance
Age					
Mean \pm SD	44.00 \pm 13.10	40.53 \pm 14.83	0.460	0.503	NS
Range	25–66	10–63			
Sex					
Female	8 (53.3)	8 (53.3)	0.000	1.000	NS
Male	7 (46.7)	7 (46.7)			
Weight (kg)					
Mean \pm SD	82.24 \pm 12.09	82.20 \pm 11.38	0.000	0.993	NS
Range	60–100	60–100			
Duration of symptoms (months)					
Mean \pm SD	125.63 \pm 148.97	126.40 \pm 141.35	0.000	0.989	NS
Range	30–512	30–512			
Total surgical time (min)					
Mean \pm SD	98.00 \pm 13.16	97.53 \pm 12.12	0.010	0.920	NS
Range	80–120	80–118			

Table 3. Comparison among Nissen (N = 15) and Toupet (N = 15) concerning indication, PPI use, hiatus hernia, erosive esophagitis and Barrett's esophagus.

	Nissen [n (%)]	Toupet [n (%)]	Test value	P value	Significance
Indication					
Failed medical therapy	11 (73.3)	10 (66.7)	0.159	0.690	NS
Patient preference	4 (26.7)	5 (33.3)			
PPI use	14 (93.3)	13 (86.7)	0.370	0.543	NS
Hiatus hernia	9 (60.0)	8 (53.3)	0.136	0.713	NS
Erosive esophagitis	3 (20.0)	2 (13.3)	0.240	0.624	NS
Barrett's esophagus	2 (13.3)	1 (6.7)	0.370	0.543	NS

Table 4. Comparison between Nissen (N = 15) and Toupet (N = 15) regarding endoscopic finding.

Endoscopic finding	Nissen [n (%)]	Toupet [n (%)]	Test value	P value	Significance
Grade A	7 (46.7)	6 (40.0)	1.577	0.454	NS
Grade B	3 (20.0)	6 (40.0)			
Grade C	5 (33.3)	3 (20.0)			

Table 5. Comparison between Nissen (N = 15) and Toupet (N = 15) regarding manometry findings.

Manometry findings	Nissen [n (%)]	Toupet [n (%)]	Test value*	P value	Significance
LES hypertonia	4 (26.7)	8 (53.3)	0.240	0.624	NS
LES hypotonia	2 (13.3)	3 (20.0)			
High contractility	7 (46.7)	4 (26.7)			
Dysperistalsis	2 (13.3)	0			

Table 6. Postoperative comparison of manometry and pH metrics between the Nissen (N = 15) and Toupet (N = 15) procedures.

Postoperative	Nissen (N = 15)	Toupet (N = 15)	Test value	P value	Significance
Man metric data	–	–	–		
LES pressure (mmHg)					
Mean ± SD	12.87 ± 4.16	14.40 ± 3.64	1.155	0.292	NS
Range	8–20	10–20			
Integrated relaxation pressure (mmHg)					
Mean ± SD	13.33 ± 3.98	13.67 ± 3.90	0.054	0.818	NS
Range	6–20	7–20			
pH metric data	–	–	–		
All reflux distal episode (times)					
Mean ± SD	4.47 ± 1.85	4.27 ± 2.12	0.076	0.785	NS
Range	1–8	1–10			
All liquid – mixed reflux (times)					
Mean ± SD	2.27 ± 1.33	2.13 ± 1.25	0.080	0.779	NS
Range	1–5	1–5			
All reflux percent time (<1.4 %)					
Mean ± SD	–	–	NA	NA	NA
Range	–	–			
De Meester score (<14.7)					
Mean ± SD	0.63 ± 0.27	0.65 ± 0.26	0.019	0.892	NS
Range	0.1–1	0.2–1			

statistically significant difference among the Nissen and Toupet procedures.

4. Discussion

There have been several studies that compare laparoscopic total fundoplication versus partial fundoplication, however there have not been many randomized controlled trials. In a study comparing laparoscopic Nissen and anterior 180° fundoplication in 107 people, those in the anterior hemifundoplication group reported much less dysphagia for solid food and were more likely to be satisfied with the clinical outcome. There was no significant difference in postoperative dysphagia rates or Visick scores between laparoscopic Nissen and Toupet fundoplication, according to a trial in which 39 patients were randomly assigned to either operation.⁹

A randomized trial of 163 patients who underwent laparoscopic Nissen or anterior partial fundoplication found that the anterior partial group had significantly less postoperative dysphagia than the Nissen group, despite having a significantly higher rate of recurrent reflux 24 months after surgery.¹⁰

The results of these manometric investigations are consistent with those that Daud et al.¹¹ reported,

which showed a tendency toward lower LOS resting and residual pressures following Toupet in comparison to 180° anterior fundoplication.

A comparison was made between the pressures that were found following Toupet fundoplication and the pressures that were found following anterior fundoplication in a Swedish experiment. Higher LOS resting and residual pressures were trending toward the Toupet fundoplication.¹² One probable reason for the discrepancy between the results of the two trials is that Daud et al.¹¹ and the current study both used the 180° anterior fundoplication technique, while the previous study only used the 120° technique. Both this trial and the last one used a 180° strategy.

Koch et al.¹³ presented evidence that the LES pressures had greatly improved.

According to the findings of ours, there was not a statistically significant difference detected among Nissen and Toupet postoperative in terms of manometric data or pH metric data.

According to the findings of Booth and colleagues, who investigated the question of whether a total (Nissen) or partial (Toupet) fundoplication is more effective, as well as the question of whether preoperative esophageal manometry should be utilized

to determine the degree of fundoplication that is performed. They discovered that patients in the Toupet group had longer postoperative acid exposure periods and experienced a greater number of pH failures. Partial fundoplication and total (Nissen) fundoplication (TF) for GERD were compared in a meta-analysis of randomized trials for morbidity, efficacy, and long-term symptomatology, as reported by Booth et al.,¹⁴ partial fundoplication was shown to be more effective than entire (Nissen) fundoplication (TF) in treating GERD. According to what they found, the presence of partial fundoplication was not linked to a lower level of efficacy in controlling acid reflux.⁶

According to the findings of Du et al.,¹⁵ LNF was connected to a higher LES pressure.

Roks and colleagues found no difference in esophageal acid exposure during 24-h esophageal pH monitoring, suggesting that a reduction in LOS residual resting pressure does not exacerbate acidic reflux episodes. This suggests that there was no rise in acidic reflux episodes due to the decrease in LOS residual resting pressure.¹⁶

In the most recent study, it was discovered that in terms of dysphagia and other preoperative symptoms. No significant difference could be detected among the Nissen and Toupet techniques.

Booth et al.¹⁴ discovered that patients who were planned to have Nissen fundoplication were significantly more likely to report moderate dysphagia before surgery.

According to the findings of this study, there was not a statistically significant difference discovered among Nissen and Toupet in terms of symptoms after 6 months and 1 year. In the Nissen group, dysphagia occurred in 26.7 % of cases and chest pain happened in 20 % of cases, while in the Toupet group, same signs happened in only 6.7 % of cases.

This agreed with the results found by Booth et al.,¹⁴ who found that no significant differences in reflux-related symptoms existed between treatment groups up to a year after surgery. Dysphagia of any severity and chest pain while eating were more common in the Nissen group at 12 months.

Whether a full (360°) or partial (90°) fundoplication is more effective in treating GERD was the focus of a study by Glen and colleagues. They came to the conclusion that there was no statistically significant difference in the degree to which GERD was cured by either partial or total fundoplication. They also did not identify any differences in outcomes in the subset of patients who had neurological impairments.¹⁷

LNF increases postoperative dysphagia, gas-bloating, and inability to belch, according to Du

et al.¹⁵ subgroup analysis showed that dysphagia prevalence between approaches decreased over time.

Postoperative complications were similar between open Nissen and Toupet in a randomized controlled trial conducted over a 20-year period.¹⁸ As a solid predictor of long-term success after GERD surgery. Excellent ($\approx 90\%$) and equivalent patient satisfaction was found between the two groups.^{19,20}

Mandeville et al.⁶ found equal esophagitis, heartburn, and reflux rates. Their meta-analysis suggests that surgery-eligible GERD patients should undergo partial fundoplication.

Roks and colleagues found no difference in GERD symptoms and esophageal acid exposure between partial fundoplication types. Both arms had little postoperative side-effects and excellent patient satisfaction. Surgeons should base their decision between a laparoscopic 270° posterior (Toupet) and 180° anterior fundoplication on their own level of experience and personal taste, according to the results of this 12-month experiment.¹⁶

No substantial improvement in dysphagia was observed in a randomized controlled trial comparing laparoscopic Toupet and 180° anterior fundoplication. However, patients experienced a trade-off between reflux and incapacity to belch and nausea. 180° anterior fundoplication increased heartburn and pH values. Both treatments were well-received.¹¹

There were no statistically significant differences between laparoscopic Toupet and 180° anterior fundoplication in terms of reflux control or post-fundoplication symptoms, as reported by Roks et al.¹⁶ who randomized twice as many patients as Daud et al.¹¹

Koch et al.¹³ prospectively studied 150 laparoscopic Nissen fundoplication patients. At a 3-year follow-up, GIQLI scores increased from 90.1 ± 8.9 to 123.7 ± 9.8 . Healthier people score 122.6 ± 8.5 points.

Balko and colleagues looked at 33 consecutive patients with GERD and weak distal esophageal spasms (amplitude 30 mmHg). These patients ($n = 19$ and 14) were prospectively assigned to receive either a Toupet or Nissen fundoplication. Toupet performed better after 3 months. Both gas-bloat syndrome (50 %) and dysphagia (57 %) were significantly more common after Nissen compared to Toupet ($P < 0.01$ and $P = 0.02$, respectively). Toupet patients were happier with their results three months after surgery than Nissen patients were. Similar patterns were observed in the 12-month follow-up.²¹

Yates and Oelschlager prospectively examined 96 patients with impaired peristalsis after partial ($n = 39$) or whole ($n = 57$) fundoplication. The entire

fundoplication group had considerably better heartburn scores and distal esophageal acid exposure than the partial fundoplication group. Total fundoplication considerably improved dysphagia and distal esophageal amplitudes, whereas partial fundoplication did not. Due to heartburn, two partial fundoplication patients had reoperation and total fundoplication. Thus, Yates²² recommend total fundoplication for GERD patients with faulty peristalsis.

4.1. Conclusion

There does not appear to be a significant difference between the symptomatic outcomes of laparoscopic Nissen and Toupet fundoplication. The evidence does not establish that one method is more effective than another. Both LNF and LTF have strong GERD control to a similar degree.

Conflicts of interest

There are no conflicts of interest.

Acknowledgement

Authors declare that there is no grants , external funders or no financial issues to be declared.

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