

The effect of narrowed segment length on the degree of early postoperative dysphagia in laparoscopic Nissen fundoplication

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Background/aims: Although laparoscopic Nissen fundoplication is the gold standard in the surgical treatment of gastroesophageal reflux disease, it may cause troublesome complications like dysphagia. In this study, we demonstrated the effect of narrowed segment length on early dysphagia in patients. **Materials and Methods:** Forty-one patients who underwent laparoscopic Nissen fundoplication by a single surgeon between January 2007 and November 2008 were reviewed. Dysphagia scores were assessed by a question in the Gastrointestinal Quality of Life Index questionnaire and recorded preoperatively and at 1 month and 6 months. Barium esophagogram was performed for all patients at 1 month. Narrowed segment length was measured on esophagogram. Patients were divided into two groups (Group 1, ≤ 30 mm; Group 2, >30 mm). Dysphagia scores preoperatively and at 1 month and 6 months were compared between the two groups. **Results:** The two groups were homogeneous in age, gender, body mass index, and preoperative dysphagia score. We were unable to demonstrate any difference in preoperative and postoperative dysphagia scores between the two groups. **Conclusions:** In this study, we used subjective data for grade of dysphagia and esophagogram for wrap length instead of manometric data. In our opinion, there is no effect of narrowed segment length on the degree of early postoperative dysphagia in patients undergoing laparoscopic Nissen fundoplication.

Key words: Laparoscopic Nissen fundoplication, dysphagia, gastroesophageal reflux disease

Laparoskopik Nissen fundoplikasyonunda daraltılan segmentin ameliyat sonrası oluşan disfajiye etkisi

Giriş ve Amaç: Laparoskopik Nissen fundoplikasyonu gastroözofageal reflü hastalığında altın standart olarak kabul edilmesine rağmen yutma güçlüğü gibi bazı problemlere yol açabilir. Biz bu çalışmada, hastalarda görülen erken yutma güçlüğünde daraltılan segmentin etkisini göstermeye çalıştık. **Gereç ve Yöntem:** Ocak 2007 ve Kasım 2008 tarihleri arasında tek cerrah tarafından laparoskopik Nissen fundoplikasyonu yapılan 41 hastanın sonuçları incelendi. Yutma güçlüğü Gastrointestinal Hayat Kalite İndeksi anketindeki bir soruyla tespit edildi ve ameliyat öncesi, ameliyat sonrası birinci ve altıncı aylarda saptanarak kaydedildi. Daraltılan segmentin uzunluğu özofagogramda tespit edildi. Hastalar iki gruba ayrıldı (Grup 1, ≤ 30 mm; Grup 2, >30 mm). Ameliyat öncesi, 1. ve 6. ay yutma güçlüğü skorları iki grup arasında karşılaştırıldı. **Bulgular:** İki grup yaş, cinsiyet, vücut kitle indeksi ve ameliyat öncesi yutma güçlüğü skorları karşılaştırıldığında homojendi. Ameliyat öncesi ve sonrası yutma güçlüğü skorlarında iki grup arasında bir fark saptanmadı. **Sonuç:** Biz bu çalışmada yutma güçlüğünün derecesi için subjektif veriler ve daraltılan segmentin uzunluğu için manometri yerine özofagogram kullandık. Biz laparoskopik Nissen fundoplikasyonu yapılan hastalarda erken yutma güçlüğünde daraltılan segmentin bir etkisi olmadığını düşünüyoruz.

Anahtar kelimeler: Laparoskopik Nissen fundoplikasyonu, yutma güçlüğü, gastroözofageal reflü hastalığı

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INTRODUCTION

Laparoscopic Nissen fundoplication (LNF) is the gold standard in the surgical treatment of gastroesophageal reflux disease (GERD) (1). Since its first introduction by Dallemagne (2) in 1991, there has been a very large acceptance. It has a 96% success rate in the treatment of GERD symptoms (3). One of the most troublesome complications of LNF is persistent dysphagia postoperatively (4). It is more prominent in the early postoperative period. This causes weight loss in patients undergoing LNF (5). Reports examining the effect of narrowed segment length on side effects are inadequate. In the present study, we demonstrated the effect of narrowed segment length on early dysphagia in patients.

MATERIALS AND METHODS

Forty-one consecutive patients were operated between January 2007 and November 2008 in Etlik İhtisas Hospital and Fatih Sultan Mehmet Education and Research Hospital. All operations were performed by the same surgeon. All patients had a preoperative evaluation including clinical interview with standard assessment of their symptoms and upper gastrointestinal endoscopy. Body weight and height were evaluated, and body mass index (BMI) was calculated. Ambulatory 24-hour (h) pH monitoring was performed preoperatively only for patients that had typical GERD symptoms but non-erosion in the esophagus. A bipolar pH electrode was used for this purpose (MMS, Dover, USA). The standard deMeester score was calculated, and pathologic reflux was registered if the score exceeded 14.7. Barium esophagogram was performed one month after surgery for all patients.

Indications for surgery in our patients were determined as follows: long history of GERD-related symptoms and esophagitis on endoscopy or pathological reflux on 24-h pH monitoring for non-erosive esophagitis. All patients underwent LNF. Narrowed segment length after fundoplication was measured on barium esophagogram (Figure 1). Two patients were excluded from the study because of undetermined segment length on esophagogram. All patients completed the Gastrointestinal Quality of Life Index (GIQLI) questionnaire preoperatively and then at 1 month and 6 months postoperatively for the evaluation of quality of life. A question about the grade of dysphagia in the GIQLI questionnaire was used for the evaluation

of dysphagia. The question was scored on a 5-point scale as: 0 (continuously), 1 (frequently), 2 (sometimes), 3 (occasional), and 4 (none).

Patients were divided into two groups according to narrowed segment length (≤ 30 mm or >30 mm) measured on esophagogram. There were 19 patients in Group 1 (≤ 30 mm) and 20 patients in Group 2 (>30 mm). If normal distribution was present, Student's t-test was used to compare mean values. In cases with an abnormal distribution, Mann-Whitney U test was used to compare the mean values between the two groups. For comparison of repeated nonparametric data, Friedman test was used. Significance was defined as a p value less than 0.05.

Operative Technique

Cefazolin was administered for antibiotic prophylaxis before the operation. All operations were performed by the same surgeon. A nasogastric tube was placed before pneumoperitoneum. All operations were performed laparoscopically using the five-trocar approach. Insufflation was made by direct trocar technique above the umbilicus as described previously in our article (6). The phrenoesophageal ligament was divided. The hepatic branch of the anterior vagus was divided routinely. The short gastric vessels were divided in all cases. Diaphragmatic crural repair was performed with 2-3 interrupted 2/0 nonabsorbable polyester sutures. An approximately 3 cm floppy 360° wrap was created by encircling the anterior of the fun-

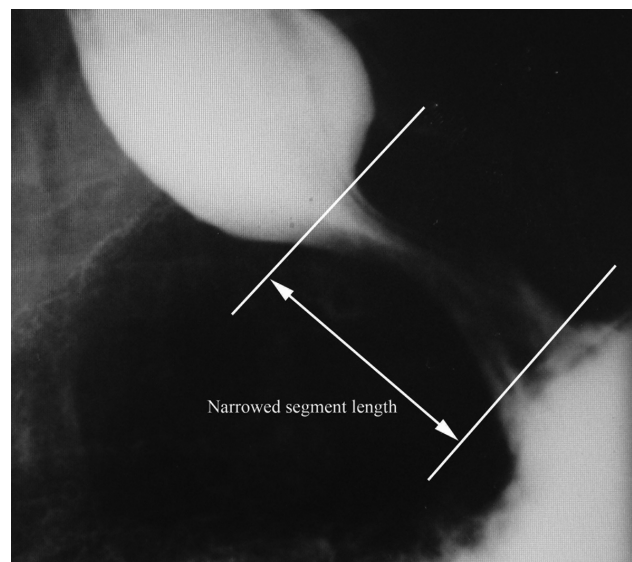


Figure 1. Measurement of narrowed segment length on barium esophagogram.

dus from the posterior of the esophagus. Fundoplication was completed by two nonabsorbable seromuscular sutures, the proximal one of which included the anterior esophageal wall. We did not measure the length of the wrap by ruler. The wrap was not anchored to the crura. No calibrating bougie was used. There was no need for conversion to open surgery. Oral intake was started on the first postoperative day. Patients were discharged from the hospital on the first postoperative day.

RESULTS

The two groups were homogeneous with respect to age, gender and BMI (Table 1) and preoperative dysphagia score (Table 2). The grades of dysphagia in the two groups before the operation and at the follow-up assessment are presented in Table 2.

Preoperative mean dysphagia scores were 2.22 in Group 1 and 2.11 in Group 2, and the difference did not reach statistical significance ($p=0.710$). At 1 month after surgery, the grade of dysphagia increased in both groups ($p<0.05$). Mean dysphagia scores at 1 month were 1.95 and 1.88, respectively; however, the difference did not reach statistical significance in either group ($p=0.858$).

At 6 months after surgery, the grade of dysphagia decreased in both groups when compared to dysphagia scores at 1 month ($p<0.05$). We noted no difference in grade of dysphagia between the two groups at 6 months ($p=0.622$). Proton pump inhibitor therapy was continued 1 month after sur-

gery. No patient underwent reoperation. There was no relapse during this period. Pneumothorax occurred in one patient intraoperatively. There was also a trocar site hematoma in one patient in the early postoperative period that resolved spontaneously.

DISCUSSION

Laparoscopic Nissen fundoplication (LNF) is the standard surgical care for GERD. The aim of this therapy is to reestablish normal hiatal anatomy and to create a sufficient antireflux barrier by performing fundoplication. The major drawback is the high percentage of temporary or persistent dysphagia (5). Various modifications of this procedure have been implemented in an attempt to reduce the prevalence of this complication (7). DeMeester claimed that dysphagia can be reduced by enlarging the caliber of the bougie used to size the fundoplication or by shortening of the fundoplication length from 4 to 1 cm or by division of short gastric vessels (SGV) (7).

The standard procedure for GERD is 360° Nissen fundoplication. To reduce the rate of dysphagia, partial fundoplication was introduced. The one most commonly used is Toupet fundoplication. It is the preferred technique to overcome the aforementioned complications when esophageal peristalsis is weak. However, long-term studies have shown that a partial fundoplication is less effective in controlling reflux than a Nissen fundoplication (8,9). Total fundoplication should be the procedure of choice for patients with GERD regardless of the preoperative esophageal motility. In a retrospective study, Herbella *et al.* (10) concluded that total fundoplication more often causes normalization of peristalsis, with consequent amelioration of esophageal clearance. LNF is our operation of choice for GERD. According to our results, it caused dysphagia only in the early postoperative period. Dysphagia scores were better at 6 months after surgery than preoperatively.

There are prospective randomized reports about the need to divide SGV (11,12). All these studies have concluded that there is no benefit in division of SGV during LNF. Yang *et al.* (11) found no advantages of SGV division after a 10-year follow-up. On the contrary, dividing SGV prolongs operating time and raises the risk of intraoperative blood loss (12). Unusual complications like splenic infarction and splenic abscess may be seen after SGV division (13,14). Our preferred technique is

Table 1. Characteristics of patients in the two groups

	Narrowed segment length		p value
	≤30 mm	>30 mm	
Males	12	12	
Females	7	8	
Mean age (years)	41.3	39.1	NS
Mean BMI	26.2	26.4	NS
Mean segment length	25.0	40.1	NS

BMI: Body mass index. NS: Not significant.

Table 2. Comparison of dysphagia scores between the two groups

Dysphagia score	Narrowed segment length		p value
	Group 1 (≤30 mm)	Group 2 (>30 mm)	
Preop	2.22	2.11	0.710
1 month	1.95	1.88	0.858
6 months	2.44	2.31	0.622

to divide SGV, as we believe it causes a looser wrap of the fundus. It does prolong the operating time, but we did not detect any complications regarding SGV division.

We did not use any bougie during the operation to calibrate the tightness of the floppy fundic wrap. Some advocate the usage of bougie to reduce the prevalence of dysphagia (7). DeMeester et al. (7) recommended the usage of a 60F large bougie instead of a smaller one. However, the insertion of a bougie can cause life-threatening complications like esophageal perforation. In a retrospective study, Novitsky et al. (15) did not use any esophageal bougie and reported a low rate of postoperative dysphagia compared to that of other investigators using the esophageal bougie. We also did not use any bougie in the learning period and consider the use of a bougie to be unnecessary for reducing dysphagia.

The mechanism of postoperative dysphagia after LNF is not fully understood. The literature contains very few data regarding the length of the narrowed segment. The first description of fundoplication was by Rudolph Nissen, in 1956 (16), and he recommended a 5-cm wrap around the lower esophagus. Because of dysphagia, various modifications have been performed.

Normally, gastric distention causes a progressive decrease in lower esophageal sphincter (LES) length and competency (17). However, Nissen fundoplication prevents sphincter shortening and improves competency of the LES to progressive degrees of gastric distention (17). During the esopha-

gogram, we also detected that the swallowing of barium did not cause a decrease in LES length. Segment length during the procedure was constant.

Del Pino Porres et al. (18) demonstrated in a non-randomized study that the length of the fundoplication has no influence on the mean pressure values of the LES or on its length. They compared manometric data of a 4-5 cm long wrap with a 1-1.5 cm short wrap and concluded that longer suture does not mean a longer length of high pressure zone or higher pressure. Our study supports this idea. Although we performed an approximately 3-cm fundic wrap, measurement of the narrowed segment showed different values. The primary determinant of segment length may be the posterior cover of the stomach, not anterior stitches (18). One randomized study compared short and long fundic wrap in Nissen and Toupet fundoplication (19). They were unable to confirm the influence of wrap length on treatment failure of Nissen fundoplication.

There is no study in the literature that evaluates the effect of narrowed segment length measured on esophagogram on dysphagia scores in patients undergoing LNF. In this study, we used subjective data for grade of dysphagia and esophagogram for wrap length instead of manometric data. We were unable to detect any significant effect of segment length on early postoperative dysphagia. In our opinion, narrowed segment length has no effect on the degree of early postoperative dysphagia in patients undergoing LNF.

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