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Tip III ve IV Hiatal Fıtık Tedavisinde Laparoskopik Floppy Nissen Fundoplikasyonu ve Laparoskopik Toupet Fundoplikasyonunun Erken Sonuçlarının Karşılaştırılması

Comparison of Early Outcomes of Laparoscopic Floppy Nissen Fundoplication and Laparoscopic Toupet Fundoplication in the Treatment of Type III and IV Hiatal Hernia

Serkan Tayar [1*], Tolga Kalayci [2]

[1] Medical Park Trabzon Karadeniz Hastanesi Genel Cerrahi Kliniği, Trabzon, Türkiye
[2] Ağrı İbrahim Çeçen Üniversitesi Tıp Fakültesi Genel Cerrahi Anabilim Dalı, Ağrı, Türkiye

e-mail: tayarserkan61@hotmail.com, dr.tolgakalayci@gmail.com
ORCID: 0000-0001-5174-2416
ORCID: 0000-0002-6977-1757
*Sorumlu yazar/ Corresponding Author: Serkan Tayar

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Öz

Giriş ve Amaç: Bu çalışmada Tip III ve IV hiatal hernilerin (HH) tedavisinde kullanılan laparoskopik Floppy Nissen fundoplikasyon tekniği (LFNFT) ile laparoskopik Toupet fundoplikasyon tekniği (LTFT) arasında karşılaştırma yapılması amaçlanmıştır.

Gereç ve Yöntemler: Bu retrospektif analiz, etik onay alındıktan sonra yapıldı. Ocak 2020 ile Mayıs 2022 tarihleri arasında Tip III ve IV hiatal herni ameliyatı olan hastalar tarandı. Hiatal herni onarımı için LFNFT ve LTFT uygulanan hastalar seçildi. 18 yaş altı hastalar ve ameliyat sonrası kliniğimizde takip edilen hastalar çalışma dışı bırakıldı. Gruplar arasındaki klinik ve takip farklılıkları istatistiksel olarak değerlendirildi.

Bulgular: Çalışma kriterlerine uyan 38 hastanın 27'si (%71,1) kadındı. Tüm hastaların yaş ortalaması 41,39±14,03 yıl (21-77) idi. 10 (%26,3) hastada Tip 3 HH, kalan hastalarda (%73,7) Tip 4 HH vardı. 27 (%71,1) hastaya LFNFT, 11'ine (%28,9) LTFT uygulandı. Postoperatif takiplerinde 14 (%36,8) hastada komplikasyon gelişti ve en sık karşılaşılan güçlük %13,1 ile gaz şişkinliği idi. Gruplar karşılaştırıldığında erkek hastalarda (p=0,005) ve genç hastalarda (p<0,0001) LTFT tercih edildi. Ayrıca LTFT, ameliyathane süresi (p=0,038) ve hastanede kalış süresi (p=0,004) daha kısa olan bir işlemdir. Ancak erken dönem sonuçlarında iki ameliyat grubu arasında fark yoktu.

Sonuç: Her iki tekniğin erken dönem sonuçları benzerdi. Ancak LTFT, daha hızlı operasyon süresi ve taburculuk süresi olan teknikti. Bu nedenle hiatal herni onarımı için LTFT'ni öneriyoruz.

Anahtar kelimeler: Hiatal herni, Hastanede kalış, Nissen operasyonu.

Abstract

Objective: This study aims to compare the laparoscopic Floppy Nissen fundoplication technique (LFNFT) and the laparoscopic Toupet fundoplication technique (LTFT) used in treating Type III and IV hiatal hernias (HHs).

Materials and Methods: This retrospective analysis was conducted after ethical approval. Patients who underwent Type III and IV hiatal hernia surgery were searched between January 2020 and May 2022. Patients who underwent LFNFT and LTFT for hiatal hernia repair were selected. Patients under 18 and patients who were followed up in our clinic after surgery were excluded from the study. The clinical and follow-up differences between the groups were evaluated statistically.

Results: Of the 38 patients who met the study criteria, 27 (71.1%) were female. The mean age of all patients was 41.39±14.03 years (21-77). 10 (26.3%) patients had Type 3 HH, and the remaining patients (73.7%) had Type 4 HH. LFNFT was performed on 27 (71.1%) patients, and LTFT on 11 (28.9%). Complications developed in 14 (36.8%) patients in the postoperative follow-up, and the most common difficulty was gas bloating, with a rate of 13.1%. In

comparing the groups, LTFT was preferred in the male patients (p=0.005) and younger patients (p<0.0001). In addition, LTFT was a procedure that had a shorter operation room time (p=0.038) and length of hospital stay (p=0.004). However, there was no difference between the two surgery groups among the early period outcomes.
Conclusion: The early period outcomes of both techniques were similar. However, LTFT was the technique with a faster operation time and discharge. Therefore, we recommend the LTFT for hiatal hernia repair.

Keywords: Hiatal hernia, Hospital stay, Nissen operation.

1. Introduction

Physiological reflux is accepted as the retrograde passage of stomach contents into the oesophagus in the rem phase of sleep and the postprandial period, depending on the position. The presence of retrosternal burning more than two days a week for a few months is called gastroesophageal reflux disease (GERD) [1]. Hiatal hernia (HH) is a widespread pathology in the community and causes GERD if symptomatic. HH occurs with disruption of the normal anatomical relationship of the gastroesophageal junction and the diaphragmatic hiatus [2]. HHs are divided into four types according to the position of the gastroesophageal junction, hernia size and content. Type I HHs are called sliding hernias. Sliding HHs account for 95% of all hiatal hernias [3, 4]. Type II HHs are called para-oesophagal hernias, which occur when part of the stomach migrates into the mediastinum parallel to the oesophagus. Type III HHs are the combination of sliding hernia and para-oesophagal hernia. Type IV HHs are the herniation of different organs such as the colon, small intestine or spleen, and the stomach in the thoracic cavity [3].

Many well-known operating techniques in the literature can be applied to HH types [5, 6]. Although both open and minimally invasive procedures have published similar results in morbidity/mortality, complications, long-term benefit and symptom control, laparoscopic/thoracoscopic surgical techniques have become widespread in resident training due to short hospital stays and rapid return to work [2]. Therefore, laparoscopic fundoplication methods have become the gold standard. Therefore, while laparoscopic fundoplication methods have become the gold standard, surgical procedures in reflux surgery to be considered have become important. According to the patient's anatomy, the fundoplication and crus repair calibration are crucial in reflux surgery. Tight fundoplication and narrow crus cause symptoms such as long-term dysphagia, restriction of vomiting and belching, dyspepsia, and distension, while loose repair may cause recurrent reflux. Insufficient oesophagal mobilisation and tension of the hiatal hernia to the abdomen may lead to the development of para-oesophagal hernia and fundus incarceration in the long term [7].

This study is aimed to compare the laparoscopic floppy Nissen fundoplication technique (LFNFT), and laparoscopic Toupet fundoplication technique (LTFT) applied in the treatment of hiatal hernia, and their early outcomes are presented.

2. Materials and Methods

This retrospective analysis was conducted after ethical approval (KAEK 2022/07-81). Patients who underwent Type III and IV hiatal hernia surgery were searched between January 2020 and May 2022. Patients who underwent LFNFT and LTFT for hiatal hernia repair were selected. Patients under 18 and patients who were followed up in our clinic after surgery were excluded from the study. In addition, all procedures performed in studies involving human participants were by the ethical standards of the institutional and national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

2.1.Searched Parameters

The patients' age, gender, comorbidity status, the presence and duration of proton pump inhibitors in the preoperative period, hernia characteristics detected in preoperative endoscopy and tomography, and the hiatal hernia repair method applied to the patients and the presence of additional surgery were investigated. Operation room time and length of hospital stay were evaluated. Early outcomes were considered as complications and mortality in the first month postoperatively.

After data collection, patients were divided into two groups according to the type of hiatal hernia repair performed: the LFNFT and the LTFT groups. The clinical and follow-up differences between the groups were evaluated statistically.

2.2.Statistical Analysis

Statistical analyses were performed using the IBM Statistical Analyses for Social Sciences (SPSS) ver. 23.0 for Windows. Quantitative variables were expressed as mean ± standard deviation (SD), median, minimum-maximum, interquartile range and interval. Qualitative variables were reported as numbers and percentages. Kolmogorov Smirnov and Shapiro Wilk tests were used to evaluate the normality distribution. Due to normality test results, a Mann-Whitney U test to compare groups. In addition, a Fisher's exact test was used to compare qualitative variables. A p-value below 0.05 was considered statistically significant.

3. Results and Discussion

3.1.Results

Of the 38 patients who met the study criteria, 27 (71.1%) were female. The mean age of all patients was 41.39±14.03 years (21-77). Before surgery, 26 patients had a history of long-term use of proton pump inhibitors ranging from 1 to 7 years. In addition, all patients had no other disease in the preoperative period.

Upper gastrointestinal endoscopy, hepatobiliary ultrasonography, and thoracoabdominal computed tomography were routinely performed in all patients in the preoperative period. Colonoscopy was performed on patients over 40 years of age in addition to endoscopy.

After preoperative evaluations, 10 (26.3%) patients had Type 3 HH, and the remaining patients (73.7%) had Type 4 HH. Additionally, 4 (10.5%) patients had cholelithiasis. LFNFT was performed on 27 (71.1%) patients, and LTFT on 11 (28.9%). The mean operation room time was 56.31±14.07 minutes (40-90). In addition, laparoscopic sleeve gastrectomy was performed in 5 (13.2%) patients and laparoscopic cholecystectomy in 4 (10.5%) patients. No operative complications were observed. At the same time, two patients over 65 years of age were followed in the intensive care unit for one day during the postoperative period. The remaining patients were followed up in the service in the postoperative period. Complications developed in 14 (36.8%) patients in the postoperative follow-up, and the most common difficulty was gas bloating, with a rate of 13.1%. However, the mortality rate in the study was 0%. The clinical parameters of all patients are shown in Table 1.

Table 1. Patients' clinical parameters and their follow-up.

Parameters	**N (%) or value**
Age	41.39±14.03 (21-77)
Gender	
• Female	27 (71.1)
• Male	11 (28.9)
Proton pump inhibitor	
• Yes	26 (68.4)
• No	12 (31.6)
Hiatal hernia type	
• Type III	10 (26.3)
• Type IV	28 (73.7)
Surgery type	
• Floppy Nissen fundoplication	27 (71.1)
• Toupet fundoplication	11 (28.9)
Additional surgery	
• Sleeve gastrectomy	5 (13.2)
• Cholecystectomy	6 (10.5)
Operation room time	56.31±14.07 (40-90)
Postoperative follow-up	
• Gas bloating	5 (13.1)
• Dysphagia	4 (10.5)
○ Lasting a week	1 (2.6)
○ Lasting three week	2 (5.3)
○ Lasting a month	1 (2.6)
• Difficulty belching	3 (7.9)
• Flatulence	2 (5.3)
• No pathology	24 (64.9)
Hospital stays	2.63±0.71 (2-4)

In comparing the groups, LTFT was preferred in the male patients (p=0.005) and younger patients (p<0.0001). In addition, LTFT is a procedure with a shorter operation room time (p=0.038) and length of hospital stay (p=0.004). However, there was no difference between the two surgery groups among the early period outcomes. (Table 2)

3.2.Discussion

This comparative study presents the early period outcomes of Type III and IV hiatal hernia surgery. Many studies compare these two methods in the literature [8, 9]. Based on the results of our research, Toupet fundoplication comes to the fore because of the shorter operation time and hospital stay. Postoperative dysphagia rate, gas bloating rate and flatulence rate was higher in the Nissen fundoplication group, while difficulty belching rate was higher in the Toupet fundoplication group. However, the two surgical methods showed similar early outcomes [9].

In a Chinese randomised controlled trial by Wang et al., age, gender distribution, proton pump inhibitor usage rate, and preoperative dysphagia rate were similar between the two groups. In addition, perioperative complication rate, mean operation room time, and length of hospital stay were similar. However, the preoperative regurgitation rate was higher floppy Nissen fundoplication group (41% vs 31%, p=0.023). Among the early period postoperative outcomes, dysphagia rate (27.9% vs 14.6%), gas bloating rate (30.2% vs 9.8%), inability to belch rate (20.9% vs 4.9%), and regurgitation rate (14% vs 2.4%) were higher in the patients who underwent floppy Nissen fundoplication. However, only gas bloating and inability to belch was higher statistically, p=0.020 and p=0.029, respectively. In another randomised study in which the demographic characteristics of the patients in the groups were similar, it was shown that both procedures proved to be equally effective in improving quality of life and GERD symptoms. However, the reoperation and dysphagia rates were lower, and the ability to belch was higher after Toupet fundoplication than after Nissen fundoplication [10]. In a meta-analysis that included 13 studies, the operative time, perioperative complications, postoperative satisfaction, recurrence, and the rates of medication adoption or re-operation due to recurrence were not significantly different between the two groups. However, rates of adverse results involving dysphasia, gas-bloat syndrome, inability to belch and re-operation due to severe dysphasia were considerably higher after the Nissen fundoplication group [11]. Toydemir et al. showed that dysphagia rate (15.4% vs 9.9%) and gas bloating (19.6% vs 10.8%) were higher in patients who underwent Nissen fundoplication [12]. However, the operative rom time, estimated operative blood loss, perioperative morbidity, length of hospitalisation, and efficacy in relieving symptoms were similar in the study of Erenoğlu et al. [13]. In this study, the male sex ratio and the young patient population ratio were higher in the

Table 2. Comparison of Laparoscopic Floppy Nissen Fundoplication and Laparoscopic Toupet Fundoplication.

Parameters	**Floppy Nissen fundoplication (N=27)**	**Toupet fundoplication (N=11)**	**P-value**
Age [a]	25.00	6.00	**<0.0001***
Gender [b]			**0.005****
• Female	23 (85.2)	4 (14.8)	
• Male	4 (36.4)	7 (63.6)	
Proton pump inhibitor [b]			0.121**
• Yes	16 (61.5)	10 (38.5)	
• No	11 (91.7)	1 (8.3)	
Hiatal hernia type [b]			0.225**
• Type III	9 (90)	1 (10)	
• Type IV	18 (64.3)	10 (35.7)	
Additional surgery			
Sleeve gastrectomy [b]			0.295**
• Yes	5 (100)	0 (0)	
• No	22 (66.7)	11 (33.3)	
Cholecystectomy [b]			1.000**
• Yes	3 (75)	1 (25)	
• No	24 (70.6)	10 (29.4)	
Operation room time [a]	21.87	13.68	**0.038***
Postoperative follow-up			
Gas bloating [b]			0.295**
• Yes	5 (18.5)	0 (0)	
• No	22 (81.5)	11 (100)	
Dysphagia [b]			0.303**
• Yes	4 (14.8)	0 (0)	
• No	23 (85.2)	11 (100)	
Difficulty belching [b]			0.196**
• Yes	1 (3.7)	2 (18.2)	
• No	26 (96.3)	9 (81.8)	
Flatulence [b]			1.000**
• Yes	2 (7.4)	0 (0)	
• No	25 (92.6)	11 (100)	
Hospital stays [a]	22.76	11.50	**0.004***

[a] Mann Whitney U test, **Fisher's exact test..

Toupet group. However, the two surgical methods had statistically similar results in terms of early outcomes.

Dysphagia is one of the main problems after anti-reflux surgery. It can be seen in the very early stages after the surgery, but it can also be seen as a chronic symptom in the future. Dysphagia occurring in the early period is primarily due to oesophagal oedema. However, several anatomical and technical factors, such as a tight and long wrap and scar tissue formation, are involved in the pathogenesis of chronic dysphagia [14]. Since a 360-degree fundoplication is performed in the Nissen fundoplication, the probability of dysphagia is higher in these cases. Similar to the literature, dysphagia after Nissen fundoplication was higher (14.8% vs 0%).

Limitations

The most important limitation of the current study is that it was conducted retrospectively. In addition, the small number of patients, unfortunately, increases the statistical error rate. The number of patients should be increased to obtain more reliable data, and studies examining long-term outcomes are needed for a healthy comparison of both techniques.

4. Conclusion

Hiatal hernia is a pathology that is very common in the community and causes reflux if symptomatic. Surgical treatment is an essential option in medically resistant hiatal hernia cases. LFNFT and LTFT were two main surgical techniques for repairing the hiatal hernia. The early period outcomes of both methods were similar. However, LTFT was the technique with a faster operation time and discharge. Therefore, we recommend the LTFT for hiatal hernia repair.

5. Acknowledgements and Disclosures

Ethics Committee Approval: Ethics committee approval was received from the Non-invasive Clinical Research Ethics Committee of Erzurum Regional Education and Research Hospital, Erzurum, Turkey (KAEK 2022/07-81).

Conflict of Interest: None declared.

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