

# Gastroözefageal Reflü Hastalığında Robotik Fundoplikasyona Karşı Laparoskopik Nissen Fundoplikasyonu

## Robotic Surgery Versus Laparoscopic Nissen Fundoplication For Gastroesophageal Reflux Disease

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### ÖZ

**GİRİŞ ve AMAÇ:** Laparoskopik Nissen fundoplikasyonu gastroözofageal reflü hastalığı için altın standarttır, ancak günümüzde robotik cerrahi de güvenli ve etkili bir yöntemdir. Ülkemizde robotik veya laparoskopik cerrahi kullanımı ile ilgili henüz bir fikir birliği yoktur. Bu çalışmanın amacı, standart laparoskopik NF'yi, robotik NF yaklaşımıyla, prosedürleri kullanmanın avantajları ve dezavantajları açısından karşılaştırmaktır.

**YÖNTEM ve GEREÇLER:** Nissen fundoplikasyonu yapılan toplam 42 hasta çalışmaya dahil edildi. Bunlardan 28' i geleneksel laparoskopi (Grup I) ve 14'ü robotik cerrahi (Grup II) ile tedavi edildi. İki grupta yaş, cinsiyet ve vücut kitle indeksi ile ilgili senkronizasyon sağlandı.

**BULGULAR:** Tüm hastalara hiatus henoplastisi ve Nissen fundoplikasyonu uygulandı. Ameliyat sırasında açık ameliyata geçilmedi ve sonrası mortalite gözlenmedi. Ortalama ameliyat süresi grup I'de  $127.46 \pm 42.04$  dakika ve grup II'de  $253.57 \pm 42.48$  dakika idi. Bu parametrede I ve II gruplarından istatistiksel olarak anlamlı fark vardı ( $p < 0.001$ ).

**TARTIŞMA ve SONUÇ:** RNF çalışmamızda konvansiyonel laparoskopik NF ile karşılaştırıldığında benzer perioperatif ve postoperatif sonuçları göstermektedir. Bu çalışma, RNF' nin GÖRH tedavisi için güvenli ve etkili bir yöntem olduğunu göstermiştir, ancak ameliyat süresini uzatmaktadır.

**Anahtar Kelimeler:** Robotik, laparoskopik, nissen fundoplikasyon, gastroözofageal reflü hastalığı

### ABSTRACT

**INTRODUCTION:** Laparoscopic Nissen fundoplication was the gold standard for gastroesophageal reflux disease but nowadays, robotic surgery is also safe and effective method too. No consensus currently exists regarding the use of robotic or laparoscopic surgery in.

The aim of the present study was to compare standard laparoscopic NF with the robotic NF approach in terms of the advantages and disadvantages of using each procedure.

**METHODS:** A patient group of 42 candidates for Nissen fundoplication. Of these, 28 were treated by traditional laparoscopy (Group I) and 14 by robotic surgery (Group II). The synchronization was provided in the two groups about age, gender and body mass index.

**RESULTS:** All patients underwent Hiatus hernioplasty and Nissen fundoplication. There were no conversions to open procedures and no in-hospital deaths. Mean operation time was  $127.46 \pm 42.04$  minutes in group I and  $253.57 \pm 42.48$  minutes in group II. There were statistically significant differences in this parameter from groups I and II ( $p < 0.001$ ).

**DISCUSSION AND CONCLUSION:** RNF shows similar perioperative and postoperative outcomes compared with conventional laparoscopic NF in our study. This study has demonstrated that RNF is safe and effective method for treating GERD, but it prolongs the operation time.

**Keywords:** Robotic, laparoscopic, nissen fundoplication, gastroesophageal reflux disease

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Başvuru Tarihi: 29.03.2020

Kabul Tarihi: 09.11.2020

## INTRODUCTION

Gastroesophageal reflux disease (GERD) is the one of the most common health and social problems, which affects more than half of the world's population (1). Traditional laparoscopic funduplications (LF) have been the gold standard for laparoscopic Nissen fundoplication (LNF) for two decades, although single-incision laparoscopic Nissen fundoplication was described only recently (2).

In 2000, the robotic surgery was introduced to surgeons to take potential benefits of the robotic system contain three-dimensional (3-D) vision, angled tools and a surgeon-controlled camera platform. Recent small patient's number studies have revealed robotic assisted laparoscopic nissen fundoplication (RLNF) to be safe and effective compared with traditional laparoscopic nissen fundoplication (3). The first RNF surgery was performed using the Mona robot in Brussels at Belgium (3). RNF became widely used after its certification by the Food and Drug Administration (FDA), in spite of its unclear advantages and disadvantages. No consensus currently exists regarding the use of robotic surgery in NF. Current studies demonstrate that some surgeon think that robotic nissen fundoplication has arisen as an encouraging technical novelty (4, 5). On the other hand, other surgeon's think it increases the operation time and also increases the cost (6-9).

The aim of the present study was to compare standard laparoscopic NF with the robotic NF approach in terms of the advantages and disadvantages of using each procedure.

## MATERIAL AND METHODS

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

From 2017 January to July 2018, 28 patient' s were operated laparoscopically at XXX Training and Research Hospital and from 2017 January to July 2018, 14 patient' s were operated using robotic da Vinci system at YYY Hospital by the same surgeons

due to hiatus hernia or reflux disease and associated co-morbidity.

A retrospective clinical trial was undertaken with a patient group of 42 candidates for Nissen fundoplication. Of these 42 participants, 28 were treated by traditional laparoscopy (Group I) and 14 by robotic surgery (Group II). The synchronization was provided in the two groups about age, gender and body mass index. All the participants in this study suffered from GERD, as documented by gastroscopy, 24-hours pH-metry, barium swallow, and esophageal manometry. All the patients had low or moderate operative risk (ASA 1 or 2). All procedures were performed by the same surgeon who experience with more than 300 laparoscopic Nissen funduplications.

Hiatus hernioplasty and Nissen fundoplication was performed in all patients as the operative procedure.

### Statistical Analysis

Data analysis was performed by using SPSS for Windows, (version 16.0, Chicago, IL, USA). Categorical variables were compared using the independent sample T-test, Pearson Chi Square or Fisher's exact test where appropriate. A probability value of <0.05 was considered significant.

## RESULTS

### Patient's characteristics

The laparoscopic surgery group consisted of 28 (66.7%) patients (12 women and 16 men) with a median age of 40 years (range, 22-67 years), and a median body mass index (BMI) of 26.3 kg/m<sup>2</sup> (range 21-37.1 kg/m<sup>2</sup>). In the robotic surgery group there were 14 (33.3%) patients (6 women and 8 men) with a median age of 39.5 years (range, 21-64 years) and a median BMI of 26 kg/m<sup>2</sup> (range, 21 – 34 kg/m<sup>2</sup>). (Table 1).

**Table 1. Demographic and clinical characteristics of the patients**

Parameters	Laparoscopic group (n=28)	Robotic group (n=14)	P value
Median age (years) (Range: min-max)	40 (22- 67)	39.5 (21- 64)	0.91
Gender (male, %)	57.1 %	57.1 %	
Male	16	8	1
Female	12	6	
Median BMI (kg/m <sup>2</sup> ) (Range: min-max)	26.3 (21-37.1)	26 (21-34)	0.81
De Meester score	38.97±2.12	65.28±6.09	0.48
Median peroperative blood loss (ml)	30 (10- 100)	25 (10-50)	0.95
Mean operation time (minute)	127.4±45.1	253.57±42.48	<0.001
Mean hospital stay	3.03± 0.74	3.71± 0.82	0.055

The average duration of symptoms was 7 months (range, 1--28 months) and heartburn being the most common presenting symptom (n = 36 [85.7%]) in 42 patients.

#### Surgical outcomes

All patients underwent Hiatus hernioplasty and Nissen fundoplication. 28 patients underwent laparoscopic and 14 patients underwent robotic surgery. There were no conversions to open procedures and no in-hospital deaths. Mean operation time was 127.46± 42.04 minutes in group I and 253.57±42.48 minutes in group II. There were statistically significant differences in this parameter from groups I and II (p<0.001). The per-operative complications were not occurred in any patients. Median operative blood loss in Group I and II were 30ml (range 10- 100ml) and 25 ml (range 10- 50 ml), respectively. There were no statistically significant differences in this parameter from groups I and II.

#### Postoperative outcomes

The mean hospital stay was 3.03± 0.74 days (range, 4-10) and 3.71± 0.82 days in group I and II, respectively. There were no statistically significant differences in this parameter from groups I and II. Postoperative intensive care unit (ICU) was not needed in any patients. Postoperative period was uneventfully for all patients in both groups. Gas-bloating syndrome was seen in one patient at laparoscopic group and in two patients at robotic

surgery group. We did not find any symptom recurrence in each two groups; all patients recovered appropriately with a high level of satisfaction.

#### DISCUSSION

Despite the successes in laparoscopy, manipulation was often hampered by a flat, rigid, non-articulated instruments and also two-dimensional (2-D) image (10). Furthermore, physiologic tremors of the surgeon were easily transmitted through the tip of the rigid instruments, which made the anastomosis and dissections complicated (11). The robotic surgery has recently been presented into clinical practice with the aim of improving success by eliminating fatigue and tremors (12). In additionally, it suggests different technical progresses when compared with standard laparoscopic procedures, such as 3-D visualization of the operating area, increased maneuverability (articulating wrists) of the instruments and improved ergonomic posture of the surgeon (13). Nowadays, robotic procedures have begun to be widely used applications.

Previous studies showed that robotic Nissen fundoplication procedure is safe and outcomes are similar to laparoscopy. [14]. In our study; patient outcomes, including postoperative complication rates and length of hospital stay, were similar. Only the duration of surgery was longer in the robotic surgery and statistically significant difference was found. The robotic surgery for GERD in this study appears to be effective and safe.

In a recent study; no significant difference was found between robotic Nissen fundoplication and the laparoscopic Nissen fundoplication for operative complications, duration of hospital stay, requirement of re- operation and occurrence of postoperative dysphagia (15).

In another study showed that the cost of the robotic procedure was significantly higher than laparoscopic techniques but robotic surgery was less expensive than open surgery because of the largely through decreased length of postoperative stay and fewer complications. (15,16)

#### Study Limitations

This study has some limitations which have to be pointed out. First of all, it was a two center retrospective study with relatively small sample size cohort. Furthermore, the follow-up period was quite

short and did not include 5 years data. The heterogeneity of the patients (in laparoscopy and robotic surgery group) was another limitation of our study.

#### Conclusions

Our study has demonstrated that RNF is safe and effective for treating GERD, but it prolongs the operation time. RNF also shows similar perioperative and postoperative outcomes compared with conventional laparoscopic NF in our study.

#### Informed Consent

Informed consents were obtained from patients who participated in this study.

#### Competing interests

No conflict of interest was declared by the authors.

#### Financial Disclosure

The authors declared that this study has received no financial support.

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