

Utility of esophageal manometry and pH-metry in gastroesophageal reflux disease before surgery

Gastroözofageal reflü hastalığı cerrahisinden önce özofageal manometri ve 24 saatlik PH ölçümü

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Background/aims: The necessity of manometric evaluation before fundoplication in patients with gastroesophageal reflux disease is still a matter of debate. However, misdiagnosis can be responsible for postoperative problems. We aimed to evaluate the necessities of manometry and pH-metry before fundoplication in order to prevent possible complications after surgery. **Methods:** Between 1997 and 2004, 259 consecutive patients who referred to our laboratory with a diagnosis of gastroesophageal reflux disease and request for manometric test before surgery were evaluated retrospectively. Manometric analysis was performed in all patients and 24-hour ambulatory pH-metry in 91 of them. **Results:** The mean age of the patients was 42.6±13 years and 51% were female. While 102 (39.4%) of the patients had normal esophageal motility, 122 (47.1%) had gastroesophageal reflux-related dysmotility (22% with ineffective esophageal motility, 25.1% with hypotensive lower esophageal sphincter). Primary esophageal motility disorders were detected in 29 (11.2%) patients (4 achalasia, 24 uncoordinated contractions and 1 nutcracker esophagus). Six patients had secondary dysmotility caused by scleroderma. Pathologic reflux was detected in 54 (59.3%) patients in whom pH-metry was performed. **Conclusions:** Our results support that manometry and pH-metry must be performed before surgery in gastroesophageal reflux disease.

Key words: Gastroesophageal reflux disease, pH-metry, motility, anti-reflux surgery

Amaç: Gastroözofageal reflü hastalarında fundoplikasyon ameliyatı öncesinde manometrik değerlendirmenin gerekliliği hala tartışmalıdır. Ancak, ameliyat sonrası problemlerden yanlış tanı sorumlu olabilir. Bu çalışmada cerrahi sonrası problemleri engellemek için fundoplikasyon öncesinde manometri ve 24 saatlik pH analizinin gerekliliğinin değerlendirilmesi amaçlanmıştır. **Yöntem:** 1997-2004 yılları arasında gastroözofageal reflü nedeni ile ameliyat planlanan ve manometrik inceleme için laboratuvarımıza yönlendirilen 259 hasta retrospektif olarak değerlendirildi. Hastaların hepsine manometrik inceleme, 91'ine de 24 saatlik pH analizi yapılmıştı. **Bulgular:** Hastaların ortalama yaşı 42.6±13 yıl ve %51'i kadındı. Hastaların 102'sinde (%39.4) özofagus motilitesi normal iken, 122'sinde (%47.1) reflü ile ilişkili dismotilite saptandı (%2 inefektif özofageal motilite, %25.1 hipotansif alt özofagus sfinkteri). Yirmidokuz hastada (%11.2) primer özofageal motilite bozukluğu olduğu tespit edilirken (4 akalazya, 24 ankoordine kontraksiyonlar ve 1 nutcracker özofagus), 6 hastada sklerodermaya bağlı sekonder dismotilite bulundu. 24 saatlik pH analizi yapılan hastaların 54'ünde (59.3%) patolojik reflü saptandı. **Sonuç:** Sonuçlarımız gastroözofageal reflü cerrahisi öncesinde manometri ve 24 saatlik pH analizi yapılması gerekliliğini desteklemektedir.

Anahtar kelimeler: Gastroözofageal reflü hastalığı, pH metre, motilite, anti-reflü cerrahi

INTRODUCTION

The utility of esophageal manometry in clinical practice resides in three domains: i- to define esophageal motor function, ii- to define abnormal motor function, and iii- to delineate a treatment plan based on motor abnormalities (1). Numerous investigations have demonstrated manometric abnormalities associated with gastroesophageal reflux disease (GERD), but from a diagnostic viewpo-

int, the utility of this technique is limited by issues of sensitivity or specificity. Impaired motility of the esophageal body is a common finding in GERD, with a prevalence of 25% in patients with mild disease and up to 50% in patients with severe disease (2, 3). The prevalence of abnormal esophageal motility is more frequent with chronic GERD and that dysmotility is found most com-

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monly in patients with more severe GERD (2). It remains controversial as to whether esophageal dysmotility is a cause or consequence of the disease (4).

Anti-reflux surgery effectively controls reflux in most patients (5). A number of technical modifications of the original Nissen (6) fundoplication have been presented over the years, but the total fundic wrap is still the most widely used surgical procedure for long-term management of GERD (1).

The necessity of manometric evaluation before fundoplication in patients with GERD is still a matter of debate. Some studies (8, 9) reported that esophageal dysmotility-related GERD did not affect surgical outcomes. Rydberg *et al.* (8) suggested that esophageal manometric findings indicative of motor dysfunction should not be used in clinical practice to select patients with established chronic GERD for either a total or partial fundoplication. The most obvious objectives for preoperative manometric investigation should be to exclude other non-GERD causes of symptoms. Fibbe *et al.* (9) also suggested that in the assessment of patients undergoing anti-reflux surgery, the indication of manometry should be based on a careful history, and thus is restricted essentially to detection of contraindications to fundoplication, implying selective rather than routine use. However, misdiagnosis can be responsible for postoperative complications. We aimed to evaluate the utility of manometry and pH-metry before surgery.

MATERIALS AND METHODS

Between 1997 and 2004, 259 consecutive patients who were referred to our laboratory with the diagnosis of GERD based on clinical symptoms and/or endoscopic findings and request for the manometric test and 24-hour pH-metry before surgery were evaluated retrospectively. Manometric analysis was performed in all patients and 24-hour ambulatory pH-metry in 91 of them. All patients had reflux symptoms despite acid suppression therapy. They stopped acid suppression therapy one week before pH-metry analysis. All of these patients were referred to our gastrointestinal motility laboratory from different surgical centers. Patients were accepted as non-responders to medical therapy, and reflux surgery was planned by their doctors. Because this study was retrospective, a detailed evaluation of history could not be done.

Distal esophageal pH monitoring was performed

by Synetics. We standardized electrode pH to 7.01 and 1.07 (Medtronic Inc, Minneapolis, MN buffer solution) before each recording. pH catheters (Flexilog single sensor, UK or Medtronic single sensor, Denmark) were passed nasally and positioned such that the distal electrode was 5 cm above the gastroesophageal junction. The pH electrodes were connected to a portable digital data recorder (Digitrapper MK III, Medtronic Inc, Minneapolis, MN) that stored pH data every 4 seconds for up to 24 hours. The data were downloaded and analyzed using Polygram, Synectics Medical.

Motility function was evaluated by esophageal manometry (Synetics Medical). Basal lower esophageal sphincter (LES) pressure was measured by pull-through technique using perfused 4 lumen catheter after overnight fasting. Ten swallows each with 5 ml of water were performed at 30-second intervals. Manometric abnormalities were defined as primary and secondary disorders (systemic sclerosis). Characteristics of achalasia were accepted as a failure of the esophagogastric junction high-pressure zone to relax adequately with swallowing and aperistalsis in the smooth muscle esophagus. Presence of simultaneous contractions ($\geq 20\%$ wet swallows) with or without LES abnormality, intermittent peristalsis, repetitive contractions (≥ 3 peaks), prolonged duration (> 6 s), and retrograde contractions were accepted as an uncoordinated motility. Hypercontracting (hypertensive peristalsis "nutcracker", hypertensive LES) and hypocontracting (ineffective motility, hypotensive LES) LES were defined as other primary motility disorders (11).

The study protocol was approved by the local ethics committee. All descriptive analyses were done with SPSS 13.0 for Windows (SPSS Inc., Chicago, IL) and results are presented as mean values and standard deviations.

RESULTS

The mean age of patients was 42.6 ± 13 years, and 51% were female. While 102 (39.4%) patients had normal esophageal motility, 122 (47.1%) had GERD-related dysmotility (22% with ineffective esophageal motility, 25.1% with hypotensive LES). Primary esophageal motility disorders were detected in 29 (11.2%) patients (4 achalasia, 24 uncoordinated contractions and 1 nutcracker esophagus).

Six patients (2.3%) had secondary dysmotility cau-

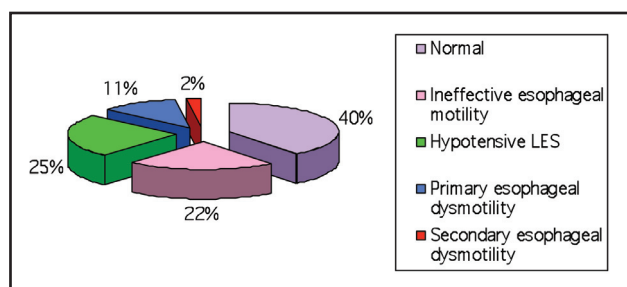


Figure 1. Manometric results of patients with diagnosis of GERD.

sed by scleroderma (diagnosis was confirmed by other tests in the rheumatology clinic) that was not diagnosed before motility study (Figures 1, 2, 3). Pathologic reflux was detected in 54 (59.3%) patients in whom pH-metry was performed (Table 1). Of these, 27.8% (n=15) had normal esophageal motility. Other results were as follows: 5.6% (n=3) patients with uncoordinated contractions, 29.6% (n=16) with ineffective esophageal motility, 29.6% (n=16) with hypotensive LES, and 7.4% (n=4) with aperistaltic esophagus. Additional esophageal motility disorders were detected in 13% (n=7) of patients who had pathologic reflux in 24-hour ambulatory pH-metry. According to the results of esophageal manometry of 37 patients with normal pH-metry, 51.4% (n=19) had normal manometry, 10.8% (n=4) had uncoordinated contractions, 21.6% (n=8) had ineffective esophageal motility, and 16.2% (n=6) had hypotensive LES.

Surgery was not recommended in patients with primary or secondary esophageal dysmotility. Balloon dilatation was performed for treatment of achalasia, and symptomatic medical treatment was

given for uncoordinated esophageal dysmotility.

DISCUSSION

In clinical practice, the utility of preoperative manometry is controversial, but excluding primary esophageal dysmotilities such as achalasia is very important. On the other hand, some studies have suggested that tailoring of anti-reflux surgery according to preoperative motility tests is of no benefit to patients (8,9) and that preoperative manometric assessment is a poor predictor of outcome (10). Fibbe et al. (9) showed that postoperative dysphagia was significantly increased among the patients who underwent Nissen fundoplication (44% Nissen vs 17% Toupet; $p < 0.0001$) but was unrelated to preoperative manometric findings. Another study also concluded that manometric findings were not related with postoperative symptoms (8). However, most of the patients with primary or secondary esophageal motility disorders can apply to outpatient clinics with only reflux symptoms. Our results showed that primary and secondary esophageal dysmotility may be present in 13.5% of patients with reflux symptoms.

These cases were referred to our center as proton pump inhibitor (PPI) non-responder patients with reflux symptoms. However, we do not know if they used PPI optimally or if they were partial responders or if the surgical treatment was their own choice. Because this study is retrospective, we could not obtain a detailed history in this regard. The dominant symptom was reflux in patients diagnosed with achalasia and scleroderma according to manometric findings, but we were unable to question patients regarding possible minimal dysp-

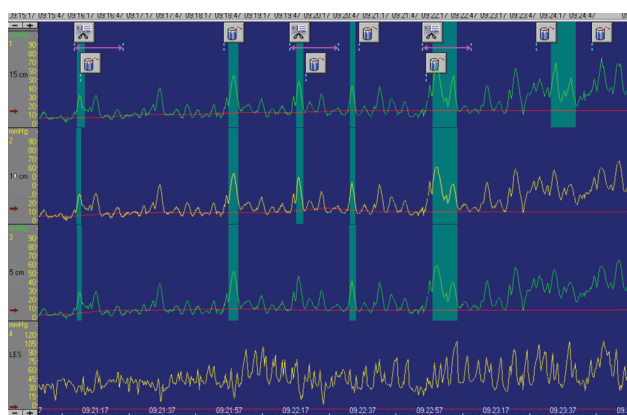


Figure 2. A patient diagnosed with achalasia. Figure shows incomplete LES relaxation and simultaneous contraction.

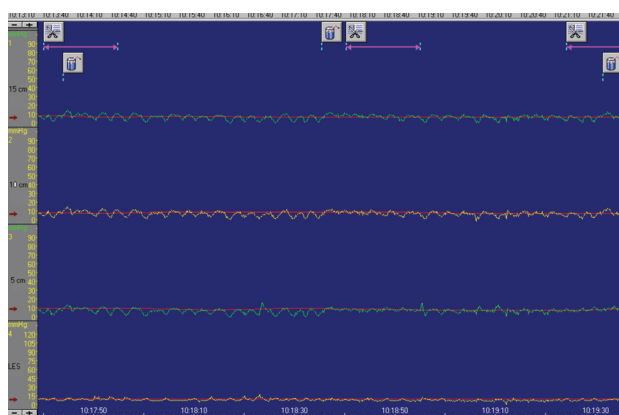


Figure 3. A patient diagnosed with scleroderma. Figure shows aperistaltic esophagus, and there is no contraction and hypotensive LES.

Table 1. 24-hour ambulatory pH-metry results

n	Total (91)	Pathologic reflux (54)
DeMeester score	29.2±28.8	44.2±28.9
Number of reflux	139.3±167.6	202.7±192.4
Longest reflux time (min)	15.3±28.8	23.6±35.1
Reflux time pH <4 (min)	133.6±342.7	211.3±429.1

hagia. Nevertheless, reflux symptoms sometimes can be dominant in achalasia and scleroderma patients (12,13).

Impaired esophageal body motility is also a complication of chronic GERD. However, it remains questionable whether the dysmotility is a primary event that makes these patients susceptible to GERD or whether it is secondary to chronic injury to the esophagus produced by repetitive acid exposure over many years (14). In patients with impaired esophageal body motility, fundoplication may result in severe postoperative dysphagia. Lund *et al.* (15) compared Toupet and Nissen fundoplication in patients with impaired esophageal body peristalsis in the distal esophagus. They concluded that laparoscopic Toupet fundoplication provides an effective antireflux barrier according to manometric, pH-metry, and symptom criteria, avoids potential postoperative dysphagia in patients with weak esophageal peristalsis, and results in improved esophageal body function six months after surgery.

In our study, manometry results affected the surgery decision in 35% (primary and secondary motility disorders and ineffective esophageal motility) of patients, and operation type was affected by manometric results in 22% (ineffective esophageal motility). However, this decision was only our suggestion to the patients' surgeons based on the manometry results. Because these patients were

followed-up at other surgical centers and were only referred to our motility laboratory for manometric or pH metric tests, we were unable to obtain their surgical data.

pH-metry analysis was available in only 91 patients. Surgeons generally want to see pH analyses only in patients with non-erosive reflux esophagitis. If patients have typical esophagitis symptoms and endoscopic findings, they only want to see manometry before the surgery. Therefore, we can accept practically that other patients in whom we did not perform pH-metry had gastroesophageal reflux. pH-metry was normal in 40% of our patients. All of these patients had reflux symptoms before this procedure and they stopped PPI therapy one week before pH-metry analyses. Before surgery, symptoms should be evaluated to determine any relation with acid reflux. Effective acid suppression therapy should be questioned first, and then weak acid reflux or alkaline reflux may be evaluated using new techniques like impedance.

In general practice, reflux surgery is performed mostly without detailed analysis of the patients, and patients apply to our center with the same or additional symptoms after surgery. This study does not include post-surgical data. However, it showed that surgery should not be performed in 13.5% of patients.

In conclusion, manometric and ambulatory pH-metry analyses are not required before reflux surgery according to current guidelines. Our study showed that primary and secondary esophageal dysmotility may be overlooked during clinical and endoscopic evaluation, and approximately half of the patients with reflux symptoms have no pathologic acid reflux. According to these data, we think that manometry and pH-metry must be performed before the decision of reflux surgery.

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