SURGICAL THERAPY OF ESOPHAGUS REFLUX DISEASE

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Abstract

Introduction: Fundoplication is the most frequently used action in the surgical treatment of gastroesophageal reflux disease (GERD). There are several types of fundoplication. The objective of our study was to identify complications after surgical treatment of GERD.

Material and Methods: We determined several parameters of the monitored and we recorded complications related to surgery: occurrence of surgical, early and late post-surgical complications.

Results: 52 patients (24 men and 28 women) with an average age of 53.3 years were included. The most frequently chosen type of fundoplication was Nissen-Rossetti. The most frequently occurring subjective post-surgery difficulties were temporal dysphagia (11.5%), sensation of nausea and vomiting after eating (3.8 %), pain in the surgical wound, and dyspnoea occurring in all patients after thoracotomy. Early post-surgery complication developed in 6 patients (11.5 %)

Conclusion: Occurrence of complications in the group monitored by us was up to 11.5 % and perioperative mortality was 0 %. Hiatal hernia is frequently found in patients with GERD and it is considered to be one of the major causes for the development of this disease.

Key words: gastroesophageal reflux disease, laparoscopic fundoplication, Nissen-Rossetti, Toupet, complications

INTRODUCTION

The gastroesophageal reflux disease (GERD) is a disease caused by abnormal reflux of stomach contents to esophagus or further up to the oral cavity and respiratory tract. It causes subjective problems to the patient and/or objectively provable changes on the esophagus mucous membrane (1). It is divided according to endoscopic finding into non-erosive (NERD) and erosive reflux disease (ERD) (2, 3).

The prevalence of GERD referring to those with symptoms at least once per week varies greatly with ethnicity and geography: 18.1–27.8 % in North America, 8.8–25.9 % in Europe, and 2.5–7.8 % in East Asia, as estimated from 28 studies (4).

Therapy is complex and consists of regime and dietary measures (reduce intake of fried, strongly spiced meals, citrus fruits, restrict alcohol, no smoking, elevated position during sleep is suitable) (5), pharmacotherapy (proton pump inhibitors, gastrointestinal motility agents) (3), endoscopic therapy (application of radio frequency energy, injection of biologically inert polymers, endoscopic suture, endoscopic fundoplication) (6).

Fundoplication is the most frequently used action in the surgical treatment of GERD. There are several types of fundoplication: complete fundoplication (Nissen-Rossetti), partial fundoplication (Toupet, Dor) (7). The aim of fundoplication is to renew the function of the lower esophageal sphincter (LES) with preserved ability to swallow and ventilate gasses (8).

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GERD must be objectively confirmed (endoscopically or by pH-metry) prior to any consideration of surgical therapy. Indications for surgical treatment according to SAGES 2010 are:

- unsuccessful conservative treatment,
- presence of GERD complications,
- presence of extraesophageal symptoms in GERD,
- patient's request (taking into account long-term quality of life).

Asymptomatic sliding hernia and small sliding hernia responding to PPI therapy are not indicated for surgical treatment. Large hiatal hernia which can, in addition to reflux, cause also other problems is indicated for surgery by hiatoplasty.

Absolute contraindications for surgical therapy are common to all laparoscopic surgeries. They include the patient's inability to tolerate general anesthesia (serious cardio-respiratory diseases) and uncorrectable coagulopathy. Relative contraindications include previous upper abdominal surgery, severe morbid obesity with a body mass index greater than 35, and esophageal motility disorders. Patients with a body index over 35 may benefit from gastric bypass surgery (9).

The objective of our study was to identify complications after surgical treatment of GERD.

MATERIAL AND METHODS

Patients after surgical treatment of gastroesophageal reflux disease, hospitalized at the Clinic of Surgery and Transplant Center, Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava, and Martin University Hospital from 01.01.2011 to 31.12.2015 were included in the study.

Inclusion criteria:

- Age of 18–80 years
- Daily proton pump inhibitor treatment for a period of at least 12 months without desired effect
- Persisting GERD symptoms after PPI discontinuation
- Erosive esophagitis
- Extraesophageal GERD symptoms
- Good patient's compliance
- Signature of the informed consent

We determined the following parameters of the monitored group: patient's gender and age, duration of GERD symptoms, presence of reflux esophagitis (proved endoscopically), coincidence of GERD and hiatal hernia, surgical approach, type of fundoplication, performance of hiatoplasty, duration of surgery, subjective post-surgery difficulties, start of oral intake after surgery, duration of hospitalization, complications related to surgery: occurrence of surgical, early and late post-surgical complications. Early complications include post-surgical dysphagia, pneumothorax and emphysema, perforation of esophagus and stomach. The most frequently occurring late complications include gas-bloat syndrome (10).

We used a certified statistical program MedCalc version 13.1.2. (MedCalc Software's VAT registration number is BE 0809 344 640, Member of International Association of Statistical Computing, Ostend, Belgium).

Ethical approval: All procedures involving human participants have been approved according to the ethical standards of the institutional and/or national research committee, including the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

The clinical and research activities being reported are consistent with the Principles of the Declaration of Istanbul as outlined in the 'Declaration of Istanbul on Organ Trafficking and Transplant Tourism.

RESULTS

52 patients (24 men and 28 women) with an average age of 53.3 years were included in the group. Table 1 shows the characteristics of the group.

Reflux esophagitis was present in 36 patients and according to LA classification LA-A had 10 patients, LA-B 20 patients, and LA-C 6 patients. 50 patients from the group of monitored patients (96.2%) underwent primo-surgery. Hiatal hernia was diagnosed in 34 patients (65.4%). Individual types are shown in Figure 1.

Table 1 Characteristics of the group

gender – men (%)	46.2
age (years)	53.3 ± 13.4
duration of symptoms (years)	3.9 ± 0.8
reflux esophagitis (%)	69.2
hiatal hernia (%)	65.4
hiatoplasty (%)	78.8
duration of surgery (min)	132 ± 72.5
hospitalization (days)	6.7 ± 4.1

Fig. 1 Types of hiatal hernia

The most frequently chosen type of fundoplication was Nissen-Rossetti (360°), followed by Toupet (270°). Hiatoplasty, i.e. sutura crura diaphragm, was performed in 41 surgeries; mesh was used for one especially large defect (thoracotomy re-surgery). Nissen-Rossetti (the golden standard which was preferred) was indicated 41 times. Toupet fundoplication was

indicated in patients who suffered also from dysphagia in addition to reflux (total of 11 patients). Laparoscopy was performed in total 48 times (Nissen - Rossetti 38 times, Toupet 10 times), laparotomy was used twice – in case of a patient after repeated laparotomy due to polytrauma. This patient underwent Toupet fundoplication. Symptoms returned after 12 months. CT examination with p.o. contrast confirmed collar dislocation. Laparotomy re-surgery with Nissen – Rossetti fundoplication was subsequently performed.

Table 2 Division of the group according to the type of surgery and surgical approach

	Nissen-Rossetti		Toupet	
	Primary surgery	Re-surgery	Primary surgery	Re-surgery
Laparoscopically	38	0	10	0
Laparotomically	0	1	1	0
Thoracotomically	1	1	0	0

Thoracotomy (total 2 times) was chosen primarily once due to a large fixed paraesophageal hernia and once was used in re-surgery after failure of laparotomic Nissen – Rossetti fundoplication. Surgery lasted in average 132 minutes, with the shortest surgery lasting 50 minutes and the longest 270 minutes.

The most frequently occurring subjective post-surgery difficulties were temporal dysphagia (6 patients – 11.5%), sensation of nausea and vomiting after eating (2 patients – 3.8 %), pain in the surgical wound and dyspnoea occurring in all patients after thoracotomy.

The start of oral intake was indicated for majority of patients in the evening on the day of the surgery according to tolerance, or on the first post-surgery day (88.5 % – Figure 2).

Fig. 2 Start of oral intake

The average duration of hospitalization was 7 days. The shortest hospitalization lasted 2 days, the longest 18 days. The average duration of hospitalization of patients after laparoscopy was 5 days. The average duration of hospitalization after laparotomy was 10 days, after thoracotomy 8 days.

Perioperative complications were observed in 5 patients (8.6%). Two patients had pneumothorax, one patient had small laceration of liver from the retractor, one patient had bleeding from the lower area of the liver together with bile leak and tear of the upper pole of the spleen, and finally in the case of one patient there were technical problems with harmonic scalpel.

Complications during the surgery were recorded in the case of 5 patients (9.6%). Pneumothorax occurred in two patients and was treated with chest drainage (drains were cancelled in both cases on the third day after the drainage). Small liver laceration from the retractor occurred in one patient and was treated by coagulation during the surgery. Bleeding from the lower area of the liver together with bile leak was observed in one patient. One patient had tear of the upper pole of the spleen. They were treated in both cases with tear suture and application of local hemostyptic.

Early post-surgery complication (first 72 hours after the surgery) developed in 6 patients (11.5 %). They included bleeding into the chest wall and abdominal cavity (conservative procedure), vomiting, paralytic ileus – managed with prokinetics, mechanical obstruction (hernia incisional incarcerate with the necessity of re-surgery), bronchopneumonia, and pulmonary embolism.

Early perioperative complications according to Clavien-Dindo: total of 8 patients – 2 during the surgery and 4 within early post-operative period (first 72 hours)

I: 3 patients (hematoma of chest and abdominal wall, paralytic ileus, vomiting)

II: 2 patients (bronchopneumonia, pulmonary embolism)

IIIa: 2 patients (thoracic drainage in LA for PNO)

IIIb: 1 patient (incarcerate hernia in port scar)

IV: 0

V: 0

Late post-surgery complications were observed in 4 patients (7.7%) during the monitored period of three years (clinical examination, questionnaire, and endoscopic examination) and surgical therapy was indicated in 3 cases (5.8 %), endoscopic in one case (1.9 %). Two patients who had primo-surgery before 2011 and one patient who had surgery at another workplace underwent re-surgery during the monitored period. A total of 7 cases of late complications were treated during the monitored period.

Relapse of hiatal hernia was diagnosed in six patients and surgical review was indicated for all patients. The average time lapse between the primo-surgery and re-surgery was 3 years. Stenosis of the distal esophagus was diagnosed in one patient and endoscopic balloon dilatation was indicated.

Finally, we evaluated satisfaction of patients using a questionnaire. 33 patients (56.9 %) (30 patients after Nissen - Rossetti, 3 patients after Toupet) were completely satisfied (no complications, no PPI treatment), 14 patients (24.1 %) (9 patients after Nissen - Rossetti, 5 patients after Toupet) were partially satisfied (significant recess of complications, no PPI treatment) and 5 patients (8.6 %) (2 patients after Nissen - Rossetti, 3 patients after Toupet) were dissatisfied.

DISCUSSION

GERD is prevalent worldwide and the disease burden may be increasing. The range of GERD prevalence estimates is 18.1%–27.8% in North America, 8.8%–25.9% in Europe, 2.5%–7.8% in East Asia, 8.7%–33.1% in the Middle East, 11.6% in Australia, and 23.0% in South America (11).

According to the guidelines written by the American Society for Gastrointestinal and Endoscopic Surgeons (SAGES) surgical procedures for GERD are curative in 85%–93% of cases (12). As advancements in the field of laparoscopy have been made, minimal invasive operations have been established as the gold standard in the surgical treatment of this condition (13).

There have been studies showing poor resolution of reflux symptoms after surgery in patients who do not respond to acid reducing medications. An eleven-year follow-up study reported response and lack of response to acid reducing medications were associated with 77.1% and 56.0% success rates of laparoscopic Nissen fundoplication (respectively) (14).

In our study we followed 15 parameters related to the patient, surgery and post-surgery period and we also assessed possible complications.

One of the monitored parameters was the duration of GERD symptoms. Majority of patients was monitored in this period by the gastroenterologist and treated with antisecretory drugs. Failure of conservative treatment or frequent recurrence of GERD symptoms after discontinuation of antisecretory drugs or finding of a large hiatal hernia were indications for surgical therapy.

Endoscopically diagnosed reflux esophagitis was present in 69.2% of patients. Reflux esophagitis is one of the GERD complications and it occurs after a long-term exposure of mucous membrane of the esophagus to stomach acid. Reparative processes of ulcerative esophagitis can lead even to peptic stricture of the esophagus, but it was not diagnosed in any patient from the monitored group.

Hiatal hernia was present in 65.4% of patients, with dominance of axial hiatal hernia (40.4%). It is known that the presence of hiatal hernia can cause reduction of LES tonus, enlargement of the angle of His, with longer TLESR episodes. The presence of hiatal hernia in as much as 70% of monitored patients indicates that this condition predisposes the development of GERD. Other factors predisposing this disease include LES dysfunction, reduced esophagus motility, slowed gastric emptying, and increased stomach acid secretion. These factors could be the cause of GERD occurrence in patients without hiatal hernia (15, 16).

We evaluated the chosen surgical approach separately for primo-surgeries and for re-surgeries. Laparoscopy was chosen for patients with the first surgery due to GERD in 92.3 % because it is currently the most preferred approach due to its mini-invasivity. Laparotomy was chosen only in the case of one patient due to repeated laparotomies in the past after polytrauma and thoracotomy was chosen for one patient. Approaches in two cases of re-surgeries were as follows: laparotomy in 1 case, thoracotomy in 1 case. The choice of surgical approach for review depends on findings from display examinations, experience of the surgical team, and expected possible complications. Laparoscopic refunduplications are a widely recognized therapy option after the failure of primary surgery. Younger age, female gender, and chronic pulmonary disease are associated with reoperation after primary fundoplication (17). However, the morbidity and conversion rate is higher than in the case of primo-surgeries, especially due to present adhesions and more frequent lacerations of the spleen, stomach, and esophagus. Laparoscopic refunduplication is, therefore, recommended only for workplaces with sufficient experience (18). Conversion to open surgery was not necessary in our group in any case of laparoscopies performed.

The average duration of laparoscopies was 2 hours and 13 minutes without any significant difference between the duration of primo-surgeries and re-surgeries. A study of 2,052 patients from the National Surgical Quality Improvement Database of the American College of Surgeons analyzing the duration of laparoscopic funduplications specifies the average duration of surgery 135 minutes (19). Average duration of this type of surgery in our group was 133 minutes, which is a comparable result. Complications during surgery occurred during 5 surgeries, which represents 9.6 % of the total number of surgeries.

Early post-surgery complications (first 72 hours after surgery) occurred in case of 6 patients (11.5 %) and late complications in case of 7 patients (13.5 %). The most frequent

late complication was hiatal hernia and average time lapse between the primo-surgery and re-surgery was 3 years. A study from 2005 (Smith et al) analyzing 307 cases of re-surgeries after fundoplication specifies as the most frequent reason for surgical review the herniation of the sleeve above the diaphragm (61 %) (20). In our group of patients the relapse of hiatal hernia was the reason for surgical review in the case of both patients (3.8 %). Neither of these patients required further review. Various authors specify various percentages of patients requiring re-operation. Buckley (2014) states 5–10 % (21), Braghetto (2019) 18 % (22). It is said that majority of conditions requiring review shows up within 2 years after the surgery (20), therefore the share of patients requiring re-operation determined by us can increase.

CONCLUSION

Hiatal hernia is frequently found in patients with GERD and it is considered to be one of the major causes for the development of this disease. The most often used surgical treatment is laparoscopic fundoplication according to Nissen-Rossetti. Other surgical approaches and partial fundoplications are indicated in specific causes. Duration of hospitalization after laparoscopy is shorter than after open surgery. Emphasis is placed on good pre-surgery diagnostics and adequate peroperative assessment of the anatomic situation and quality of tissues. In the group monitored by us the occurrence of complications, whether during the surgery or after it, was up to 11.5 %; perioperative mortality was 0 %. All subjective post-surgery difficulties of patients gradually subsided. The nature of complications is not related to the type of fundoplication; at the same time it applies that patients after Nissen – Rossetti are more satisfied than those after Toupet. The results of the evaluation of parameters characterizing the surgery and post-surgery period were comparable to studies from other workplaces in the world.

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