

INCIDENCE AND PREDISPOSING FACTORS FOR THE MIGRATION OF THE FUNDOPPLICATION BY NISSEN-ROSSETTI TECHNIQUE IN THE SURGICAL TREATMENT OF GERD

Incidência e fatores predisponentes da migração da fundoplicatura pela técnica de Nissen-Rossetti no tratamento da doença do refluxo gastroesofágico

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ABSTRACT - Background - Gastroesophageal reflux is the gastrointestinal tract disease most frequently found nowadays. The Nissen-Rossetti fundoplication is widely used for the surgical treatment, and intrathoracic migration of the valve is the most frequent complication. **Aim** - To assess the incidence of the fundoplication and its risk factors. **Methods** - Were analyzed retrospectively medical records of 207 patients undergoing laparoscopic fundoplication by the Nissen-Rossetti technique for the treatment of reflux disease. The variables analyzed were: sex, age, esophagitis grade, size of the herniation, enlargement of the cardia and esophageal shortening. For quantitative variables, was considered the Student's t test. For the nominal, was considered the chi-square or Fisher's exact test. P values <0.05 were considered statistically significant. **Results** - Of the total, 135 were women (65.22%) and 72 men (34.78%) with mean age of 47.43 years. The size of the hernia varied between 2 and 6 cm. Two hundred patients had esophagitis (96.62%) and 113 (56.50%) grade I, 75 grade II (37.50%) and 12 grade III or IV (6%). Enlargement of the cardia and Barrett's esophagus were seen in 153 (73.91%) and 13 (6.28%) cases, respectively. One patient had esophageal shortening. Among women, 33 (24.4%) showed migration and among men, only six (8.3%) ($p = 0.005$). The average age of patients with and without migration was 54.03 and 45.89 years, respectively ($p = 0.001$). **Conclusion** - The incidence of the fundoplication migration was 18.8%. The gender (female) and higher age influence the probability of migration. The degree of esophagitis, size of hernia and enlargement of the cardia were not risk factors for intrathoracic migration of the fundoplication

HEADINGS - Fundoplication.
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RESUMO - Racional - A doença do refluxo gastroesofágico é uma das enfermidades do trato gastrointestinal mais frequentes atualmente. A fundoplicatura de Nissen-Rossetti é técnica operatória muito empregada para o tratamento cirúrgico, sendo a migração intratorácica da válvula uma das principais complicações. **Objetivo** - Avaliar a incidência da migração da fundoplicatura e seus fatores de risco. **Método** - Analisou-se retrospectivamente 207 prontuários de pacientes submetidos à fundoplicatura videolaparoscópica pela técnica de Nissen-Rossetti para tratamento da doença do refluxo. As variáveis analisadas foram: sexo, idade, esofagite, grau de esofagite, tamanho da hérnia, alargamento da cárdia, encurtamento esofágico. Para as variáveis quantitativas, foi considerado o teste t de Student. Para as nominais, foi considerado o teste de Qui-quadrado ou o teste exato de Fisher. Valores de $p < 0,05$ indicaram significância estatística. **Resultados** - Do total, 135 eram mulheres (65,22%) e 72 homens (34,78%), com média de idade de 47,43 anos. O tamanho da hérnia variou entre 2 e 6 cm. Duzentos pacientes tinham esofagite (96,62%), sendo 113 (56,50%) grau I, 75 grau II (37,50%) e 12 grau III ou IV (6%). Alargamento de cárdia e esôfago de Barrett foram vistos em 153 (73,91%) e 13 (6,28%) casos, respectivamente. Um paciente apresentava encurtamento esofágico. Dentre as mulheres, 33 (24,4%) apresentaram migração e entre os homens, apenas seis (8,3%) ($p = 0,005$). A idade média dos pacientes com e sem migração foi de 54,03 e 45,89 anos, respectivamente ($p = 0,001$). **Conclusão** - A incidência da migração da fundoplicatura foi de 18,8%. O gênero feminino e possuir maior idade influenciam na probabilidade dessa migração. O grau de esofagite, tamanho da hérnia e alargamento da cárdia não se mostraram fatores de risco para migração intratorácica da fundoplicatura.

DESCRIPTORIOS - Fundoplicatura. Refluxo gastroesofágico

INTRODUCTION

The gastroesophageal reflux disease (GERD) is chronic disorder resulting from the retrograde flow of gastroduodenal contents into the esophagus and / or adjacent organs, causing a variable spectrum of symptoms (esophageal or extraesophageal), associated or not with tissue injury¹⁹. It is one of the diseases of the gastrointestinal tract most frequently seen today. Corresponds to 70% of esophageal disorders and affects approximately 7-10% of the adult population. Moreover, it has great importance for medical and social communities, increasing in incidence and causing symptoms of different severity. It may significantly affect the quality of life of patients. It is also responsible for burdening the hospital expenses worldwide. It is estimated that its prevalence in our country, is around 12%¹⁹.

The clinical manifestations are considered typical of GERD and characterized by heartburn and regurgitation. However, it is also associated with pulmonary symptoms and lower airway diseases, such as asthma, chronic cough, bronchitis, aspirate pneumonia, idiopathic pulmonary fibrosis. It also is related to hoarseness, laryngitis, subglottic stenosis, granuloma and laryngeal carcinoma, and other extra-esophageal manifestations such as noncardiac chest pain, dental erosion, sinusitis, pharyngitis, and sleep apnea⁴.

Among the methods used for diagnosis of GERD are: endoscopy, pH monitoring tests, contrast radiography of the esophagus, esophageal manometry and impedance. Each of the above has its own indications and limitations, leaving the doctor to judge their relevance¹⁷.

Surgical treatment for the disease is indicated when there is no satisfactory response of patients treated with continuous drug therapy; in complicated forms of the disease (Barrett's esophagus, ulceration, stenosis) and in patients with respiratory manifestations of GERD¹⁹.

Currently, the surgical procedure is performed through videolaparoscopy. The first surgical correction of GERD by this method was performed in 1991 by Geagea and Dallemagne et al. Since then, the technique has become well accepted by the advantages of minimally invasive surgery, such as lower operative morbidity, decreased length of stay and hospital costs, rapid return to regular activities¹⁷, and better cosmetic results²³.

In recent decades, several surgical techniques have been developed to treat it. Nowadays, the Nissen and Nissen-Rossetti procedures are most used due to its high efficiency²⁶.

Many papers has reviewed the major

complications associated with Nissen fundoplication, especially dysphagia, inability to vomit and permanent gastric distension, all related to the great competence of the valve mechanism constructed surgically. There is also pneumothorax, one more common intra-operative complications, occurring in 5-8% of the patients. Moreover, the true seal of the stomach was also associated with more severe cases, severe narrowing of the esophagus, the perforation of the organ itself, the formation of paraesophageal hernias, migration / sliding of the valve to the chest . Among these, the intrathoracic valve with persistent symptoms is the main cause of performing a new operation^{6,7,26}.

Migration or fundoplication herniation to the thorax can occur in 0.2-6%, according to the literature and can appear early or late in the follow-up^{6,16}.

The initial symptoms of this migration, when present, is characterized by coughing, nausea and vomiting followed by abdominal discomfort, chest or abdominal pain and dyspnea. Symptoms become clearer when accompanied by gastric incarceration or volvulus of the stomach. The diagnosis relies on clinical manifestations in simple chest X-rays and contrast of the esophagus, computed tomography and endoscopy, showing the valve in intrathoracic position⁸.

The causes of migration are not understood, it has been hypothesized relationship with the technique used - inadequate approximation of right diaphragmatic pillar, insufficient mobilization of the gastric fundus, the failure to make use of suture, occurrence of "bucking" at the time of extubation or risk factors exist in the patient, such as previous disease complications (severe esophagitis or/and periesophagitis), size of hiatal hernia, "short esophagus"; technical problem on surgical procedures^{20,23,25}.

It is important to clarify the factors related to the migration of thoracic fundoplication and realize its prevention. Not recognized, it may progress to necrosis and / or gastric perforation. In these cases morbidity occurs in 70% and mortality in 4.9%⁸.

The aim of this study was to evaluate the incidence of fundoplication migration and to analyze the risk factors for its occurrence.

METHOD

Were analyzed the late follow-up of five years records of 207 patients who underwent laparoscopic fundoplication with the Nissen-Rossetti technique for treatment of GERD during the period 2000 to 2007 in Curitiba, Evangelic

Hospital / Evangelic Faculty of Parana, Curitiba, Brazil.

The patients were divided into two groups: group A corresponding to the ones who suffered the fundoplication migration, and group B with those who did not migrate.

The data were reviewed retrospectively through a record search in a computerized database in order to analyze the possible factors responsible for the migration. The variables evaluated were gender, age, esophagitis, esophagitis grade, size of the herniation, enlargement of the cardia and esophageal shortening.

Were included all patients diagnosed with GERD - subject to initial clinical treatment for at least six months - with the preoperative evaluation performed by endoscopy, contrast radiography and underwent surgery by the technique of laparoscopic Nissen-Rossetti.

All patients received routine anti-emetic in the immediate postoperative period and underwent endoscopy six months after the operation. Was considered migration when endoscopic findings showed the presence of intrathoracic valve, not relating this finding with the recurrence of the disease, ie, the symptoms of the disease.

To compare the quantitative variables, was considered the Student's t test for independent samples. For the nominal, was considered the chi-square or Fisher's exact test. P values <0.05 were considered statistically significant. The data were organized into an Excel spreadsheet and analyzed using the software Statistica v.8.0.

RESULTS

Among the 207 cases, 39 patients were found to have fundoplication migration, accounting for 18.8% of cases (95% CI: 13.5 to 24.2). There were 135 women (65.22%) and 72 men (34.78%) aged between 21-79 years (mean age 47.43 ± 14.11 years). The size of the hernia varied between 2-6 cm (average 3.11 ± 0.70 cm).

Among the clinical conditions, 200 (96.62%) patients had esophagitis (113 / 56.50% grade I, 75 / 37.50% grade II and 12/6% grade III or IV). Enlargement of the cardia and Barrett's esophagus were seen in 153 (73.91%) and 13 (6.28%) cases, respectively. Only one patient had esophageal shortening.

In the group of patients who had migration (group A) 33 (24.4%) were women and six (8.3%) men. But among those who did not have it (group B), 102 (75.6%) were female and 66 (91.7%) male. The p-value for this variable was 0.005, with statistical significance.

The average age of patients with migration was

54.03 ± 14.18 years and no migration 45.89 ± 13.69 years, with a statistically significant difference ($p = 0.001$).

The size of the hernia in group A and B were, respectively, 3.17 ± 0.76 cm and 3.09 ± 0.69 cm ($p = 0.552$).

Esophagitis was seen in all patients in group A and 161 in group B ($p = 0.352$). The degree of esophagitis did not achieve statistical significance ($p = 0.193$).

In group A, 13 patients were found not having enlargement of the cardia and 26 yes. ($p = 0.311$).

In the only patient in whom was detected the presence of esophageal shortening, there was migration of the fundoplication. Barrett's esophagus was seen in three patients in group A and 10 in group B ($p = 0.711$).

DISCUSSION

The first surgical approaches were taken using open (laparotomy or thoracotomy). However, only with the advent of correction of gastroesophageal reflux by laparoscopy was the surgical treatment accepted by the patients and the operations increased in number^{16,20}.

Several laparoscopic techniques have been proposed. The Nissen fundoplication and its variant designed by Rossetti remain operations of choice. Recent studies have shown that laparoscopic Nissen-Rossetti can be made in more than 95% of patients and disease control can be achieved in approximately 90-93% of them. In this study, patients had been operated by the Nissen-Rossetti technique^{2,11,14}.

The wide diffusion and acceptance of laparoscopic surgery by this technique can be confirmed by studies showing an increase of three to five times the number of fundoplication performed for GERD in the past decade¹³.

With this increased number of laparoscopic operations, failures in antireflux operation have become a common clinical condition, with their rates doubling over the last decade. The failure of the fundoplications are estimated at 6-20%, and the most common symptoms are recurrent reflux (30-60%) and dysphagia (10-20%). However, most patients can be managed with drugs, only needing reoperation 4-6% of them^{2,21}.

Some studies show that open fundoplication failure occurs in 9-30% of patients, depending on how failure is defined and the duration of patient follow-up. In laparoscopic surgery these rates vary from 2-17% depending on the definition of failure and surgeon experience^{13,14}.

Studies have shown significant difference in failure mechanism between the open and

laparoscopic techniques. The fundoplication was intact the most cases in laparoscopy (72.7%). At laparotomy, it was more often due to rupture of the fundoplication. Although the reason for this difference is not entirely clear, it has been suggested that the lack of adhesions in the anterior and posterior surface when performing laparoscopic fundoplication can be the cause of increase in the number of migration¹¹.

There are six mechanisms in the literature of failure of laparoscopic antireflux surgery described: the sliding of the fundoplication; valve rupture; herniation of the fundoplication into the chest; valve too tight; twisted fundoplication; and stomach of two compartments¹³.

The migration of the fundoplication into the chest has a higher incidence after laparoscopic fundoplication compared to open procedure. Several possible explanations have been raised: recent mobilization of the patient due to less postoperative pain could induce physical exercises that increase intra-abdominal pressure; greater periesophageal dissection and lesser amount of intraperitoneal adhesions^{10,13}.

This flaw was first reported in 1973 by Balison et al. after transthoracic approach for Nissen fundoplication. In this study, 18.8% of patients had intrathoracic valve as found in postoperative endoscopy, were not taken into account the presence or absence of symptoms. Reviewing the literature, there are intrathoracic migration rates ranging from 0.69% to 24%^{3,9,10,16,18,20}.

Importantly, this condition can be asymptomatic or symptomatic, with most patients fit into the first group. So there is no significant relationship between the recurrence of GERD symptoms in the postoperative period and anatomic position of the valve. Studies show variation between 4.55% to 36% of migration as a cause of symptoms and to nominate the new operation. The anti-reflux valve may present competent even when intrathoracic. Therefore, in patients with this condition, but asymptomatic, the therapy should be conservative, non-surgical intervention is indicated for them^{2,5,10,18,22,24}.

It has been demonstrated in this series that there are significant statistical correlation between age ($p = 0.001$) and gender ($p = 0.005$) with the fundoplication. That is, more migration occurs in older patients and those of females. This finding contrasts with other studies^{14,16,22}.

The hernia occurred preoperatively in all analyzed patients, no significant difference in the sizes of hernias among the groups with and without migration ($p = 0.552$). Although this result corroborates with other studies, some authors show that the presence of a large hiatal hernia preoperatively (< 3 cm) is a significant risk factor

for failed antireflux operation (including intrathoracic migration of the valve)^{10,12,14,27}.

Barrett's esophagus was an endoscopic finding not so frequent (6.28%) compared to the incidences reported in the literature ranging from 14% to 39%^{15,19,20}. His relationship with the fundoplication was not significant ($p = 0.711$); in 13 patients, three had the migration (23.1%). However, the literature shows that patients with Barrett's esophagus, have advanced GERD, with more strictures, which would contribute to the higher incidence of migration in these patients^{13,14,22,25}.

The presence of esophagitis occurred in 96%, which corroborates with the existing data. In other studies, esophagitis was present in 50% to 73% of cases. The presence and degree of esophagitis did not correlate significantly with herniation of the valve, which is consistent with other published studies. However, there are reports pointing out that both could serve as an additional risk for early migration of fundoplication^{7,14,16,18,22}.

Short esophagus is defined as the inability to reduce the gastroesophageal junction below the diaphragm. Several authors suggest that esophageal shortening is an important risk factor in the occurrence of the fundoplication due to the "memory" that the cranial esophagus has this condition. In this study, only one patient had esophageal shortening - not diagnosed preoperatively, and had migration ($p = 0.188$)^{1,15,16,18}.

There was no statistical significance ($p = 0.311$) in the presence or absence of enlargement of the cardia, while during the literature review no studies compared these data with the migration.

Some series concluded that high BMI increases the risk for complications of laparoscopic Nissen-Rossetti fundoplication, since elderly patients and especially the obese, often have muscle gap less consistent and more fragile, requiring careful dissection and greater delicacy in the application of hiatoplasty sutures. But in others, obesity did not reach statistical significance in relation to the failure of antireflux operation^{9,18,14}.

Recent studies have shown that the physiological role of physiologic forces in the hiatus of the diaphragm can contribute to herniation of the valve. Vomiting, cough, nausea, or the efforts of other types (lifting heavy objects, effort in urinating) are examples of such forces^{13,14,15,22,25}.

Therefore, the occurrence of episodes of vomiting in the early postoperative period should be avoided so that fundoplication does not migrate into the chest. Among measures to prevent vomiting has been: a change in anesthetic agent, use of antiemetic drugs during surgery and in the immediate postoperative period, special care of

the anesthesiologist during extubation, patient instructions on the importance of anti-emetic use, dietary guidelines and awareness of non-performing excessive physical exertion. A single dose of IV steroids has also shown significant reduction in the incidence and severity of nausea and vomiting postoperatively^{14,18}.

It should be noted, also, the fact that the adoption of anti-emetics in all patients in the post-operative explain the absence of early migration of fundoplication. The service where this paper was conducted also routinely use these drugs; however, although this effort, there were early fundoplication migrations in some cases; an explanation is not applicable in this task²⁵.

The success of anti-reflux operation is directly related to its indication, to the type of procedure, meticulous surgical technique, surgeon experience and careful selection of the patient. Inadequate surgical technique, incorrect choice of the procedure and patients were not properly selected causes of failure of 42% to 66% of cases reported in the literature^{2,7,9,14,20,25}.

Regarding the technical quality of the anti-reflux operation, three main factors seem to be involved to a higher incidence of the migration: inadequate closure of the diaphragm, the non-fixation of the valve at the lower surface of the diaphragm and other periesophageal tissues; insufficient mobilization the fundus and inappropriate use of sutures. Therefore, some studies suggest the closure of the diaphragm with non-absorbable suture threads and fixation of the valve in the esophagus and in the lower surface of the diaphragm^{7, 15,16,20,22,28}.

CONCLUSION

The incidence of the fundoplication was 18.8%. Being female and having higher age influence the probability of this migration. Degree of esophagitis, size of hernia and enlargement of the cardia were not risk factors for intrathoracic migration of the fundoplication.

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