P.O.Box 2345, Beijing 100023,China
Fax: +86-10-85381893
E-mail: wjg@wjgnet.com www.wjgnet.com

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• BRIEF REPORTS •

Postmyotomy dysphagia after laparoscopic surgery for achalasia

Yutaka Shiino, Ziad T. Awad, Gleb R. Haynatzki, Richard E. Davis, Ronald A. Hinder, Charles J. Filipi

Yutaka Shiino, Ziad T. Awad, Richard E. Davis, Charles J. Filipi, Department of Surgery, Creighton University, 601 N. 30th Street, Omaha, NE 68131, USA
Gleb R. Haynatzki, Department of Medicine, Creighton University, 601 N. 30th Street, Omaha, NE 68131, USA
Ronald A. Hinder, Department of Surgery, Mayo Clinic Jacksonville, 4500 San Pablo Road, Jacksonville, FL 32224, USA
Correspondence to: Charles J. Filipi, Professor of Surgery. Department of Surgery, Suite 3740, Creighton University School of Medicine, 601 No. 30th Street, Omaha, NE 68131, USA. cjfilipi@Creighton.edu
Telephone: +1-402-2804213 **Fax:** +402-2804593
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Abstract

AIM: To determine predictive factors for postoperative dysphagia after laparoscopic myotomy for achalasia.

METHODS: Logistic regression was used to investigate the possible association between the response (postoperative dysphagia, with two levels: none/mild and moderate/severe) and several plausible predictive factors.

RESULTS: Eight patients experienced severe or moderate postoperative dysphagia. The logistic regression revealed that only the severity of preoperative dysphagia (with four levels: mild, moderate, severe, and liquid) was a marginally significant (P=0.0575) predictive factor for postoperative dysphagia.

CONCLUSION: The severity of postoperative dysphagia is strongly associated with preoperative dysphagia. Preoperative symptomatology can significantly impact patient outcome.

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INTRODUCTION

Results of laparoscopic Heller myotomy are as effective as traditional surgery and have the additional advantages of a shorter hospital stay and less discomfort[1, 2]. Although the early results of mini-invasive surgery for achalasia appear satisfactory in general, postmyotomy dysphagia remains a problem[3, 4]. Most reports do not describe the cause of postoperative dysphagia although its incidence is quantified.

Aperistalsis, incomplete relaxation of the lower esophageal sphincter, exposure of the esophageal mucosa to reflux material, incomplete myotomy and a too tight or a distorted Dor fundoplication can result in dysphagia. In addition, operation-related trauma such as perforation, edema, vagal nerve injury and fibrosis may cause dysphagia. For further improvement of laparoscopic Heller myotomy, additional factors affecting results should be determined for postmyotomy dysphagia is not rare. This study was conducted to investigate the causes of persistent symptomatology and to assist in predicting poor results of laparoscopic surgery for achalasia.

MATERIALS AND METHODS

Patients

36 patients (18 females and 18 males) who underwent laparoscopic Heller myotomy and fundoplication were investigated retrospectively. All patients underwent a preoperative barium swallow, esophagogastroscopy and manometry to establish the diagnosis of achalasia.

Manometry

Lower esophageal sphincter (LES) manometry was performed utilizing the station pull-through method and the esophageal body study was completed using 10 wet swallows with the distal tip of the manometry catheter located 3 cm above the upper border of the LES.

Surgical procedures

Two surgeons performed these procedures at the same institution. Myotomy was performed in all cases from approximately 4 cm above the esophagogastric junction to 2 cm distal to the gastroesophageal junction. Methods used to establish the location of the esophagogastric junction included identifying an outward tapering of the stomach, a change in the thickness of musclaris, the angle of the circular muscles and observation with intraoperative esophagoscopy in selected cases. Either an anterior or posterior fundoplication was performed in conjunction with the Heller myotomy, according to the surgeon's preference.

Grouping

The response variable, postoperative dysphagia, was classified into 2 categories according to the severity: severe or moderate dysphagia (Group A), and mild or no dysphagia (Group B). A category of "severe dysphagia" represented debilitating dysphagia requiring therapeutic intervention; "moderate dysphagia" represented frequent but not requiring intervention, "mild dysphagia" represented occasional symptoms not requiring therapy and "no dysphagia" represented absence of symptoms.

Parameters

Fourteen predictive factors for postoperative dysphagia as the response / dependent variables were evaluated. These included age, weight, preoperative symptom duration, LES pressure, abdominal and overall length of the LES, relaxation of the LES, contraction pressure of the esophageal body, percentage of simultaneous contractions, preoperative pneumatic dilation, the type of fundoplication, severity of preoperative dysphagia (*D*), heartburn (*HB*) and regurgitation (*R*). Factors *D*, *HB* and *R* were numerically ranked by an independent observer according to their severity, as 1-4 for mild through liquid dysphagia, 0-3 and 0-3, respectively. Preoperative forceful dilation and the type of fundoplication were categorized as binary (0-1) variables.

Statistical analysis

Since our response variable was binary, we had chosen the logistic regression approach and expressed the logarithm of the odds ratio for the response as a linear function of the

explanatory variables, i.e. we had fitted a model of the form:

$$Log\left(\frac{P}{1-P}\right)= ß_0+ ß_1\times Age+ \ldots+ ß_{12}\times D+ ß_{13}\times HB + ß_{14}\times R \quad \{I\}$$

Where P was the probability of poor outcome (moderate/severe postoperative dysphagia) and 1-p is the probability of favorable outcome (none/mild postoperative dysphagia). We used the statistical package SAS® 8.0 to implement the maximum likelihood estimation of the coefficients of the above equation. As a result, the final model included only one predictive factor.

RESULTS

Six patients experienced severe dysphagia after the operation and required interventional treatment. A 43 year-old female complaining of severe postoperative dysphagia and weight loss underwent repeat laparoscopic myotomy which was completed uneventfully 16 months after the primary myotomy. Only dense adhesions of the anterior esophagus were found.

Five patients underwent endoscopic dilatation 1 to 18 months after the primary operation. Two patients required two balloon dilatations while the remaining 3 patients underwent Hurst Maloney bouginage.

Two additional patients complained of moderate postoperative dysphagia. Their dysphagia lasted several months but improved without further intervention. Seven of the 8 patients with postoperative severe or moderate dysphagia experienced no complications. One patient had gastric stasis requiring 9 days of hospitalization.

As a result of the logistic regression analysis (equation {I}), only preoperative dysphagia, D, was marginally significant (P=0.0575); all the rest had P-values larger than 0.20 and were not significant. Thus, the final model involves only one predictive factor, D:

$$Log\left(\frac{P}{1-P}\right)= ß_0 + ß_{11}\times D \quad \{II\}$$

where $ß_0$=-2.7953, $ß_{11}$=0.9366. Therefore, the odds ratio increased as D increased, and as a result of {II} the odds in favor of having moderate/severe postoperative dysphagia for somebody with mild preoperative dysphagia were approximately 39.2 % of that for somebody with moderate preoperative dysphagia. Similarly, the chance of somebody with moderate preoperative dysphagia to have moderate/severe postoperative dysphagia was 39.2 % of that for somebody with severe preoperative dysphagia and, finally, somebody with severe preoperative dysphagia had only 39.2% of that chance for somebody with moderate preoperative dysphagia. The last number was derived by first exponentiating 0.9366 which gave 2.551, and then finding its reciprocal, 0.392.

What we could derive from {II} was the fact that there existed a positive association between the probability of poor outcome (severe or moderate postoperative dysphagia) and the explanatory variable, the severity of preoperative dysphagia, D. The fact that we obtained only marginal significance (P=0.0575) was apparently due to the small sample size. Should the sample size be increased, the result would have been statistically significant at a level 0.05.

DISCUSSION

The objective of this study was to clarify causes for postoperative dysphagia after laparoscopic Heller myotomy for achalasia.

The severity of preoperative dysphagia is marginally significant with a P value of 0.0575 and was positively associated with postoperative dysphagia. Numerous articles on laparoscopic Heller myotomy have been published since the first case report[5]. However, none have specifically addressed the cause of failed myotomy. Some studies were instructive in surgical technique and others are simply case reports[6,7].

The type of fundoplication and the extent of myotomy onto the gastric wall are extremely important for this operation[8,9]. A previous report has shown that patients undergoing anterior fundoplication in conjunction with myotomy were more likely to experience postmyotomy dysphagia or heartburn than those undergoing posterior fundoplication[9]. Posterior fundoplication is considered effective because it is capable of keeping the edges of myotomy apart[10].

We demonstrated a positive association between the probability of poor outcome and the severity of preoperative dysphagia. Why does the severity of preoperative dysphagia make the outcome poor? Preoperative manometry showed that patients with the more severe preoperative dysphagia did not always have higher LES pressure or poor relaxation of the LES. There also was no evidence of poorer esophageal peristalsis (all patients were 100 % dysfunctional).

Patients with short-term dysphagia (5 to 6 months) were included in the analysis because they presented a significant problem for the clinician. Early postoperative dysphagia (< 2 months) was well tolerated by the patient. More prolonged difficulty required explanation. The degree of preoperative dysphagia could be explained preoperatively as a postoperative risk factor and would assist in reducing patient anxiety and expectations.

The length of myotomy is believed to be a critical technical feature of the operation. The extent of the gastric myotomy appears to play a key role in prevention of dysphagia. Some surgeons prefer to extend the myotomy 1 cm beyond gastroesophageal junction[11,12], while others recommend 2 cm or longer[9,13]. Generally, a shorter gastric myotomy is performed in conjunction with the transthoracic or thoracoscopic approach. On the other hand, longer myotomy is usually performed with concomitant fundoplication with open transabdominal or laparoscopic approach[14,15]. The former operation is prone to gastroesophageal reflux disease as documented by pH monitoring[10,16] Several authors have demonstrated the necessity of fundoplication. They have shown that patients undergoing myotomy without fundoplication have a higher chance of experiencing postoperative gastroesophageal reflux[17,18]. Mattioli *et al*. has clearly shown in a prospective study that a significantly better long-term outcome results from a transabdominal long cardiomyotomy plus anterior fundoplication as compared to transabdominal long myotomy alone or a transthoracic short cardiomyotomy[8].

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