Comparison of thoracoscopic and laproscopic esophagomyotomy with fundoplication for primary motility disorders

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Abstract

Objectives: With the introduction of videoscopic techniques, controversy has arisen whether a thoracoscopic or laproscopic approach is indicated for the surgical management of symptomatic primary motility disorders. The aim of this study was to compare the outcomes of the two techniques performed by one group.

Methods: Between 1995 and 1997, 78 patients (42 female, 36 males: ages 21–86; mean 53 years) underwent a videoscopic esophagomyotomy with fundoplication via a thoracic (12) or abdominal (66) approach for dysphagia or chest pain. Pre-operative evaluation with esophagogastroscopy and manometry revealed a primary motility disorder in 64 and primary motility disorder with stricture in 14. Primary motility disorders exhibited were hypertensive LES (25), nutcracker (26), achalasia (14), and diffuse esophageal spasm (13). Associated fundoplications to prevent reflux included abdominal Toupet partial fundoplication (52), abdominal Nissen (14) and thoracic Belsey (12). Significance of variation in outcomes was determined by Mann–Whitney U-test. Results: There was no mortality. Follow-up ranged from 6–40 months (mean = 18). Early morbidity included dysphagia – chest pain greater than 6 weeks in 16 patients. (5 Belsey 41%, 10 Toupet 19 %, 1 Nissen 7%) Late morbidity included three recurrent strictures requiring dilatation (Belsey 2/5, Toupet 1/7). Two patients (3.1%) experienced a recurrent motility disorder after abdominal short myotomy – Toupet. Five patients experienced post-operative gastroesophageal reflux after partial fundoplication (two Belsey = 16.6%, three Toupet = 5.7%). Overall 63 patients (81%) were completely relieved of dysphagia – chest pain. Conclusions: Thoracoscopic esophagomyotomy with Belsey fundoplication was associated with a significantly higher incidence of post-operative dysphagia – chest pain (P = 0.05) and recurrent stricture (P = 0.01) than laproscopic esophagomyotomy with partial or total fundoplication, however, there was no significant difference in the incidence of recurrent motility disorders (P = 0.54) or gastroesophageal reflux disease (P = 0.12) between the techniques. Our results support utilization of a laproscopic approach for primary motility disorders. © 1999 Elsevier Science B.V. All rights reserved.

Keywords: Thoracoscopic; Laproscopic; Esophagomyotmy; Fundoplication; Primary motility disorders

1. Introduction

The identification and recognition of primary motility disorders and their role in producing clinically significant dysphagia and chest pain has increased with the wide spread availability of modern esophageal manometry to evaluate gastroesophageal reflux disease (GERD). This increased emphasis on evaluation was driven by the introduction of minimally invasive surgical techniques which reduced the formidable morbidity associated with open procedures [1]. Open surgical esophagomyotomy has been the cornerstone of therapy in patients with primary motility disorders unimproved after conservative management. Controversy has long existed, however, on the extent of the myotomy and whether a fundoplication should be included to prevent reflux [2]. Surgeon preference and training usually dictated whether an abdominal or thoracic approach was employed, and which specific fundoplication, if any, were utilized. Previous studies have evaluated outcomes after open myotomy without antireflux control and utilizing a Belsey partial or Nissen full fundoplication. [3–5].

With the introduction of videoscopic techniques since 1992, new controversy has arisen whether a thoracoscopic or laproscopic approach has a place in the management of symptomatic primary motility disorders [1,6,7]. The purpose of this study was to compare the outcomes of the two techniques performed by one group.

2. Materials and methods

Seventy-eight patients with clinically significant dysphagia or chest pain underwent a videoscopic esophagomyotomy with fundoplication between January 1995 and October
1997. There were 42 women and 36 men, ranging in age from 21–86 years (mean = 53 years).

Preparative evaluation routinely included esophagogastroscopy and esophageal manometry, performed by the lead author. Esophagogastroscopy was utilized to assess the presence of an anatomic obstruction and revealed 14 unassociated stricture and two patients with epiphrenic diverticuli. Manometric studies were performed with a three channel solid state catheter utilizing a one centimeter station pull through technique to localize and measure the lower esophageal sphincter pressure (LES). Body motility was assessed with the catheter positioned 3 cm above the LES utilizing 10 wet swallows. Primary motility disorder exhibited were 25 hypertensive LES (HLES), 26 nutcracker esophagus (NUT), 14 achalasia (ACH), and 13 diffuse esophageal spasm (DES) utilizing criteria established by Castell [8].

Our operative technique has been previously described [1,6]. A thoracoscopic approach with long esophagomyotomy to the aortic arch was utilized in 12 patients all of whom underwent a Belsey fundoplication. A laproscopic approach with a short 6 cm esophagomyotomy to the inferior pulmonary vein was used in 66 patients of whom 52 underwent a 270° partial Toupet fundoplication and 14 a 360° Nissen fundoplication. Our choice of operative approach (thoracic or abdominal) and fundoplication technique for reflux control (Belsey, Toupet, or Nissen) evolved over 34 months of this study. Initially the thoracoscopic approach (Belsey fundo) was utilized for patients with diffuse esophageal spasm or nutcracker esophagus where a long myotomy was favored, for patients with prior upper abdominal surgery, or for associated intra-thoracic pathology which required concomitant repair. The laproscopic approach with Toupet partial fundoplication was initially utilized for achalasia and hypertensive LES where a short myotomy was considered adequate. This was later expanded to include diffuse esophageal spasm and nutcracker esophagus with a Toupet of Nissen fundoplication.

The thoracoscopic Belsey cohort (NUT 7, DES 3, HLES 2) included two patients with epiphrenic diverticuli who underwent simultaneous resection and one patient undergoing a left unilateral lung volume reduction for emphysema. One patient had undergone an antrectomy for ulcer disease 20 years previously.

The laproscopic Toupet cohort (NUT 13, DES 8, HLES 17, ACH 14) included four patients who had a previous Nissen fundoplication and two patients who underwent simultaneous highly selective vagotomy and pyloromyotomy for peptic ulcer disease. The laproscopic Nissen group (NUT 6, DES 2, HLES 6) had one patient with a previous Belsey and one patient who underwent a simultaneous Collis esophagoplasty.

### Table 1

<table>
<thead>
<tr>
<th>Operation</th>
<th>Dysphagia</th>
<th>Strictures</th>
<th>Recurrent motility disorders</th>
<th>Post-operative GERD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belsey (12)</td>
<td>5 (41%)</td>
<td>(5)</td>
<td>2 (40%)</td>
<td>0</td>
</tr>
<tr>
<td>Toupet (52)</td>
<td>10 (19%)</td>
<td>(7)</td>
<td>1 (14.3%)</td>
<td>2 (3.8%)</td>
</tr>
<tr>
<td>Nissen (14)</td>
<td>1 (7%)</td>
<td>(2)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

3. Statistical analysis

Significance of variation in outcomes was determined by Mann–Whitney U-test. Differences were considered significant at the 0.05 level.

4. Results

Operative time averaged 70 min with the laproscopic technique and 120 min with the thoracoscopic technique. Hospital length of stay was 24 h for laproscopy and 72 h for thoracoscopy.

Follow-up ranged from 6–40 months (mean = 18). There was no mortality and no esophageal leaks or operative injuries requiring repair. Morbidity by procedure is listed in Table 1. Early morbidity included dysphagia – chest pain greater than 6 weeks in 16 patients. Late morbidity included three recurrent strictures requiring dilatation, two recurrent motility disorders requiring subsequent thoracoscopic long myotomy, and five patients with significant post-operative gastroesophageal reflux; (GERD) of whom four underwent later conversion to a laproscopic Nissen fundoplication.

The thoracoscopic technique was associated with a significant higher incidence of post-operative dysphagia (P = 0.05) and recurrent stricture (P = 0.01) than the laproscopic approach with partial or total fundoplication. Despite the higher incidence of recurrent motility disorders after the abdominal short myotomy and the higher incidence of post-operative gastroesophageal reflux with either of the partial fundoplications; this difference was not significant.

Overall 63 patients (81%) were completely relieved of dysphagia – chest pain.

5. Discussion

The goal of surgical intervention for primary motility
disorders mirrors Belsey’s initial objectives for reflux; the elimination of symptoms without the introduction of new complications; employing a teachable technique with minimal morbidity and mortality [9]. Our primary objective was to relieve the functional or anatomic distal obstruction associated with primary motility disorders with or without an associated stricture. We therefore, routinely extended our myotomy distally across the gastro-esophageal junction, confirming this with simultaneous intra-operative esophageogastroscopy and routinely adding a fundoplication to prevent reflux. Attempts to subjectively judge the end point of the myotomy so as to avoid reflux or performing a fundoplication, have resulted in two significant problems in previous open series employing this technique. Gastro-esophageal reflux has been documented in 28.5% of patients studied after an open myotomy without fundoplication, and up to 23% report long term persistent dysphagia [2,4].

Our study demonstrates a fundoplication can reduce post-operative GERD after esophagomyotomy. We experienced only five patients (6.4%) with documented post-operative reflux overall. While all five occurred with partial fundoplications (Belsey 16.6%, Toupet 5.7%,) the difference was not significant between techniques. In our larger experience with over 1000 minimally invasive fundoplications for GERD our incidence of recurrent reflux between techniques was similar (Belsey 13.6%, Toupet 5.5%, Nissen 2.2%). The higher incidence of reflux after the Besley repair as opposed to the Toupet may be due to anchoring the wrap anteriorly where it has been demonstrated that a diaphragmatic excursion is greatest with respiration [12]. Our current practice is to utilize a full fundoplication if body motility pressures are normal and a partial fundoplication for low amplitude peristalsis or esophageal failure. Further study will be required to demonstrate any advantage to this approach.

Our study challenges the concept that a long myotomy to the aortic arch or higher is necessary in spastic motor disorders of the esophagus. Our results demonstrate significantly less morbidity secondary to dysphagia, chest pain and strictures utilizing the laproscopic short myotomy. While there were two recurrent motility disorders (nutcracker) in the laproscopic group, this was not a significant difference. The laproscopic technique can be accomplished as an outpatient 23 h stay with minimal pain and scarring. In contrast the thoracoscopic and open thoracic technique requires a longer hospitalization and expense [10]. In addition open thoracic procedures are associated with long term post thoracotomy pain [11]. The operative times are longer for the thoracoscopic technique as it is more technically demanding [1,6]. It requires utilization of a double lumen endotracheal tube, lateral decubitus positioning, and a post-operative chest tube. The rigid rib cage limits exposure with minimally invasive trocars and instrumentation, further challenging the surgeons skills. These factors account for longer operating times and length of stay and alone would mitigate against the thoracoscopic approach.

Our study’s findings are limited by the short follow-up (mean = 18 month) and lack of randomization of patients to technique. In addition follow-up manometry would assist in quantitating any differences in LES and body motility pressures between techniques.

Our results demonstrate that videoscopic esophagomyotomy with fundoplication can be safely accomplished. Early outcomes with 81% of patients completely relieved of dysphagia-chest pain compares favorably with nine series of open procedures reporting a 77% success [4]. The reduced operating time, hospital stay and morbidity associated with a laproscopic approach supports its utilization for primarily motility disorders over thoracoscopic or open thoracic techniques.

References