

# Quality of Life Comparing Dor and Toupet After Heller Myotomy for Achalasia

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## ABSTRACT

**Background:** Laparoscopic Heller cardiomyotomy (LHC) is standard therapy for achalasia. Traditionally, an antireflux procedure has accompanied the myotomy. This study was undertaken to compare quality-of-life outcomes between patients undergoing myotomy with Toupet versus Dor fundoplication. In addition, we investigated overall patient satisfaction after LHC in the treatment of achalasia.

**Methods:** One hundred thirty-five patients who underwent LHC over a 13-year period were identified for inclusion. Symptoms queried included dysphagia, heartburn, and bloating using the Gastroesophageal Reflux Disease–Health-Related Quality of Life Scale and a second published scale for the assessment of gastroesophageal reflux disease and dysphagia symptoms. The patients' overall satisfaction after surgery was also rated. Data were compared on the basis of type of fundoplication. Symptom scores were analyzed using chi-square tests and Fisher's exact tests.

**Results:** Sixty-three patients completed the survey (47%). There were no perioperative deaths or reoperations. The mean length of stay was 2.8 days. The mean operative time for LHC with Toupet fundoplication was  $137.3 \pm 30.91$  minutes and for LHC with Dor fundoplication was  $111.5 \pm 32.44$  minutes ( $P = .006$ ). There was no difference with respect to the incidence or severity of postoperative heartburn, dysphagia, or bloating. Overall satisfaction with Toupet fundoplication was 87.5% and with Dor fundoplication was 93.8% ( $P > .999$ ).

**Conclusions:** LHC with either Toupet or Dor fundoplication gave excellent patient satisfaction. Postoperative symptoms of heartburn and dysphagia were equivalent when comparing LHC with either antireflux procedure.

Dor and Toupet fundoplication were found to have equivalent outcomes in the short term. We prefer Dor to Toupet fundoplication because of its decreased need for extensive dissection and better mucosal protection.

**Key Words:** Achalasia, Dor fundoplication, Dysphagia, GERD, Heller cardiomyotomy, Toupet fundoplication.

## INTRODUCTION

Laparoscopic Heller cardiomyotomy (LHC) is now a standard therapy for achalasia. It has been shown to reduce dysphagia symptoms and improve quality of life.<sup>1,2</sup> The myotomy alleviates dysphagia symptoms by releasing the distal esophageal muscular layers, thereby limiting lower esophageal sphincter contraction.<sup>3</sup> However, myotomy alone has been shown to increase gastroesophageal reflux disease (GERD)<sup>4</sup>; hence, it is now common practice to include an antireflux procedure. A 360° (Nissen) fundoplication has been used. However, this patient population experienced a high rate of dysphagia. These patients have some degree of esophageal body dysmotility, and a 360° wrap can make esophageal emptying more difficult.<sup>5</sup> Thus, although Nissen fundoplication is effective at controlling postoperative acid reflux, it is less favorable because of a high dysphagia recurrence rate.<sup>4</sup>

A partial fundoplication has the benefits of less dissection, decreased operative time, and improvement in dysphagia symptoms, while showing improvement in reflux rates comparable with 360° fundoplication.<sup>6</sup> Both Dor and Toupet fundoplications provide antireflux benefits with less risk for recurrent dysphagia in postmyotomy patients.<sup>7</sup> However, the best option for partial fundoplication remains to be determined.

Our initial practice consisted of LHC in conjunction with routine Toupet fundoplication for patients with achalasia. Toupet fundoplication is advocated on the basis of better reduction of reflux<sup>8</sup> and better outcomes because the 270° posterior fundoplication aids in keeping myotomy edges apart.<sup>9</sup> However, we have since transitioned to performing Dor fundoplication because it covers the exposed esophageal mucosa, and less extensive dissection is re-

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quired, leaving the stomach attachments in place.<sup>10</sup> Additionally, Dor fundoplication may be more amenable to a single-site surgical technique.<sup>11</sup> The risk for pseudodiverticulum of the esophagus after myotomy<sup>12</sup> is a concern raised primarily after the thoracoscopic approach; however, this phenomenon has been described in other laparoscopic and endoscopic procedures<sup>13</sup> and could be a risk in the Toupet procedure secondary to an uncovered myotomy.

Given the current controversy regarding best surgical practice for the treatment of achalasia, the objective of our study was to compare the reflux-related and regurgitation-related quality-of-life outcomes between patients undergoing myotomy with Toupet fundoplication and those undergoing myotomy with Dor fundoplication. In addition, we investigated overall patient satisfaction after LHC in the treatment of achalasia.

## METHODS

### Study Group

The study group consisted of 135 consecutive patients who underwent LHC with fundoplication between 1998 and 2010 by 1 surgeon at a single institution. Before January 2010, Toupet fundoplication was performed for all patients unless there was suspicion of mucosal violation after myotomy. Dor fundoplication was performed to reinforce the mucosa in these cases. After January 2010, Dor fundoplication was performed exclusively.

### Design

The study was a retrospective physician telephone survey. The study design and patient questionnaire were approved by the Institutional Review Board of The Penn State Hershey Medical Center. The Gastroesophageal Reflux Disease–Health-Related Quality of Life Scale (GERD-HRQL) was used to assess the severity of reflux.<sup>14</sup> The GERD-HRQL is a disease-specific, 10-question, 6-point Likert-type scale identifying symptoms such as heartburn and bloating. The scale ranges from 0 to 50, with higher scores correlating with worse symptoms. The final question assesses patients' overall satisfaction with their current conditions.

Additionally, the subjects were asked to rate how often they experienced symptoms of GERD or dysphagia. The questions chosen were similar to those presented by Khajanchee et al<sup>15</sup> in 2005. Briefly, symptoms of GERD were rated as follows: 0 = none, 1 = once or twice a

month, 2 = once or twice a week, 3 = once a day, and 4 = once a day and continuous. Data were compared on the basis of type of fundoplication, Dor or Toupet. Symptoms of dysphagia were rated as follows: 0 = no symptoms, 1 = dysphagia once or twice a month to bread or meat, 2 = dysphagia once or twice a week to thick food, 3 = dysphagia to thick liquids daily, and 4 = inability to swallow oral secretions. For the purposes of our study, patients were deemed to have resolution of their dysphagia symptoms if they reported a score of 0 or 1. Parametric data are presented as mean  $\pm$  SD, and nonparametric data are presented as median (interquartile range). Symptom scores after myotomy were analyzed using Fisher's exact test, chi-square statistics, and Wilcoxon's rank-sum test. *P* values < .05 were considered statistically significant.

### Operative Technique

Our LHC technique is similar to that described by Williams and Peters.<sup>7</sup> Technical details center on meticulous dissection of the muscle without violating the mucosa. The myotomy was performed sharply with laparoscopic scissors. Intraoperative endoscopy was used to ensure adequacy of the myotomy and to rule out mucosal perforation with a leak test. Toupet and Dor fundoplications were performed as described by Pellegrini and Eubanks.<sup>16</sup> Toupet fundoplication was undertaken by passing the fundus posteriorly through the dissected retroesophageal space and anchoring it to the myotomy site and the right and left crura with serial sutures. For Dor fundoplication, the fundus was brought anteriorly and sutured to the left crus and myotomy site. A second suture was used to affix the fundus to the left side of the myotomy without including the crus. This was repeated in the same fashion on the right side to complete the fundoplication. We do not routinely fully expose the retroesophageal crura or divide the short gastric vessels.

## RESULTS

Sixty-three of the 135 patients participated in the survey (47%). Fifteen of the 20 eligible patients (75%) with Dor fundoplication responded, whereas 48 of the 115 patients (42%) with Toupet fundoplication participated. The mean age of patients was  $57 \pm 17$  years, with 33 men and 30 women. Both treatment groups were similar in age, gender, and number and type of preoperative interventions. Median operative time was shorter in the Dor group than the Toupet group (100 [92–131] vs 129.5 [115–162] min, *P* < .01) (**Table 1**). There were no intraoperative complications and no perioperative deaths. The median fol-

**Table 1.**  
Patient Characteristics of Dor and Toupet Groups

Variable	Toupet (n = 48)	Dor (n = 15)	P
Age, y	59.3 ± 15	48.9 ± 18	.07
Gender			.49
Male	24 (50%)	9 (60%)	
Female	24 (50%)	6 (40%)	
OR time, min	129.5 (115–162)	100 (92–131)	<.01
Number of patients with interventions before surgery	28	6	.214
Duration of follow-up, mo	60 (36–84)	19 (14–22)	<.01
Preoperative intervention			.35
Dilation only	16	4	
OnabotulinumtoxinA (Botox; Allergan, Irvine, CA) only	7	0	
Both	5	2	
None	20	9	

Data are expressed as mean ± SD, as numbers, or as median (interquartile range).

low-up time was 60 (36–84) months for the Toupet group and 19 (14–22) months for the Dor group ( $P < .001$ ).

Using GERD-HRQL, no difference in the severity of postoperative GERD symptoms was seen between the Toupet fundoplication and Dor fundoplication groups. Results are shown in **Table 2**. Overall satisfaction with their current conditions was 89% for all patients. There was no difference in patient satisfaction in current postoperative condition between the 2 groups (88% Toupet vs 93% Dor,  $P = .60$ ).

Patient scores for the GERD assessment scale are shown in **Table 3**. Most patients reported having symptoms less than once or twice a month. However, 25% of Toupet patients and 20% of Dor patients reported having symptoms at least once or twice a week. There was no difference between Dor and Toupet fundoplication with respect to the incidence of postoperative GERD symptoms ( $P = .49$ ).

Patient scores for the dysphagia assessment scale are listed in **Table 4**. Eighty percent of patients undergoing surgery for achalasia reported complete resolution of dysphagia symptoms as measured by patient questionnaire. Eighty-seven percent of patients undergoing Dor fundoplication and 78% of patients undergoing Toupet fundoplication had complete resolution of their dysphagia symptoms. There was no difference between the Dor and

Toupet groups ( $P = .73$ ). No patients required reoperative intervention.

## DISCUSSION

LHC has become standard therapy for the management of achalasia. Dysphagia symptoms and quality of life are effectively improved with this procedure.<sup>1,2</sup> The high incidence of postoperative reflux has led most surgeons to perform an antireflux procedure in addition to the myotomy.<sup>4</sup> Although a 360° Nissen fundoplication has been shown to be effective, it may be associated with a high incidence of long-term postoperative dysphagia. Thus, partial fundoplication has been advocated.<sup>5,6,12</sup> In a review by Abir et al,<sup>17</sup> dysphagia resolution was achieved in 83% to 90% of patients undergoing LHC with Toupet fundoplication and 77% to 91% of patients undergoing LHC with Dor fundoplication. Furthermore, a recent randomized control trial by Rawlings et al<sup>8</sup> demonstrated reduction in symptoms postoperatively in 90.9% in the Dor group and 93.1% in the Toupet group at 6-month to 12-month follow-up. Overall, in our study population, 83% of patients reported resolution of dysphagia. Patients undergoing Toupet and Dor fundoplications reported 81% and 87% resolution of dysphagia, respectively. These results are consistent with those previously reported.<sup>17</sup>

There was no significant difference in GERD incidence or severity in patients undergoing Toupet or Dor fundopli-

**Table 2.**  
Assessment of Postoperative GERD Severity

GERD-HRQL*	Toupet (n = 48)	Dor (n = 15)	<i>P</i>
How bad is your heartburn?			
0–1	35 (73%)	13 (87%)	.28
2–5	13 (27%)	2 (13%)	
Heartburn when lying down?			
0–1	36 (75%)	12 (80%)	.96
2–5	12 (25%)	3 (20%)	
Heartburn when standing up?			
0–1	45 (94%)	13 (87%)	.73
2–5	3 (6%)	2 (13%)	
Heartburn after meals?			
0–1	44 (92%)	15 (100%)	.58
2–5	4 (8%)	0	
Does heartburn change your diet?			
0–1	41 (85%)	15 (100%)	.27
2–5	7 (15%)	0	
Does heartburn wake you from sleep?			
0–1	38 (79%)	14 (93%)	.38
2–5	10 (21%)	1 (7%)	
Do you have difficulty swallowing?			
0–1	41 (85%)	13 (87%)	.83
2–5	7 (15%)	2 (13%)	
Do you have pain with swallowing?			
0–1	42 (88%)	13 (87%)	.87
2–5	6 (12%)	2 (13%)	
Do you have gassy or bloating feelings?			
0–1	39 (81%)	15 (100%)	.16
2–5	9 (19%)	0	
If you take medication, does it affect your life?			
0–1	45 (94%)	14 (93%)	.58
2–5	3 (6%)	1 (7%)	
Overall score	4.5 (1–8)	2 (0.5–3)	<.01 <sup>†</sup>
0–1	34 (70%)	9 (60%)	
2–5	14	6	
Overall satisfaction			
Satisfied	42 (88%)	14 (93%)	.87
Not satisfied	6 <sup>‡</sup>	1	

GERD, gastroesophageal reflux disease; Gastroesophageal Reflux Disease–Health-Related Quality of Life Scale.

\*0 = no symptoms; 1 = symptoms noticeable but not bothersome; 2 = symptoms noticeable and bothersome but not every day; 3 = symptoms bothersome every day; 4 = symptoms affect daily activities; 5 = symptoms are incapacitating, unable to do daily activities.

<sup>†</sup>Statistically significant ( $P < .05$ ).

<sup>‡</sup>Two patients were neutral.

**Table 3.**

Assessment of Postoperative Frequency of GERD Symptoms

GERD Score*	No. of Toupet Patients	No. of Dor Patients
0	21 (44%)	6 (40%)
1	15 (31%)	6 (40%)
2	12 (25%)	2 (13%)
3	0	1 (7%)
4	0	0

There was no difference between the groups ( $\chi^2 = 0.25$ ). GERD, gastroesophageal reflux disease.

\*0 = none; 1 = once or twice a month; 2 = once or twice a week; 3 = once a day; 4 = once a day and continuous.

**Table 4.**

Assessment of Postoperative Dysphagia Symptoms

Dysphagia Score*	No. of Toupet Patients	No. of Dor Patients
0	27 (56%)	10 (67%)
1	12 (25%)	3 (20%)
2	6 (13%)	2 (13%)
3	3 (6%)	0
4	0	0

There was no difference between the groups ( $\chi^2 = 0.73$ ). GERD, gastroesophageal reflux disease.

\*0 = no symptoms; 1 = dysphagia once or twice a month to bread or meat; 2 = dysphagia once or twice a week to thick food; 3 = dysphagia to thick liquids daily; 4 = inability to swallow oral secretions.

cation. The overall incidence of GERD was low, with a majority of patients reporting a score of 0 or 1 on the GERD assessment scale. However, 25% of Toupet patients and 20% of Dor patients reported having symptoms of GERD at least once a week or more. The overall severity of GERD symptoms was low in both groups, with >75% of patients scoring  $\leq 1$  for all the questions on the GERD-HRQL scale. We did not perform physiologic testing, but Rawlings et al<sup>8</sup> found abnormal acid reflux in 21.1% and 41.7% of the Toupet and Dor groups. Although this result was not statistically significant, patients with abnormal pH test results reported significantly greater heartburn frequency and severity. Symptom status thus correlated well with physiologic testing. These results demonstrate that neither operation is the perfect solution to this complex problem.

The goal of our study was to investigate outcomes in our LHC patients to assess the difference between the Toupet

and Dor groups. Toupet fundoplication has been a popular antireflux procedure in achalasia patients. Along with GERD control, proponents of Toupet fundoplication believe it keeps the myotomy edges apart, thereby reducing recurrence of achalasia. Several prospective studies have evaluated the outcomes between posterior fundoplication and anterior fundoplication. In a study by Hagedorn et al,<sup>18</sup> no differences in esophageal symptoms were found, but Toupet fundoplication was associated with significantly lower rates of abnormal acid exposure. Engstrom et al<sup>19</sup> showed that patients with Dor fundoplication had higher incidences of heartburn and regurgitation symptoms requiring a greater use of acid-reducing medications. Rawlings et al<sup>8</sup> found comparable degrees of alleviation of symptoms with both procedures and no statistically significant difference in pathologic acid reflux. However, as with Nissen fundoplication, Toupet fundoplication requires dissection posterior to the gastroesophageal junction, which increases operative time and potentially alters the posterior soft tissue attachments to the esophagus, possibly increasing postoperative GERD and dysphagia.<sup>10</sup>

Dor partial anterior fundoplication allows preservation of the posterior gastroesophageal junction as well as the potential advantage of protection of the exposed mucosa at the myotomy site. Finally, Dor fundoplication has been successfully performed using a single-site technique.<sup>11</sup>

The longer follow-up for the Toupet group compared with the Dor group is consistent with our change in procedure of choice. It is known that a certain percentage of patients will have recurrence of symptoms requiring additional treatment.<sup>20</sup> Gockel et al<sup>21</sup> reported 2 types of recurrence: early and late. Early recurrence is due to stenosis of the myotomy, best treated by repeat myotomy<sup>21</sup> or dilations.<sup>22</sup> Late recurrence is considered irreversible progression of the disease with development of mega-esophagus. This type is traditionally treated with esophagectomy,<sup>21</sup> but some groups are advocating repeat myotomy, even in this setting, as a safe treatment.<sup>23</sup> In our analysis, we did not attempt to differentiate between symptoms of early stenosis and late recurrence. It is likely that several of our patients will fit into these categories, and it is a subject of future research. However, it appears that there is no difference in early stenosis.

A major limitation of our study is the sample size. Multiple attempts to contact patients lost to follow-up were unsuccessful. Nonetheless, detailed quality-of-life data were available for 63 patients, or 47% of our study population. Finally, our results are consistent with those found in previous studies<sup>8</sup> and contribute to the existing body of



evidence for Dor and Toupet fundoplication in conjunction with laparoscopic Heller myotomy.

## CONCLUSIONS

Patients undergoing Dor or Toupet fundoplication experienced no significant difference in dysphagia or GERD incidence or severity in the short term. This suggests that both are acceptable antireflux procedures when used as adjuncts to LHC in the treatment of achalasia.

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