Has the introduction of laparoscopic Heller myotomy altered the treatment paradigm of achalasia?

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ORIGINAL ARTICLE

Achalasia is a rare esophageal motility disorder characterized by uncoordinated contractions of the esophagus leading to ineffective swallowing. Relief of dysphagia represents the primary treatment goal for patients with achalasia. Medical, endoscopic and surgical treatments have all been employed, with varying success rates. Despite minimal risk, pharmacological calcium channel blockade has generally not been effective for relief of dysphagia (1). Widely used endoscopic treatment options include Botulinum toxin injection and pneumatic dilation. While initial response rates for intramuscular Botulinum toxin are as high as 70%, the response is short lived, with a recurrence rate approaching 90% at six months (2). Long-term results of endoscopic disruption of the muscularis layer by pneumatic dilation are also suboptimal, with permanent success in only 40% to 50% of patients (3). Due to the intramural inflammation and scarring resulting from endoscopic therapies, the risk for mucosal injury is potentially increased if a subsequent myotomy is performed (4,5).

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Achalasia Questionnaire
Please take 2 minutes of your time to complete the following questionnaire to help us investigate the practices in the treatment of achalasia in Quebec.

1) 45 y.o. otherwise healthy male presents with progressive dysphagia. After contrast esophagogram, esophagoscopy, and manometry you diagnose achalasia. Your next step in the management of this patient is:
   a) Medical management (e.g. calcium channel blockers)
   b) Endoscopic dilation (pneumatic)
   c) Endoscopic injection of Botulinum Toxin (Botox)
   d) Refer for surgical Heller myotomy (skip Questions 2 and 3)

2) If the patient’s dysphagia recurs, after how many endoscopic treatments (dilation or Botox injections) would you refer for surgical myotomy?
   a) one
   b) two
   c) three
   d) four or more
   e) never refer for surgical myotomy (reason ____________________________ )

3) Which of the following reasons would make you not refer a patient with achalasia immediately for surgical Heller myotomy (choose one):
   a) Surgical myotomy is less effective than endoscopic dilation or Botox
   b) Too much morbidity associated with surgical myotomy
   c) Patient’s poor physiologic status/comorbidity
   d) Laparoscopic myotomy is not available locally

4) In your opinion, what is the most effective treatment for achalasia long term?
   a) medical management
   b) endoscopic dilation (including pneumatic)
   c) botulinum toxin injection
   d) surgical Heller myotomy

5) How many new patients with achalasia do you see per year?  ____________

6) Do you believe that prior endoscopic treatment for achalasia (Botox injection and dilation) complicate subsequent surgical Heller myotomy, increasing risk of esophageal mucosal perforation?
   a) Yes
   b) No

Figure 1) Six-question survey sent to gastroenterologists in Quebec. y.o Year old

Surgical myotomy is well recognized as the most effective and longest lasting treatment option for patients with achalasia (6). Traditionally, this has been performed through a thoracotomy, with excellent long-term symptomatic relief achieved in over 90% of patients (7,8). The surgical morbidity and long recovery associated with this incision have presented obstacles to the acceptance of this surgical approach as a first-line treatment option for patients newly diagnosed with achalasia. Therefore, despite the effective superiority of surgical myotomy, many patients and physicians have opted for nonsurgical treatment. With the successful application of minimally invasive surgical techniques to the management of achalasia, laparoscopic myotomy has significantly diminished the morbidity of the procedure and has improved recovery, while maintaining its effectiveness (6,9). Although there are reports of retrospective, single institution-based studies (10) demonstrating a change in the treatment patterns in achalasia, these studies are biased by the fact that the patients are referred for surgical myotomy. It is therefore currently unknown how the advent of minimally invasive surgery has affected the general treatment patterns of achalasia.

We sought to determine the effect of the availability of laparoscopic myotomy on the treatment paradigm for achalasia. Furthermore, we wished to identify referring physicians’ biases in the management of this disease. To address these issues, both local and regional patterns of management were examined with particular attention to the number of endoscopic treatments before surgical myotomy.

METHODS
Local patterns of treatment for achalasia were assessed by reviewing prospectively collected data on all patients undergoing laparoscopic Heller myotomy at the McGill University Health Centre, Montreal, Quebec. The numbers and types of endoscopic intervention before surgery were recorded and compared between years. All laparoscopic Heller myotomies included a partial anterior 180° fundoplication and were performed or supervised by a single surgeon (GMF).

To determine regional treatment patterns, all patients undergoing surgical myotomy from 1997 to 2002 in Quebec were identified from the Régie de l’assurance maladie du Québec (RAMQ) billing administrative database. Index patients were identified by the billing code for surgical myotomy (transabdominal or thoracic esophagogastroduodenoscopy Heller). No distinction is made in the database between minimally invasive and open techniques. All patients undergoing Heller myotomy, based on this billing code, were assumed to have had a diagnosis of achalasia. Data obtained from the database included age, sex and date of myotomy. Previous endoscopic procedures for each index patient were noted from 1990 to 2002. No separate billing code exists for pneumatic dilation or Botulinum toxin injection. Therefore, for the purpose of the present study, all procedures with a code for esophagogastroduodenoscopy with intervention – dilation, injection or ligation – were assumed to be an endoscopic treatment for achalasia in patients who had a subsequent Heller myotomy. The date of previous or subsequent endoscopic procedures was recorded for each index patient. Patients were divided into two groups (prelaparoscopy and postlaparoscopy) defined by the approximate date when laparoscopic Heller myotomy became generally available in Quebec (January 1, 2000).

To assess the referring physicians’ biases in the treatment of achalasia, a six-question survey (Figure 1) exploring the management of achalasia was sent to all gastroenterologists listed in the 2002 Quebec specialist medical directory. Questionnaires were mailed in both English and French. Nonresponse prompted the mailing of a second questionnaire after six weeks.

Data are presented as median (range) unless otherwise stated. Statistical significance of differences was determined by χ² for categorical variables and Mann-Whitney U test for continuous variables. A difference was considered significant if a P value of less than 0.05 was obtained.

RESULTS
Local treatment patterns
A total of 38 patients underwent laparoscopic Heller myotomy at the Montreal General Hospital, Montreal, Quebec from June 1999 to April 2004. Overall, 47% (18 of 38) of the patients had one or more endoscopic interventional procedures before referral for laparoscopic myotomy. Botulinum toxin injection alone was used in six patients, 10 had pneumatic dilation alone and two had both. The proportion of patients having endoscopic treatment before surgery declined from 70% in the first 10 patients (seven of 10) to 39% (11 of 28) subsequently (P=0.19).

Regional treatment patterns
One hundred eighty-five patients were identified in the RAMQ database to have undergone a Heller myotomy from 1997 to 2002 (Table 1). The number of procedures per year
remained stable over this period (prelaparoscopy = 28.7/year, postlaparoscopy = 33/year). Patients were older in the postlaparoscopy period. The proportion of patients undergoing preoperative endoscopic treatment did not significantly differ between prelaparoscopy (29%) and postlaparoscopy (23%) periods (Figure 2); however, the median time interval between the last endoscopic treatment and myotomy decreased from seven to three months. The rate of concurrent fundoplication increased significantly, from 11% to 52% (P<0.01). Seven patients had treatment failure severe enough to elicit an additional postoperative endoscopic procedure or a repeat myotomy. A fundoplication was present in two of seven failures (29%), similar to the rate in the overall cohort (60 of 185, 32%).

Survey of gastroenterologists

A total of 147 gastroenterologists were listed in the Quebec Collège des Médecins directory. Response rate after the second mailing was 41% (60 of 147). Although 90% of respondents agreed that surgical myotomy represented the most effective long-term treatment for achalasia (Figure 3A), only 37% would refer a newly diagnosed patient for immediate Heller myotomy (Figure 3B). Of the 55% choosing pneumatic dilation as first-line therapy, 58% would refer the patient for surgical opinion after a single failed dilation, while 8% would never refer to surgery (Figure 3C). In those who would not refer for immediate surgery, 73% cited patient comorbidity and 21% cited surgical trauma/morbidity as the reason for alternate treatment (Figure 3D). Among physicians who treat more than four new patients with achalasia per year, five of eight would refer for immediate surgical myotomy as the first-line therapy.

DISCUSSION

We sought to determine the impact of the introduction of minimally invasive Heller myotomy for achalasia on the treatment patterns for this disease. An assessment of the local referral patterns has demonstrated that our own institution’s increasing experience in minimally invasive surgery coincided with a reduction in the percentage of patients with previous endoscopic therapy. Although not reaching statistical significance, we found that the proportion of patients undergoing previous therapy was highest in the first 10 patients (70%) compared with subsequent patients (39%). We believe this is mainly due to a shift in the treatment paradigm employed by the gastroenterologist in our group (SM), from whom the majority of our referrals originated. As our experience with laparoscopic Heller myotomy grew, patients who were referred for confirmation and management of their achalasia underwent operation without further endoscopic procedures, representing a change in management. This did not affect the treatment patients received before referral to our centre. This finding is similar to that reported by Patti et al (10) in which a gradual, nonsignificant increase in untreated patients being referred for myotomy was reported.

Data from these single-centre studies may be biased by the fact that the patients are often referred precisely for the surgical procedure; thus, data may be skewed by local referral patterns. To eliminate this selection bias, we investigated the regional referral patterns by two additional methods. RAMQ demonstrated that the absolute number of myotomy procedures remained stable (approximately 30 per year) over a five-year period centred on an arbitrary date at which minimally invasive surgery for achalasia was presumed to have become generally available (January 1, 2000). Unfortunately, the RAMQ billing code does not distinguish between open and minimally invasive procedures. The proportion of patients receiving previous endoscopic therapy also remained stable over this time period. Of interest was that the rate of previous endoscopic therapy in the RAMQ database was lower than that in our own institution. Some patients received treatment before 1997, and a few received therapy outside of the province. In addition, as with all administrative databases, miscoding and under-representation of cases or procedures is commonplace (11), and represents an inherent weakness in this type of study. Particular to the present study, no separate billing code for the two commonly used endoscopic therapies (Botulinum toxin injection and pneumatic dilation) exists. Rather, a catchall code for any esophageal endoscopic intervention (injection, dilation, sclerosis or ligation) is used. Clearly, some endoscopic therapies may have been miscoded, resulting in under-reporting. Nonetheless, it is fair to assume that this potential miscoding would be equally distributed across the years under study; thus, trends in treatment should remain valid.

Although we found no change in the absolute number of myotomies or in the rate of previous endoscopic therapy, Heller myotomy was performed on an older population and at a shorter time interval from the last endoscopic treatment in the postlaparoscopy group. These changes suggest that the threshold for referral to myotomy may have diminished concurrently with the introduction of minimally invasive myotomy. Despite...
ongoing controversy surrounding the use of fundoplication with myotomy, the proportion of procedures, including an antireflux procedure, increased approximately fivefold during the study period. Whether this reflects an increase in the use of a transabdominal over a transthoracic approach is not available in the RAMQ database. However, this finding is consistent with a recent prospective randomized trial supporting routine fundoplication after myotomy (12).

We assessed the predominant treatment paradigm for achalasia, from the referring physicians' perspective, with a six-question survey sent to all gastroenterologists in Quebec. Although the vast majority of respondents agreed that surgical myotomy represented the most effective and longest lasting treatment for achalasia, only slightly more than one-third referred newly diagnosed patients for immediate surgery. Rather, patients are offered endoscopic therapies (predominantly pneumatic dilation). Several studies (4-5,13) suggest that preoperative endoscopic treatment may adversely affect and complicate a subsequent Heller myotomy. Increased intramural fibrosis from either Botulinum toxin injection or endoscopic dilation may obliterate the natural submucosal plane, potentially increasing the risk for mucosal injury during the myotomy (14). Indeed, more than 40% of responding gastroenterologists agreed that previous endoscopic therapy increases the risk of mucosal injury in the case of a subsequent surgical myotomy. Quebec gastroenterologists favouring immediate referral for Heller myotomy were more likely to believe that preoperative endoscopic therapy complicates subsequent surgical treatment. Reasons cited for nonsurgical primary treatment of achalasia centred on the perceived morbidity of the procedure for a given patient's physiological state. Botox Botulinum toxin; Lap Laparoscopic

![Figure 3) Responses from a questionnaire investigating the prevailing biases in the treatment of achalasia sent to all Quebec gastroenterologists. A Referring physicians’ perception of the most effective long-term treatment for achalasia. The vast majority considered surgical myotomy to be the most effective treatment. B First-line treatment for achalasia according to responses from a questionnaire to all Quebec gastroenterologists. C Referring physician-based threshold for referral of an achalasia patient for surgical myotomy (number of endoscopic interventions to be attempted before to surgical referral). D Reasons for nonreferral for surgical myotomy. The majority of responding gastroenterologists deemed the surgical procedure too morbid for a given patient’s physiological state. Botox Botulinum toxin, Lap Laparoscopic.](image-url)
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