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RAPID COMMUNICATION

Recurrent achalasia treated with Heller myotomy: A review of the literature

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Abstract

AIM: To evaluate the efficacy and safety of Heller myotomy (HM) for recurrent achalasia, performed after different methods of first-line treatment.

METHODS: We searched for studies published in PubMed from 1966 to March 2008 on treatment of recurrent achalasia with HM after failure with different methods of first-line treatment. The efficacy of HM was assessed by a pooled estimate of response rate with individual studies weighted proportionally to sample size.

RESULTS: Sixteen studies were eligible and included in the review. The results showed that HM has a better remission rate for recurrent achalasia after failure of HM [weighted mean (SD)] of 86.9% (21.8%) compared with 81.6% (23.8%) for pneumatic dilatation (PD). One study evaluated the efficacy of HM after failure of PD combined with botulinum toxin injection (83%). The most common complications were perforation and gastroesophageal reflux.

CONCLUSION: HM has the best efficacy in patients with recurrent achalasia who were treated with HM as first-line treatment. Future studies should focus on how to increase the success rate and decrease the complications of HM.

Key words: Recurrent achalasia; Heller myotomy; Pneumatic dilatation

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INTRODUCTION

Achalasia is a severe neuromuscular disorder of the esophagus, characterized by the loss of peristalsis and an inability of the lower esophageal sphincter (LES) to reach optimal relaxation[1]. Although the etiology of achalasia remains elusive, the mainstay of therapy is directed towards reduction of LES pressure to improve esophageal emptying by gravity[2].

Treatment for achalasia includes drug therapy[3], botulinum toxin (BoTx) injection[4,5], pneumatic dilatation (PD)[6,7] and Heller myotomy (HM)[8-10]. Among these, PD and HM are the most common treatment methods for untreated achalasia[11]. However, none of the treatments reverses the underlying neuropathology of achalasia. There are still some patients who have persistent or recurrent dysphagia[12].

How to select an appropriate treatment for the patients of recurrent achalasia is a hot topic of debate. BoTx, PD and HM are the most popular options for recurrent achalasia. However, BoTx and PD do not achieve a good remission rate for recurrent achalasia in the long term. Moreover, perforation is a severe complication for patients treated with PD as second-line treatment. Therefore, HM is becoming increasingly popular for treatment of recurrent achalasia[13-16]. However, the efficacy of HM is very much dependent upon first-line treatment, for reasons of symptom relapse or failure, and age and co-morbidity of patients.

Therefore, our purpose was to compare the efficacy and safety of HM for patients with recurrent achalasia treated with different methods of first-line treatment, and to evaluate the influence of first-line treatment, including BoTx, PD and HM, on the efficacy of HM performed as second-line treatment.

Table 1 Clinical characteristics of studies included in the review

	No. of patient	Age (yr) (median)	Sex (M/F)	First therapy method	Second therapy method	Operation duration time (min)	Median hospital stay (d)	Symptom remission rate (*n*/N, %)
Ali *et al*[24]	19	33 (14-74)	12/7	19 PD	LM	104 (50-198)	3.2	14/19 (77.8)
Wills *et al*[25]	44	47 (12-87)	20/24	44 PD	LM	NA	NA	32/44 (72.7)
Rosati *et al*[26]	15	36 (12-54)	9/8	15 PD	LM + Dor	114 (60-200)	6 (3-14)	14/15 (93)
Pechlivanides *et al*[27]	29	47 (12-74)	12/17	29 PD	LM + Dor	82 (45-105)	2.6 (1-8)	26/29 (90)
Omura *et al*[28]	18	42 (16-65)	10/8	18 PD	LM + Dor	150 (120-205)	8 (4-18)	16/18 (88.9)
Gockel *et al*[29]	67	44 (14-87)	40/27	67 PD	HM + Dor	104 (50-198)	3.2	52/67 (77)
Ponce *et al*[30]	32	32 (18-67)	14/18	32 PD	HM + Dor	120 (90-210)	6 (3-11)	26/32 (81.3)
Beckingham *et al*[31]	10	30 (18-46)	4/6	10 PD	LM	90 (58-180)	3 (2-4)	9/10 (90)
Patti *et al*[32]	66	46 (20-72)	36/30	66 PD-BoTx	LM + Dor	156	3.5	54/66 (83)
Duffy *et al*[33]	5	39 (15-67)	3/2	5 LM	LM + Toupet	96 (87-120)	2	5/5 (100)
Iqbal *et al*[34]	15	42 (20-65)	8/7	15 LM	LM	NA	NA	12/15 (80)
Grotenhuis *et al*[35]	19	NA	6/13	19 LM	HM + Dor	101 (90-128)	4	17/19 (89.5)
Glatz *et al*[36]	8	52 (18-62)	3/5	8 HM	HM	90 (78-124)	3.5	6/8 (74)
Robinson *et al*[37]	3	34 (28-45)	1/2	3 TM	LM	NA	NA	100
Rakita *et al*[38]	12	40 (20-52)	5/7	10 TM	LM	98 (90-112)	4.5	73
Gorecki *et al*[39]	8	38 (24-60)	4/4	8 LM	8 LM	NA	NA	87.50

LM: Laparoscopic HM; NA: No analysis; HM + Dor: HM and Dor fundoplication; LM + Dor: Laparoscopic HM and Dor fundoplication; LM + Toupet: Laparoscopic HM and Toupet fundoplication.

MATERIALS AND METHODS

Literature search

A systematic review of the literature was conducted. Search tools included Elsevier Science Direct, Blackwell Synergy, Medline (OVID), Pub-Med and Springerlink. Search terms were "achalasia" combined with "treatment, Heller myotomy, pneumatic dilatation, botulinum toxin injection, recurrent, relapse, efficacy, or safety". We first reviewed the abstracts of all articles that reported the efficacy of HM for recurrent achalasia. Then, we retrieved the full articles when relevant. Additionally, reference lists of articles were checked for further relevant articles. We included studies that assessed the influence of first-line treatment methods for HM, in order to evaluate the efficacy and safety of HM as a second-line treatment for recurrent achalasia.

Study selection and data analysis

A study was considered eligible for inclusion if patients had undergone clinical, manometric, radiographic and endoscopic evaluation to confirm achalasia. The severity of symptoms was evaluated by a modified symptom score[17], which consisted of the sum of the scores for dysphagia, regurgitation and chest pain. Recurrent achalasia is defined as recurrence of severe symptoms of dysphagia, regurgitation or chest pain (symptom scores of 2 or 3), and the need for intervention again, or repeat HM[18-22].

Data regarding the first author, year of publication, first-line treatment, operation duration, median hospital stay, and symptoms remission rate, were extracted. Since there was no controlled trial to analyze efficacy and safety of HM for recurrent achalasia patients performed with different methods as the first treatment. There was no uniformity in assessment of efficacy among trials; therefore, we extracted the number of individuals with a good-to-excellent response, which was sustained until the end of the observation period without any further therapy after HM, regardless of criteria. These were considered HM treatment failures, when patients required further treatment or were converted to esophagectomy.

Statistical analysis

The efficacy of studies included in the review was assessed by a pooled estimate of response rate with individual studies weighted proportionally to sample size[23]. In calculating the weighted mean response for each treatment modality ($\hat{p}$), included studies were characterized by the number of subjects (n) and the response rate for those subjects (p). Ellipses represent scant data.

$$SE(\hat{p}) = [p_1(1 - p_1)/n_1 + p_2(1 - p_2)/n_2 + p_x(1 - p_x)/n_x]^{1/2}$$

$$\hat{p} = (n_1p_1 + n_2p_2 + n_xp_x)/(n_1 + n_2 + n_3)$$

RESULTS

Our literature searches identified 162 studies. Of these, 16 were eligible and included in the analysis. The clinical characteristics and efficacy of studies included in the review are shown in Table 1.

Study characteristics

There were five studies[24-28] and three studies[29-31] that assessed the efficacy of HM for failed PD as the first-line treatment. The remission rate was 77.8%-93%. Operation duration was 50-210 min. Median hospital stay was 2.6-8 d. One study[32] has reported the efficacy of HM for achalasia patients who failed combined treatment with PD and BoTx. The remission rate was 83%, operation duration was 156 min, and the hospital stay was 3.5 d. There were five[33-37] studies and two[38,39] studies that assessed the efficacy of HM for failed HM as the first-line treatment. The remission rate was 73%-100%. Operation duration was 90-128 min. Median hospital stay was 2-4 d. The reasons for recurrence of

HM were incomplete myotomy, myotomy fibrosis and fundoplication disruption.

Efficacy of HM for recurrent achalasia

Our review showed that HM has a better remission rate for recurrent achalasia performed with HM [weighted mean (SD)] is 86.9% (21.8%) effective versus 81.6% (23.8%) for PD as the first line treatment. Only one study evaluated the efficacy of HM for failed PD combined with BoTx (83%). We did not evaluate the efficacy of HM for failed BoTx injection because of the lack of data.

It is still controversial that prior treatment measures influence the efficacy of HM for the recurrent achalasia. Some researchers[40] consider that HM is easy to perform in PD patients, and the efficacy is as high as that in patients without any previous therapy. Good clinical results with HM are associated with a reduction of LES pressure to < 10 mmHg. Whereas, some studies[41-43] have shown that the technical difficulties of performing HM increase in some patients with previous dilatation. Preoperative PD represents a risk factor for laparoscopic HM. There was a trend toward a higher incidence of intraoperative esophageal perforation and recurrent dysphagia in patients with prior PD treatment. Moreover, some studies[44-47] have demonstrated that reoperative laparoscopic HM can be undertaken safely (in experienced hands), and can result in good outcomes, with a similar level of success as that seen after primary myotomy.

Complications of HM for recurrent achalasia

We did not evaluate the co-morbidity in patients with recurrent achalasia treated with HM after different methods of first-line treatment, because of a lack of detailed data. Therefore, we used a descriptive method. Patients who were treated with HM experienced intraoperative and postoperative complications. The most common intraoperative complication was gastrointestinal perforation, including gastric and esophageal perforation in 1.5%-20% of patients. Besides, some patients experienced pneumothorax (1.9%-6.7%). Early postoperative complications included pulmonary complications (1.3%-4%). Some patients experienced persistent and severe chest pain, which prolonged the time to hospital discharge. Gastroesophageal reflux is a frequent complication after HM, presenting at a rate of 2.6%-20%. Most patients could be controlled with medical therapy. Some patients presented with endoscopic esophagitis without reflux symptoms.

DISCUSSION

We have performed a review to analyze efficacy and safety of HM for recurrent achalasia performed after different methods of first-line treatment. Our results showed that HM has the best clinical efficacy in recurrent achalasia when performed after HM as first-line treatment (86.9%), followed by 83% for PD combined with BoTx and 81.6% for PD. Although the number of patients in this review was relatively small, it represents one of the largest series in the literature.

First, the efficacy of HM for recurrent achalasia depends on the method of first-line treatment. Traditionally, endoscopic therapies have been selected for first-line treatment over surgery, because of the morbidity associated with open or laparoscopic HM. In patients who have had prior endoscopic therapy, there is a notable difference in the submucosal dissection plane, especially near the squamocolumnar junction. Often the plane is obliterated, and it is very difficult to confidently and easily dissect down onto the mucosa, as can be accomplished in those who have not had prior therapy[48]. However, some studies have shown that previous PD does not determine a high failure rate or a high rate of complications with HM[49]. Therefore, it is urgent to build up a standard technique to decrease the risk of HM for recurrent achalasia.

Second, the efficacy of HM for recurrent achalasia depends on the reasons for symptom relapse or failure. Reasons for failure were incomplete myotomy (33%), myotomy fibrosis (27%), fundoplication disruption (13%), too tight fundoplication (7%) and a combination of myotomy fibrosis and incomplete myotomy (20%).

Third, the efficacy of HM for recurrent achalasia depends on the age and co-morbidity of patients. There is a strong association between age at which diagnosis of achalasia is first established and the requirement for HM[50]. For each year of increasing age, the odds ratio for the eventual requirement for myotomy decreases by 0.943 (95% CI: 0.90-0.98). As age increases, the need for surgical therapy progressively diminishes. The perioperative and postoperative morbidities also influence the efficacy of HM for recurrent achalasia.

Finally, the efficacy of HM for recurrent achalasia depends on the operative technique and postoperative management. In recent years, laparoscopic HM, with or without fundoplication, has increasingly been performed because of the lower morbidity and shorter recovery period associated with laparoscopic surgery[51]. Some surgeons[52] prefer a posterior partial fundoplication instead of an anterior hemifundoplication. It prevents reflux more effectively and keeps the edges of the myotomy separate. Whereas, some studies have shown that laparoscopic HM without fundoplication has the same or an even better effect on achalasia[53]. Finley *et al*[54] have reported that laparoscopic HM without anterior fundoplication shows significantly better upright esophageal clearance, with a trend toward improved dysphagia and regurgitation frequency, when compared with anterior fundoplication.

Recently, there have been some new methods to treat recurrent achalasia. Ponciano *et al*[55] have reported that the Serra-Dória procedure for the treatment of megaesophagus in patients who had already undergone cardiomyotomy, and whose symptoms recurred, has low morbidity and no mortality. It offered a significant relief of symptoms, with a decrease in the caliber of the esophagus in several patients. The patients also improved with regards to reflux esophagitis. Oelschlager

et al[56] have suggested that an extended gastric myotomy (3 cm) more effectively disrupts the LES, thus improving the results of surgical therapy for achalasia, without increasing the rate of abnormal GER, provided that a Toupet fundoplication is added. Postoperatively, LES pressure was significantly lower after extended gastric myotomy. There were no reoperations in the extended gastric myotomy and Toupet fundoplication group.

Our review suggests that HM has the best clinical efficacy in patients with recurrent achalasia who are treated with HM as first-line treatment. Future studies should focus on how to increase the success rate of HM and decrease the complications and adverse effects. It is necessary to promote and popularize the technique of HM in general hospitals.

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COMMENTS

Background

None of the treatment measures reverses the underlying neuropathology of achalasia. Heller myotomy (HM) is the most used technique for recurrent achalasia. However, the efficacy of HM is largely dependent on the method of first-line treatment.

Research frontiers

Authors aimed to evaluate the efficacy and safety of HM for patients with recurrent achalasia treated with different methods of first-line treatment.

Innovations and breakthroughs

Previous studies support the hypothesis that the efficacy of HM is very much dependent upon first-line treatment. However, there have been no studies to compare the efficacy of HM in patients with recurrent achalasia treated with different methods of first-line treatment. In this study, they found that HM has the best efficacy in recurrent achalasia treated with HM as the first-line therapy.

Applications

The results may provide a systematic analysis of the efficacy of HM for recurrent achalasia and identify HM as having the best efficacy in patients with achalasia treated with HM as first-line treatment. They can also offer assistance with the best treatment choice for achalasia in the future.

Terminology

Achalasia is a primary motor disorder characterized by incomplete relaxation of the lower esophageal sphincter (LES) and aperistalsis of the esophageal body, secondary to loss of inhibitory ganglion cells in the myenteric plexus. The etiology of the disease is unknown, with genetic, autoimmune, infectious, and environmental factors being implicated.

Peer review

This study is a systematic review of HM for recurrent achalasia. The authors show that HM achieves the best efficacy in patients with recurrent achalasia who were treated with HM as first-line therapy. It is a very interesting study.

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