Controversy in the Surgical Management of Achalasia Cardia

Lara Herbert and Cliona Lorton

INTRODUCTION

Achalasia Cardia is a primary oesophageal motility disorder, characterised by a hypertensive lower oesophageal sphincter (LOS) which fails to relax on swallowing, and by aperistalsis of the body of the oesophagus.[1, 2]

The aetiology of the disease remains unknown. Epidemiological findings rule out an infectious cause, and there appears to be minimal genetic influence.[3, 4] A viral cause is plausible but as of yet electron microscopy has failed to detect viral particles in the vagus nerve or in the oesophageal intramural nerve plexus.[5] The incidence of the disease is 1-2 per 200,000 per year, with both sexes equally affected.[6] Onset of the disease is typically between the ages of 20 and 50.

The principal lesion is denervation of the oesophageal smooth muscle.[7] While muscular abnormalities are also present, these appear to be secondary to the neural deficit. A decreased number of ganglion cells in the oesophageal intramural nerve plexus has been found in patients with achalasia, and the extent of this loss corresponds to the duration of the disease.[8,9] There may also be degenerative changes in the vagus nerve, both in its branches to the oesophagus and in the dorsal motor nucleus.[10] The interaction between nerve plexus and vagus nerve lesions is not yet clear.[8] In both cases, the loss predominantly concerns inhibitory neurons. [8,9,10] This would explain the increased basal LOS pressure as well as the inadequate sphincteric relaxation observed on swallowing. Degeneration of the oesophageal ganglion cells leads to permanent aperistalsis as the disease progresses and favours oesophageal dilatation.[7]

Progressive dysphagia is the most common presenting symptom. It generally concerns both liquids and solids from the outset. The second most common symptom is the regurgitation of undigested food during or shortly after a meal. Approximately 36% of patients present with sub/retrosternal pain and a similar percentage with heartburn.[11] Weight loss is a very common finding in patients with achalasia due to decreased food intake, and is a good indicator of the chronicity and severity of the condition. Patients may complain of nocturnal coughing if there is overspill of oesophageal contents into the trachea, which is increased in the supine position.

Pulmonary infiltrates resulting from aspiration constitute a rare, but severe, complication.[7]

Diagnosis of achalasia cardia is based on history, barium swallow with fluoroscopy, upper endoscopy and oesophageal manometry.

Pseudoachalasia can occur in a number of conditions, most commonly in gastric adenocarcinoma.[12] The mechanism may be infiltration of the oesophageal nerve plexus or constriction of the distal oesophagus by the tumour mass. Endoscopy can be used to rule out this differential diagnosis, which is more common among older patients, who usually present with marked weight loss. Oesophageal squamous cell carcinoma, lymphoma, lung carcinomas and a number of other malignancies can also cause pseudoachalasia. Other conditions which can mimic achalasia include Chaga's disease, amyloidosis, sarcoidosis, oesophageal stricture,

chronic idiopathic intestinal pseudo-obstruction and post-vagotomy disturbance.

TREATMENT

As the degenerative neural lesion of this disease cannot be corrected, treatment is directed at palliation of symptoms and prevention of complications. Effective peristalsis is rarely restored by successful treatment, but improved oesophageal emptying and a decrease in oesophageal diameter are generally expected.

Four palliative treatments are available: pharmacotherapy, botulinum toxin injection, pneumatic dilatation and myotomy. They all aim to decrease LOS pressure and improve emptying by gravity.

Pharmacotherapy :

Smooth muscle relaxants alleviate symptoms and improve oesophageal emptying in up to 70% of patients. Nitrites, such as sublingual isosorbide dinitrite, and calcium channel blockers, such as diltiazem, nifedipine and verapamil, have this effect.

The role of pharmacological agents in the long-term management of achalasia is unclear. It is not known whether their long-term use prevents dilatation and complications. This treatment option is suitable for patients with medical conditions that interfere with pneumatic dilatation or myotomy. Also, patients with severe weight loss can be treated pharmacologically until a healthy nutritional status can be re-established, making them better candidates for other forms of treatment.

Botulinum Toxin:

Botulinum toxin type A is derived from the controlled fermentation of Clostridium botulinum. The toxin binds to presynaptic cholinergic neuronal receptors, is internalised, and irreversibly interferes with acetylcholine release, probably by preventing the neurotransmitter vesicle docking

and fusing with the axonal membrane.[13]

Pasricha and colleagues first demonstrated the similar ability of botulinum toxin to decrease LOS

basal tone and improve symptoms in patients with achalasia. [14]

An initial, beneficial response at the level of the LOS occurs in 90% of patients, but symptoms

reappear within a year in many initial responders.[15] Side effects of this treatment are rare, but include chest discomfort for a few days after the injection and an occasional rash.

The best use of botulinum toxin injection in achalasia is still being explored, but this seemingly safe approach with little apparent morbidity may be of great advantage when a short-term treatment response is desired.

Dilatation:

Forceful dilatation of the gastroesophageal sphincter to a diameter of approximately 3 cm is necessary to tear the circular muscle and to ensure a lasting reduction in LOS pressure. Many types of dilators have been developed for this purpose, but it is pneumatic dilators which are conventionally used today.

The technique of dilatation, inflation pressure and duration of inflation varies. Water-soluble contrast material is used to detect distal oesophageal leaks. Surgical consultation is undertaken if perforation is evident. Small perforations are managed conservatively with broad-spectrum

antibiotics.[16] Clinical deterioration e.g. shock, sepsis, haemorrhage or a finding of free-flowing

barium into the mediastinum, requires immediate thoracotomy and repair.

At least 60% of patients have a good response and success rates exceeding 95% have been

reported.[17] The response rate varies with patient age, (younger patients do not do as well as older patients), and duration of symptoms, (those with a shorter history do not respond as well), but it does not seem to be related to the degree of oesophageal dilatation or tortuosity. The efficacy of this procedure is decreased by as much as half with each subsequent dilatation.

Morbidity is mostly related to oesophageal perforation, a complication in approximately 5% of

patients, but surgical repair is required in less than half of these cases.[17] Perforation may be more likely in severely malnourished patients, which raises the possibility that re-establishment of

a good nutritional status decreases the complication rate following dilatation.[18]

Surgery:

The goal of surgical therapy in achalasia is to decrease LOS resting pressure without completely compromising its competency against gastroesophageal reflux (GOR).

The Heller procedure was described in 1913 and now a modification of this procedure is used

most commonly in the surgical management of achalasia.[19,20] An anterior myotomy is performed by dividing the circular muscle of the oesophagus down to the level of the mucosa. The myotomy extends less than 1cm onto the stomach and to several centimetres above the palpable region of the lower sphincter. The transthoracic approach is preferred, as it helps confirm the diagnosis, allows careful palpation and inspection of the oesophagus, and enables the surgeon to extend the myotomy proximally as far as is necessary. Open myotomies have good results in 80-90% of

patients.[21,22] They decrease the LOS pressure more reliably, and therefore have a greater efficacy than pneumatic dilatation.[23]

Minimally invasive surgical procedures are becoming a preferable alternative to open myotomy,

allowing the Heller myotomy to be performed thoracoscopically and laparoscopically .[24,25,26] Shorter hospitalisation, less pain and early resumption of activity are the benefits of the minimally

invasive approach, which remains as effective as the open techniques in the relief of dysphagia.[27] Complications of minimally invasive surgery include: anterior gastric perforation, mucosal perforation at the gastroesophageal (GO) junction and, most significantly, GOR.

Surgery is not necessary for a patient who has few symptoms and minimal oesophageal dilatation. It is, however, required for those with dilatation and food retention to prevent serious pulmonary complications and, of course, to provide symptomatic relief.

Pre-Operative Evaluation:

- Symptomatic Evaluation

  The severity of the symptoms is scored by the patient by questionnaire before and after surgery.

- Barium Swallow

  This should be the first test performed in the evaluation of dysphagia. It usually shows a "bird’s beak" narrowing at the GO junction and oesophageal dilatation proximal to the narrowing.

- Endoscopy

Endoscopy should follow a barium swallow to rule out pseudoachalasia. It excludes gastroduodenal abnormalities, peptic malignancy and stricture.

- Oesophageal Manometry

  Typical manometrical findings are the absence of oesophageal peristalsis and a hypertensive LOS which fails to relax completely in response to swallowing.

- Prolonged Ambulatory pH Monitoring

  Prolonged pH monitoring is performed to determine if abnormal reflux is present. In patients who have a positive test result, it is essential to distinguish between true reflux and increased acidity due to stasis and fermentation.[28]

Post-Operative Follow-Up:

Patients are re-examined 2-6 weeks after surgery. Oesophageal manometry and pH monitoring are performed 2-3 months after the operation. Subsequently, patients are contacted for symptomatic evaluation.

Comparisons between therapies:

Pneumatic dilatation, pharmacotherapy and botulinum toxin injection are easy to use, usually well-tolerated and relatively cheap treatment options in achalasia. Surgery generally gives longer-lasting results as well as more complete relief of symptoms. Non-operative therapy is recommended initially. Patients are only referred for surgery if they remain symptomatic after 3 attempts at pneumatic dilatation.

Two studies done by Patti et al. (2001) and a study by Stewart et al. (1999 - comparing thoracoscopic to laparoscopic myotomies) indicate that laparoscopic myotomy is the superior approach, due shorter operative times and shorter duration of hospitalisation, as well as a more effective relief of dysphagia.[28,29,30]

THE CONTROVERSY

In the surgical treatment of achalasia, a balance must be found - there must be a sufficient decrease in oesophageal obstruction to provide symptomatic relief, but an excessive decrease in LOS pressure results in GOR. An anti-reflux procedure is sometimes added to avoid this. Laparoscopic procedures are either combined with a Floppy Toupet Fundoplication attached to the sides of the myotomy or a Dor fundoplication, known as the laparoscopic Heller-Dor fundoplication. There is, nonetheless, considerable debate surrounding the actual therapeutic value of such an addition.

Arguments against an Anti-reflux procedure after oesophageal myotomy:

It is clear that adding a complete fundoplication increases resistance at the GO junction and defeats the objective of the myotomy i.e. to decrease this resistance. There is, however, evidence that even partial fundoplication procedures, e.g. Toupet and Dor techniques, increase LOS resistance and could compromise the effectiveness of the myotomy. Ellis et al. (1984) have achieved excellent relief of dysphagia with Heller myotomy alone, with only 9-15% of patients having unsatisfactory results.[31]

Richards et al. (1999) studied gastroesophageal reflux in 75 patients who had been treated by myotomy without fundoplication. They discovered that there was only a very weak correlation between patients' perceptions of their GOR (heartburn symptoms), as evaluated by a

questionnaire, and objective measurement of reflux by a distal pH sensor.[32] This proves that heartburn symptoms are not a reliable indicator of GOR in achalasia patients and should not be used as a justification to perform a fundoplication procedure with myotomy.

Furthermore, the same author found that confirmed pathological acid reflux, present in only 13%of patients, does not conform to the usual Gastro-Oesophageal Reflux Disease (GORD) pattern. Reflux events in achalasia patients occur less frequently, are of a longer duration and happen

predominantly when the patient is supine.[33] This suggests that it is inadequate clearance of fermented food and/or refluxed acid, rather than true acid reflux, which is responsible for post-myotomy heartburn. This theory is strengthened by the finding, corroborated by Ellis, that the patients most likely to have such symptoms were those with the highest LOS pressures i.e. higher

resistance across the GO junction·[34] Thus a fundoplication procedure, aimed at increasing this resistance, could potentially worsen heartburn symptoms. Indeed, pathological acid reflux following myotomy with fundoplication has been found by Patti et al.(2001) and by Csendes et al.(1981) in 17% and 19% of patients respectively. This (shows that fundoplication clearly does not fully solve the problem of post-myotomy reflux. Bonavina et al (1992)., meanwhile, achieved a very impressive 8.6% incidence of reflux when myotomy was performed without an anti-reflux

procedure.[37]

Finally, the risk-benefit ratio of adding an anti-reflux procedure must be considered. Patti et al. noteed a risk of technical problems with a Dor fundoplication and suggest that these may be avoided by skilled surgery and meticulous attention to detail.35 However, surgeons may not perform these procedures with sufficient regularity to ensure this. A simpler procedure plainly reduces the risk of technical hitches.

As previously mentioned, Richards et al.(2001) report pathological acid reflux in 13% of patients

when myotomy is performed without an associated fundoplication.[33] Routine addition of an anti-reflux procedure would thus treat 87% of patients needlessly. This is particularly pointless when one considers the fact that medication frequently suffices to control reflux symptoms in this 13%. The dysphagia which results from an insufficiently lowered LOS pressure, meanwhile, requires far more drastic treatment measures, namely pneumatic dilatation or even further surgery.

Arguments in favour of an Anti-reflux procedure after oesophageal myotomy:

Iatrogenic GORD has only recently been given proper consideration and recognition. There are therefore a limited number of studies objectively documenting oesophageal acid exposure after treatment for achalasia. Those that are available reveal some interesting trends (Tables 1 and 2).

Table 1. Postoperative pH studies after transthoracic limited myotomy without fundoplication for the treatment of achalasia

Reference	Year	No. of patients	Postoperative pH positive result
Ellis et al.[32]	1984	103	8/19 (42%)
Shoenut J, Duerksen DA[40]	1997	15	6/15 (40%)
Patti et al.[28]	1997	10	6/10 (60%)
Total			20/44 (45%)

Table 2. Postoperative pH studies following laparoscopic myotomy and fundoplication for the treatment of achalasia

Reference	Year	No. of patients	Postoperative pH positive result
Bonavina et al.[45]	1995	193	7/81 (8.6%)
Mitchell et al.[46]	1995	14	0/5
Anselmino et al.[47]	1997	43	2/35 (5.7%)
Patti et al.[30]	1998	30	1/10 (10%)
Total			10/131 (7.6%)

Relevant to the "pro-anti-reflux procedure" argument is the fact that reflux-induced stricture after an oesophagea myotomy is a severe problem, and usually requires oesophagectomy for relief of symptoms.

Long-term data stress the need for anti-reflux protection. Malthaner et al. (1994) reported on long-

term clinical results in 35 patients with achalasia.[22] These patients had undergone primary oesophageal myotomy and Belsey hemifundoplication at Toronto General Hospital. The minimum follow up time was 10 years Excellent results were found in 95% of patients at 1 year, declining to 68% after 10 years. It was concluded that there was a deterioration of the initially good results after surgical myotomy and hiatal repair, and that most of the deterioration was due to the

complication of GOR.[38] In another study, Ellis reported his experience with transthoracic short oesophageal myotomy without an anti-reflux procedure. 179 patients were analysed at a mean follow-up of 9 years, ranging from 6 months to 20 years. Overall, 89 % of patients were improved at 9 years post-operatively. Ellis also noted deterioration in good results with time. The fact that his clinical data was similar to findings in the Toronto study suggests the likelihood that reflux

played a significant role in his results as well.[34]

Another relevant finding of several recent studies is that a post-treatment sphincter pressure of

less than 10mmHg is required for long term relief of dysphagia.[39,40] This is relevant because it shows that near complete disruption of the sphincter is required to relieve dysphagia in the long term.

In one of the largest studies reported yet, Bonavina et al. (1992) report good to excellent results with transabdominal myotomy and Dor fundoplication. 94% of 198 patients had excellent/good outcomes after a mean follow-up of 5.4 years. A remarkable 81% of patients returned for post-operative 24-hour pH studies, of which only 7 (8.6%) had a positive test result. Oesophageal diameter was significantly decreased post myotomy, as was LOS pressure (40.5 +/- 9.7 to 11.7

+/- 4.7 mmHg).[37]

Zaninotto et al. (2000) reported results in 100 patients who underwent a laparoscopic Heller-Dor procedure. 70% of patients reported no dysphagia and 22 % complained of only occasional difficulty swallowing. 7 patients were salvaged by post-operative pneumatic dilatation. Of note, 24-

hour oesophageal pH monitoring showed abnormal reflux in only 5 (6.5%) of 63 patients tested.[41]

These studies confirm that laparoscopic Heller-Dor fundoplication achieves excellent medium-term results.

Patti et al. (1999) compared the outcome of 30 patients who had undergone laparoscopic myotomy with a Dor anterior fundoplication to that of 30 patients who had undergone thoracoscopic myotomy without anti-reflux repair. Dysphagia was well-relieved by both the laparoscopic and thoracoscopic groups (77% and 70% success rates respectively). 20% of patients in the group who did not have a fundoplication had a positive post-operative 24-hour pH

study result compared to only 3% following the Heller-Dor procedure.[30]

CONCLUSION

GOR is uncommon in achalasia patients who have not undergone surgery and most evidence suggests that pH proved-reflux is minimised by the addition of a partial fundoplication to a myotomy. Studies show that abdominal myotomy combined with fundoplication provides excellent symptomatic outcomes in both the short- and the long-term in patients with achalasia. Perhaps it is better to perform a partial fundoplication with a myotomy in a single operation, and thereby reduce the risk of reflux, than to risk post-operative reflux, its complications and with them, further radical surgery.

On the other hand, why complicate a surgical procedure with addition of fundoplication when such an addition risks compromising the very outcome of the surgery (i.e. by re-increasing the LOS pressure reduced by the myotomy)? Also, the fundoplication procedure has not yet been definitely proven to prevent GOR and, in any case, may be unnecessary in the majority of patients.

It is evident that there is an urgent need for in-depth study of this question. Only a randomised controlled trial of Heller myotomy, with and without an anti-reflux procedure, including full patient evaluation by questionnaire, manometry and 24 hour pH studies can provide a satisfactory answer.

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