

## Original article

# Laparoscopic treatment of achalasia: analysis of results and reflections on the technique

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## A B S T R A C T

**Introduction:** Heller myotomy using the laparoscopic approach is the best treatment that we can offer to patients with achalasia. On not acting on the cause of the disease, we can only alleviate the persistence of the symptoms, but not make them disappear.

**Objective:** To analyse the results of our group in the treatment of achalasia by laparoscopy.

**Material and methods:** The pre- and post-operative results are analysed of a series of 20 patients intervened prospectively by laparoscopy of achalasia during a period from May 2003 to April 2010. For this we used a modification of the grading scale of pre- and post-operative symptoms described by Velanovich for GER (a scale from 0-5). Data on the complications and the hospital stay were also collected.

**Results:** A wide Heller myotomy was performed using a Dor type antireflux mechanism. There were no oesophageal perforations or complications during the surgery. Two (10%) patients had postoperative complications. The mean hospital stay was  $3.11 \pm 2.13$  days. After a mean follow up of  $55.8 \pm 14.1$  months, the symptoms studied had significantly decreased after the surgery. Only 3 (15%) patients had clinical symptoms of GER after surgery. Nineteen patients (95%) said they were satisfied with the operation.

**Conclusions:** The laparoscopic treatment of achalasia is a safe technique, reproducible and effective technique, which achieves very satisfactory control of the achalasia symptoms with a minimum of morbidity.

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## Tratamiento laparoscópico de la acalasia. Análisis de resultados y reflexiones sobre la técnica

## R E S U M E N

**Introducción:** La miotomía de Heller por vía laparoscópica es el mejor tratamiento que podemos ofertar a los pacientes con acalasia. Al no actuar sobre la causa de la enfermedad sino que únicamente aliviamos la sintomatología la persistencia de los síntomas puede no desaparecer.

## Palabras clave:

Acalasia

Miotomía de Heller

Laparoscopia

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**Objetivo:** Analizar los resultados de nuestro grupo en el tratamiento de la acalasia por vía laparoscópica.

**Material y métodos:** Se revisan los resultados pre y postoperatorios de una serie de 20 pacientes intervenidos prospectivamente por vía laparoscópica de acalasia durante el período comprendido entre mayo de 2003 y abril de 2010. Para ello se ha utilizado una modificación de la escala de gradación progresiva de los síntomas pre y postoperatorios descrita por Velanovich para el RGE (escala de 0-5). También se han recogido las complicaciones y estancia hospitalaria.

**Resultados:** Se ha practicado una miotomía de Heller amplia asociando un mecanismo anti-reflujo tipo Dor en todos los casos. No se han producido perforaciones esofágicas ni complicaciones intraoperatorias. Dos (10%) pacientes han presentado complicaciones postoperatorias. La estancia hospitalaria ha sido de  $3,11 \pm 2,13$  días. Tras un seguimiento medio de  $55,8 \pm 14,1$  meses los síntomas estudiados han disminuido significativamente tras la cirugía. Sólo 3 pacientes (15%) han presentado clínica postoperatoria de RGE. Diecinueve pacientes (95%) refirieron estar satisfechos con el resultado de la intervención.

**Conclusiones:** El tratamiento laparoscópico de la acalasia es una técnica segura, reproducible y efectiva, que consigue un control de los síntomas de la acalasia muy satisfactorio con una mínima morbilidad.

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## Introduction

Achalasia is an uncommon oesophageal motility disorder, with an incidence of around one case per 100 000 inhabitants/year. It is characterised by the loss of peristalsis in the body of the oesophagus and the inability of the lower oesophageal sphincter (LOS) to relax.<sup>1-4</sup>

The most common symptom is dysphagia and, to a lesser extent, regurgitation and chest pain.

The cause is unknown and treatment is based on trying to alleviate dysphagia by reducing the pressure of the LOS. There are several ways to do this, including pneumatic dilatation, botulinum toxin injections, or surgery using the chest (conventional) or abdominal approaches. In the last decade, the laparoscopic approach has been developed and popularised. It has shown the same effectiveness as the conventional surgery mentioned above,<sup>5,6</sup> with the added benefits of being a minimally invasive technique with a reasonably low rate of complications and a good long-term outcome.<sup>1,2,4,7-11</sup>

In this prospective study, we analysed the results obtained by our group in the treatment of achalasia using the laparoscopic approach.

## Material and method

Between May 2003 and April 2010, 20 patients with achalasia underwent surgery prospectively by a laparoscopic approach.

Eight were men and 12 women. The mean age was  $50.5 \pm 5.6$  years (range: 21-73).

Two patients (10%) presented with associated gastro-oesophageal disease: one had a para-oesophageal hernia repaired during myotomy involving hernia reduction, suture of the pillars and anterior fundoplication. Another case had an oesophageal diverticulum in the middle third, which was not treated.

Five patients had previously undergone dilatation. Another patient was treated with botulinum toxin. In 14 cases, surgery was the first treatment.

## Surgical technique

A wide Heller myotomy was performed in all cases, 8-10 cm above the LOS and extending down onto the stomach 2 cm. The muscle was divided with traction-countertraction and surgical scissors, without using electric instruments to avoid mucosal perforation. Intraoperative fibrogastroscopy was carried out systematically. A Dor-type antireflux mechanism was used in all cases.

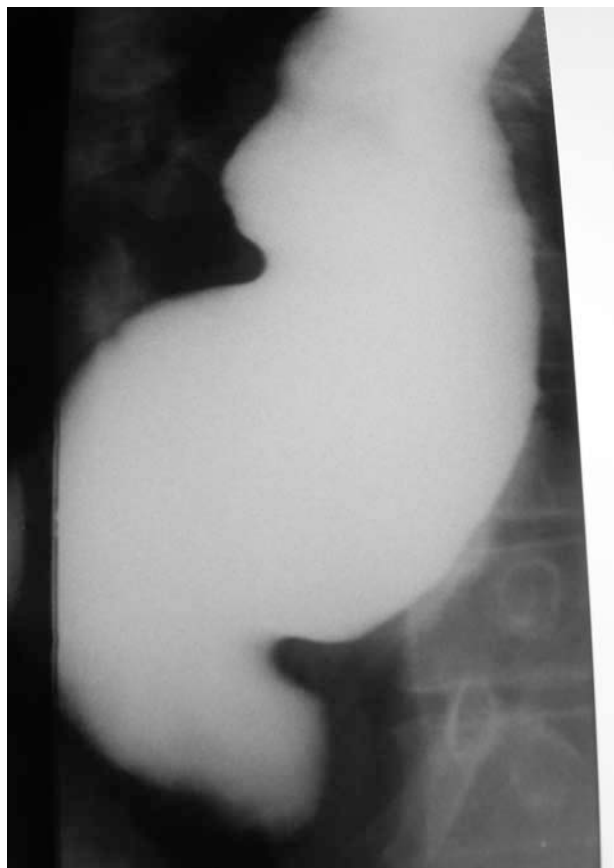
Twelve months after surgery all the patients underwent upper GI tract x-rays and fibrogastroscopy.

Given that there is no assessment scale for achalasia, to assess the results of the surgery, we used a modified version of the Velanovich scale<sup>12</sup> for gastro-oesophageal reflux, consisting of a progressive scale from 0 to 5 for grading pre- and postoperative symptoms (0: never and 5: several times a day) (Table 1).

All the patients completed the questionnaire before surgery. Between January 2010 and April 2010, they all underwent a follow-up study, completing the questionnaire again in order to compare results and assess the therapeutic efficacy of the surgery.

**Table 1 – Velanovich scale for GOR adapted for this study of achalasia**

0 = No symptoms
1 = Sporadic mild symptoms
2 = Unpleasant symptoms but not daily
3 = Daily unpleasant symptoms
4 = Symptoms affect everyday activities
5 = Symptoms are disabling and prevent the patient from doing everyday activities



**Figure 1** – Upper GI tract of patient with megaesophagus.

## Results

Laparoscopic surgery was performed in all cases without the need for conversion.

There were no cases of oesophageal perforations or intraoperative complications. Two patients (10%) suffered postoperative complications. One patient with a large megaesophagus (Figure) had postoperative pneumonia, presumably due to perianaesthetic aspiration. The other patient suffered from a haematoma at the site of trocar insertion in the left epigastrium, but no treatment was required.

The mean hospital stay was  $3.11 \pm 2.13$  days (2-12).

The mean follow-up was  $55.8 \pm 14.1$  months (4-82). The dysphagia was controlled in all cases, no patient requiring rescue surgery. This was the most intense preoperative

symptom with a score of 4.15, while in the postoperative follow-up it scored lower than other symptoms, 0.31 (Table 2).

Regurgitation and heartburn showed very similar trends. Before surgery the scores for these symptoms were below 2 and after the operation these decreased significantly to below 1 point, although heartburn was the most common residual symptom found in the postoperative period. Only 3 patients (15%) suffered postoperative GOR symptoms. One of the patients showed no endoscopic signs of oesophagitis and the results of pH tests were negative, although the symptoms were controlled with Omeprazole. In the other two cases the presence of GOR was confirmed. One of these was the patient with megaesophagus and postoperative respiratory complications, who had erosive oesophagitis, while the other patient had grade I oesophagitis. Both cases improved with proton pump inhibitors.

Chest pain also improved significantly after the myotomy, from 2.46 to 0.77 points. Although of a low intensity, it is of note that 11 out of the 20 patients suffered occasional chest pain in the postoperative period.

Nineteen patients (95%) said they were satisfied with the outcome of the operation.

## Discussion

Achalasia treatment does not address the cause of the disease, but rather aims to reduce the pressure in the lower oesophageal sphincter and ease the progression of the alimentary bolus through the oesophagus to the stomach. The aim is merely to relieve the symptoms.<sup>1,9</sup>

What is the ideal treatment? Much has been written about this, and in theory it is the treatment that is capable of producing an effective and long-lasting reduction in LOS obstruction with the least possible morbidity.<sup>1-6</sup> Studies have shown that pharmacological treatment with calcium inhibitors and botulinum toxin is less effective than endoscopic dilatation, and they are only indicated in patients with multiple pathologies not benefiting from more invasive treatment.<sup>1,4,13</sup>

Endoscopic dilatation is a fast procedure which patients can undergo as outpatients, it is cheaper and less painful than surgery and easy to repeat. On the other hand, there can be major complications, such as oesophageal perforation, described in between 1% and 10% of cases. Furthermore, it is ineffective in around 25% of young patients.<sup>13</sup>

Is surgery the ideal treatment for achalasia? Presumably yes, as the Heller myotomy has been shown to provide the most favourable and long-lasting relief of symptoms, around 85% to 94% at 10 years, while endoscopic dilatation and myotomy via thoracotomy can become less effective over time.<sup>2-6,13</sup>

The laparoscopic approach has advantages over laparotomy: it is less aggressive, reducing pain and disability time, postoperative complications and hospital stay, as well as offering a better view of the section of muscle fibres. For these reasons, most authors nowadays consider the laparoscopic Heller myotomy to be the treatment of choice for achalasia.<sup>1,2,4,7-10,14-16</sup>

**Table 2** – Results obtained by applying the Velanovich scale in pre- and post-operative periods

	Pre-op	Post-op	
Dysphagia	4.15 (0.38)	0.31 (0.63)	P<.001
Regurgitation	1.92 (1.12)	0.46 (0.88)	P<.001
Heartburn	1.62 (0.96)	0.85 (0.9)	P=.045
Chest pain	2.46 (0.88)	0.77 (0.93)	P<.001

Because this surgical procedure is not very prevalent there is a great deal of controversy regarding technical details involved such as the use of antireflux mechanisms, electric instruments, intraoperative endoscopy, or the length of the myotomy. There is no scientific evidence to this respect, but the literature is abundant.

Is fundoplication necessary? It seems clear that myotomy can cause GOR and patients are faced with either suffering achalasia or GOR. Moreover, we know that over 10% of achalasia patients suffer from concomitant oesophagogastric pathologies such as para-oesophageal hiatus hernia or oesophageal diverticulitis, which raises doubts about whether the symptoms are due to achalasia.<sup>17</sup> On the other hand, some authors think it is possible to undergo a myotomy without suffering from GOR and that fundoplication reduces the effectiveness of a myotomy and increases the risk of complications such as dysphagia.<sup>2,3,18</sup> Lyass et al,<sup>19</sup> in a meta-analysis comparing myotomies with and without fundoplication, found no significant differences between them regarding the incidence of postoperative GOR, which was around 10%.

The kind of fundoplication to perform is also controversial. Some achalasia experts<sup>4,6,14,20</sup> are in favour of a Dor-type anterior approach, preserving the posterior anatomic antireflux mechanism and covering the area of the myotomy, which is also useful if unnoticed oesophageal perforation occurs. Other renowned authors such as Millat,<sup>9</sup> Pellegrini,<sup>15</sup> and Arrixcaca's group in Spain<sup>5</sup> prefer a Toupet-type posterior fundoplication, attached to the edges of the myotomy, which helps to keep it open. In a multi-centre study comparing different fundoplications, Balaji et al<sup>11</sup> showed that anterior Dor-type fundoplications resulted in significantly less persistent heartburn (24% vs 42%) and postoperative dysphagia (4% vs 22%) than the Toupet technique.

We systematically performed anterior fundoplication and postoperative endoscopy showed only 2 cases (10%) of GOR among our patients.

What is the right length of the myotomy? A controversial issue, the proximal myotomy extends between 5 cm and 10 cm above the oesophagogastric junction. Millat<sup>9</sup> suggests that this should depend on the symptoms. Thus, when dysphagia is the main symptom it is not necessary to exceed 5 cm to achieve a satisfactory opening of the LOS, while if patients suffer a lot of chest pain before surgery, Millat favours extending the myotomy as high as possible. Over half of our patients complained of occasional postoperative chest pain. We should probably have prolonged the myotomy cranially in patients mentioning postoperative pain.

Extending the myotomy distally 1-3 cm below the LOS is recommended. It is necessary to divide the oblique muscle fibres of the stomach, as incomplete myotomy or fibrosis at the distal end of the myotomy are the main causes of relapse.<sup>4,18</sup> To ensure that the myotomy is performed correctly, like Cowgill et al,<sup>8</sup> we prefer to systematically perform intraoperative endoscopy to check the opening of the LOS and the correct passage to the inside of the stomach. We can visualise the myotomised segment by transillumination, as well as detect the presence of residual muscle fibres, gauge the length of the myotomy, and rule out unnoticed perforations.

Another matter of debate is the instruments used to perform a myotomy. Like Millat,<sup>9</sup> we favour dividing the muscles of the oesophagus without electric instruments to minimise the risk of perforations. However, other authors prefer to divide them with electrocoagulation hook and have not reported increased morbidity.<sup>1,18,19,21</sup>

How can the efficacy of a laparoscopic myotomy be assessed? Achalasia is an uncommon disorder about which no randomised studies have been carried out to clarify most of the questions addressed in this paper. Furthermore, as Robert et al<sup>18</sup> report, asymptomatic patients are unwilling to undergo postoperative endoscopic examinations. Specific quality of life studies for this pathology are not conclusive either,<sup>22</sup> and most series only assess the control of symptoms, considering the technique to be a success if there is a decrease in dysphagia symptoms of over 90% and postoperative incidence of GOR of around 10% in the short-to-medium term. However, we should bear in mind the long-term results reported by experts in open surgery,<sup>5,6</sup> who report that myotomy becomes less effective over time, calculating a success rate of 75% at 15 years.

Our results of the control of symptoms are very similar to those published by Trías and Targarona<sup>7</sup> and, more recently by Cowgill et al,<sup>8</sup> who state that 92% of a large series of 337 patients were satisfied with the outcome of the operation, reporting a significant reduction in postoperative symptoms. As in our study, heartburn was the most common residual symptom, it being more frequent than dysphagia.

The Heller laparoscopic myotomy is a safe, reproducible and effective technique which achieves a very satisfactory control of achalasia symptoms with minimal morbidity. Therefore, we consider it the treatment of choice for this disease.

## Conflict of interest

The authors affirm that they have no conflict of interest.

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