

LAPAROSCOPIC ESOPHAGOMYOTOMY FOLLOWING UNSUCCESSFUL PNEUMATIC DILATATION IN A PATIENT WITH IDIOPATHIC ACHALASIA

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SUMMARY – Achalasia is a relatively uncommon gastrointestinal disorder characterized by the absence of normal peristalsis of the esophagus and markedly diminished or absent relaxation of the lower esophageal sphincter during swallowing, caused by degenerative changes of parasympathetic innervation. All treatment modalities are palliative and include drug administration, endoscopic injection of botulinum toxin into the lower esophageal sphincter, pneumatic balloon dilatation, and surgery. Surgery offers the best longterm results and may be performed as an open or endoscopic procedure, the latter yielding excellent results accompanied by all well-known advantages of minimally invasive surgery. Presentation is made of a patient with esophageal achalasia who was treated with balloon dilatation and laparoscopic esophagomyotomy.

Key words: *Esophageal achalasia – therapy; Esophageal achalasia – surgery; Esophagus – surgery; Laparoscopy – methods; Balloon dilatation; Surgical procedures – minimally invasive*

Introduction

Achalasia is a relatively uncommon gastrointestinal disorder with an incidence of about 0.5 *per* 100,000 and prevalence of 8 *per* 100,000^{1,2}. The disorder affects males and females equally, and usually is a disease of middle age. The main features of the disorder are the absence of normal peristalsis of the esophagus and markedly diminished or absent relaxation of the lower esophageal sphincter (LES) during swallowing^{3,4}. This is caused by degeneration of the parasympathetic innervation of LES; the unopposed sympathetic tone causes failure to relax while swallowing^{5,6}. The end result of these slowly progressive changes is a range of symptoms that include dysphagia to

solids and liquids, regurgitation, chest pain and weight loss.

Various treatment modalities for achalasia exist, all being purely palliative since the esophageal motor function does not return to normal. The medical approach includes administration of sublingual nitroglycerin before or during meals, long-acting nitrates or calcium channel blockers. These agents are directed toward reducing the nonrelaxing LES tone and may relieve the obstruction to a certain extent, however, the results are questionable. Another nonsurgical approach to the problem is endoscopic injection of botulinum toxin (Botox) into LES, as described in 1995 by Pasricha *et al.*⁷. Definitive treatment requires disruption of the circular layer of the smooth muscle within LES. This can be accomplished nonsurgically through forceful pneumatic dilatation, first described in 1971 by Vantrappen *et al.*⁸.

Surgery continues to be the mainstay of treatment. In 1914, Heller⁹ described extramucosal esophagomyotomy, which has been reported to improve the symptoms in

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>85%-90% of patients¹⁰⁻¹³; this improvement of symptoms following surgery lasts for much longer than with nonsurgical approaches¹³⁻¹⁵.

With the advances in minimally invasive techniques in surgery, laparoscopic esophagomyotomy is now performed with excellent results that are comparable with open surgical treatment but carries a significantly lower morbidity, shorter postoperative recovery periods, and improved patient comfort. The endoscopic approach can be performed either thoroscopically or laparoscopically, the latter being clearly superior. Besides esophagomyotomy, cardiomyotomy is usually performed and may be followed by anterior (Dor) or posterior (Toupet) partial fundoplication. Nissen or Rossetti full wrap fundoplication may cause severe dysphagia as these patients have impaired esophageal peristalsis. At our departments, laparoscopic esophagomyotomy is performed without fundoplication, producing as good results as well.

This is a report of a patient with idiopathic esophageal achalasia successfully treated with laparoscopic esophagomyotomy at Sestre milosrdnice University Hospital, Zagreb, in May 2002, after unsuccessful repeat pneumatic dilatation.

Case Report

Our patient was a 56-year-old male whose first symptoms occurred three years prior to surgery. He had dysphagia and retrosternal chest pain. During that period, he was transferred once to Emergency Medical Service for com-

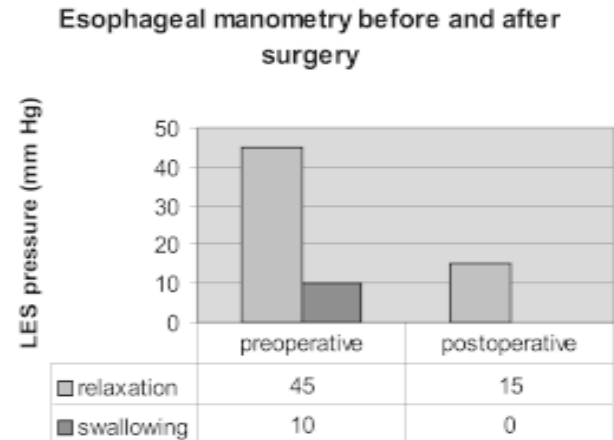


Fig. 1. Esophageal manometry: lower esophageal sphincter (LES) pressure at relaxation and swallowing before and after surgery.

plete esophageal obstruction by food, which was removed with esophagoscopy. He had no major complaints for two years when yet another complete esophageal obstruction occurred. Dysphagia was ever more pronounced, and regurgitation started to occur at an increased frequency. Pneumatic dilatation was attempted twice; the symptoms recurred within a week following each procedure. During the four months before surgery, the patient suffered a weight loss of about 14 kg.

Complete diagnostic preoperative evaluation for achalasia was performed, including history and physical examination, esophagogastrosopy, esophageal manometry (Fig. 1) and barium esophagography (Fig. 2a and 2b). The re-

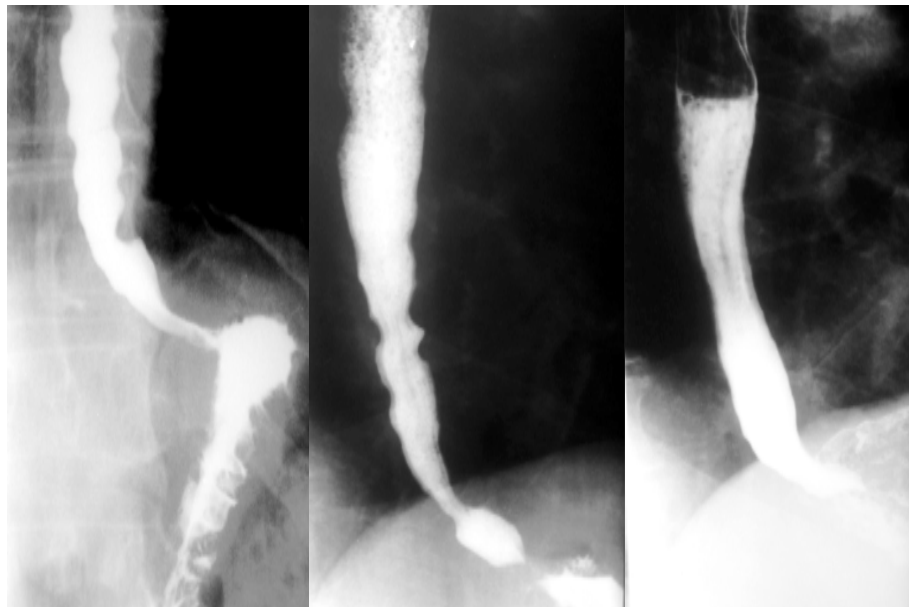


Fig. 2 a, b, c. Comparison of esophagograms: (a) eight months before surgery (left panel); (b) one month before surgery (middle panel); and (c) one month postoperatively (right panel).

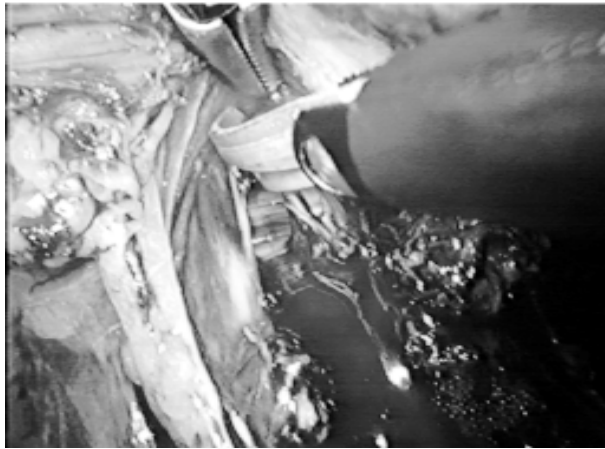


Fig. 3. Laparoscopic esophagomyotomy: esophagomyotomy with scissors is continued proximally into distal esophagus; extensive scarring is visible inferolaterally to the scissors and freed mucosa under the scissors.

maining diagnostic workup was the standard one for any routine operative procedure, i.e. chest x-ray, complete blood count, and basic laboratory parameters. The procedure itself was performed laparoscopically through five ports; the operating team consisted of the main surgeon, two assistants, and a nurse. Esophagomyotomy was performed (Fig. 3); the circular smooth muscle layer was disrupted with careful preservation of the underlying mucosa, which remained intact. Esophagomyotomy using a diathermy hook and scissors was continued proximally into the distal esophagus above the LES by 5 cm and distally down onto the stomach by 2 cm. Esophagogastrosco-

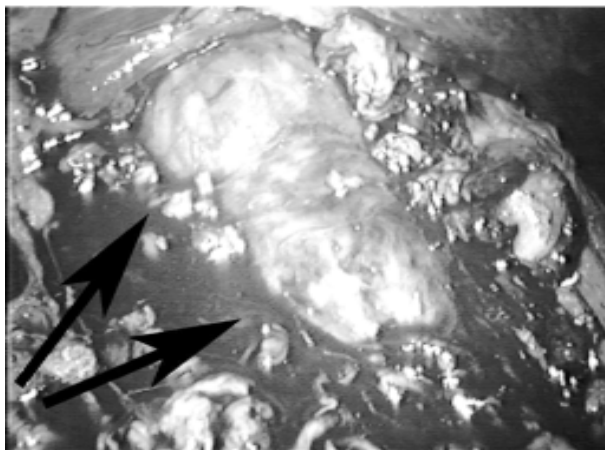


Fig. 4. Laparoscopy: distal esophagus following esophagomyotomy, visible bulging of intact underlying mucosa (arrows) as the balloon catheter is insufflated within the esophageal lumen intraoperatively.

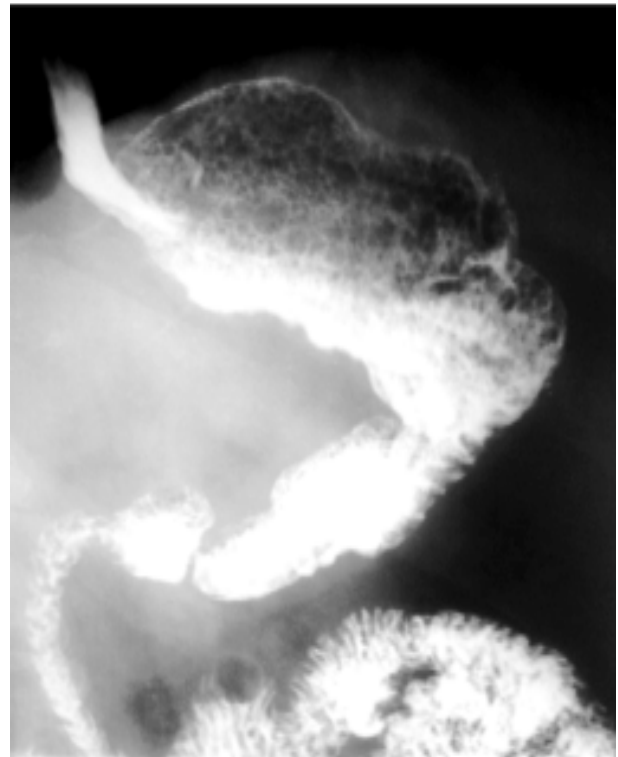


Fig. 5. Barium swallow: one month following surgery, wide lumen and excellent contrast passage through distal esophagus are visible.

formed intraoperatively and no disruption of the mucosa was observed. Free intraesophageal passage was also demonstrated intraoperatively with a balloon catheter (Fig. 4).

A Gastrografin swallow was performed 48 hours later, confirming that no mucosal tears had occurred and oral fluids were started. Ambulation commenced within 24 hours of the operation. The postoperative period proceeded uneventfully and the patient was discharged on postoperative day 4.

Control barium swallow was performed one month of the operation (Figs. 2c and 5). Control esophageal manometry was also done. The LES pressure was markedly decreased postoperatively, and was found to be within the normal values at relaxation and swallowing (Fig. 1). On follow-up visits two years after the operation, the patient was symptom-free.

Discussion

Achalasia is a relatively uncommon gastrointestinal disorder caused by significant reduction in the number of parasympathetic ganglion cells within the myenteric plexus. The main symptoms include dysphagia, weight loss,

and regurgitation. Achalasia is also considered a premalignant esophageal lesion. Carcinoma of the esophagus occurs due to mucosal irritation from retention esophagitis, and develops as a late complication in 1%-10% of patients within 10-25 years on an average, usually in the middle third of the esophagus¹⁶.

Achalasia may be treated with various treatment modalities, all being palliative. Treatment results vary, and treatment modalities may be combined, all with their advantages and flaws. Pharmacologic treatments are less effective and provide only temporary benefit. With the administration of botulinum toxin injection, the symptoms of achalasia are considerably reduced, however, the results are often only short-term. Two thirds of patients will require repeat injections of Botox and the interval between injections appears to shorten with each additional injection². Some specific groups of patients are good candidates for Botox injections, such as those who are too malnourished for surgery. Hence, botulinum toxin injections prepare the patients better for surgery by allowing normal food ingestion and more rapid weight gain than any preoperative total parenteral nutrition. Furthermore, the patients with other concurrent illnesses associated with a reduced life span or those in too bad a condition to withstand surgery are also good candidates⁶. Endoscopic balloon dilatation carries a 70% success rate and 3%-5% perforation rate, and is followed by a 24% recurrence rate^{5,17-20}. The procedure itself is quick, requires 24-hour hospitalization and can easily be repeated. However, the results have been generally poor in younger patients.

Surgery yields by far better outcome than any other treatment^{6,14}. Open surgical approach is by left thoracotomy or laparotomy, the transabdominal route being preferred as it provides better access to the LES and the cardia. Minimally invasive laparoscopic surgery carries highest improvement rate and high patient satisfaction as well as low morbidity; a significant improvement of dysphagia is observed in 92% of patients. The mean postoperative hospital stay is reduced (2.7 *vs* 8.8 days in patients treated by open surgery). Postoperative pain is reduced; postoperative use of narcotics is reduced by more than 50% in laparoscopically treated patients. The mean duration of absenteeism from work is also significantly reduced (19 *vs* 85 days)¹⁴.

Laparoscopic esophagomyotomy produces best results and should therefore be offered as the initial treatment for achalasia, especially to younger patients who seek longterm results. Previous Botox injections render surgery clearly more difficult. Horgan *et al.*²¹ found it difficult to identify

the mucosa or to dissect the muscularis off the mucosa in 50% of patients preoperatively injected with Botox, as compared with 10% of those not given Botox. Laceration of the mucosa was more likely to occur during the procedure, and when it occurs, it is accompanied by the risk of infection or subsequent scarring that may lead to dysphagia. The role of preoperative endoscopic dilatation is less clear and somewhat controversial^{17,22}. Most studies have shown that surgery is more difficult following dilatation due to subsequent scarring that occurs in a limited plane of the submucosal tear and microhemorrhages.

In our case, as described above, the patient had previously undergone balloon dilatation and his symptoms recurred within a week thereof. Intraoperatively, we found extensive scarring at the site of previous submucosal tear, which rendered the procedure more difficult. Nevertheless, no major complications occurred and the procedure was successfully performed.

References

1. SWANSTROM LL, PENNINGS J. Laparoscopic esophagomyotomy for achalasia. *Surg Endosc* 1995;9:286-92.
2. SUAREZ J, MEARIN F, BOQUE R, ZANON V, ARMENGOL JR, PRADELL J, BERMEJO B, NADAL A. Laparoscopic myotomy *vs* endoscopic dilation in the treatment of achalasia. *Surg Endosc* 2002;16:75-7.
3. ESPOSITO PS, SOSA JL, SLEEMAN D, SANTELICES AA. Laparoscopic management of achalasia. *Am Surg* 1997;63:221-3.
4. MITTAL RK, BALABAN D. The esophagogastric junction. *N Engl J Med* 1997;336:924-32.
5. REYNOLDS JC, PARKMAN HP. Achalasia. *Gastroenterol Clin North Am* 1989;18:223-55.
6. ANDREWS CN, ANVARI M, DOBRANOVSKI J. Laparoscopic Heller's myotomy or botulinum toxin injection for management of esophageal achalasia. *Surg Endosc* 1999;13:742-6.
7. PASRICHA PJ, RAVICH WJ, HENDRIX TR, SOSTRE S, JONES B, KALLOO AN. Intrasphincteric injection of botulinum toxin for the treatment of achalasia. *N Engl J Med* 1995;322:774-8.
8. VANTRAPPEN G, HELLEMANS J, DELOOF W, VALEMBOIS P, VANDENBROUCKE J. Treatment of achalasia with pneumatic dilations. *Gut* 1971;12:268-75.
9. HELLER E. Extramuköse Kardioplastik beim chronischen Kardiospasmus mit Dilation des Oesophagus. *Mitt Grenzgeb Med Chir* 1914;17:141. (in German)
10. CSENDES A, BRAGHETTO I, MASCARO J, HENRIQUEZ A. Late subjective and objective evaluation of the results of esophagomyotomy in 100 patients with achalasia of the esophagus. *Surgery* 1988;104:469-75.
11. DeMEESTER TR, STEIN HJ. Surgery for esophageal motor disorders. In: CASTELL DO, ed. *The esophagus*. Boston: Little, Brown, 1992:401-39.

12. ELLIS FH Jr, CROZIER RE, WATKINS E Jr. Operation for esophageal achalasia: results of esophagomyotomy without antireflux operation. *J Thorac Cardiovasc Surg* 1984;88:344-51.
13. PATTI MG, PELLEGRINI CA, ARCERITO M, TONG J, MULVIHILL SJ, WAY LW. Comparison of medical and minimally invasive surgical therapy for primary esophageal motility disorders. *Arch Surg* 1995;130:609-16.
14. DEMPSEY DT, KALAN MMH, GERSON RS, PARKMAN HP, MAIER WP. Comparison of outcomes following open and laparoscopic esophagomyotomy for achalasia. *Surg Endosc* 1999;13:747-50.
15. BEKAVAC-BEŠLIN M, HOCHSTÄDTER H, PERIĆ M, MIJIĆ A. The role of mesh in the prevention of recurrence after laparoscopic operations for large paraesophageal hernias. *J Soc Laparosc Surg* 2002;6:288-9.
16. ZWISCHENBERGER JB, SCOTT KA, ORRINGER MB. Achalasia. In: TOWNSEND CM, ed. *Sabiston textbook of surgery: the biological basis of modern surgical practice*. Philadelphia: Sanders, 2001:720-2.
17. CSENDES A, BRAGHETTO I, HENRIQUEZ A, CORTES C. Late results of a prospective randomized study comparing forceful dilatation and oesophagomyotomy in patients with achalasia. *Gut* 1989;20:299-304.
18. KATZ P. Achalasia: two effective treatment options: let the patient decide. *Am J Gastroenterol* 1994;89:969.
19. PARKMAN HP, REYNOLDS JC, OUYANG A, ROSATO EF, EISENBERG JM, COHEN S. Pneumatic dilatation or esophagomyotomy treatment for idiopathic achalasia. Clinical outcomes and cost analysis. *Dig Dis Sci* 1993;38:75-85.
20. VANTRAPPEN G, HELLEMANS J. Treatment of achalasia and related motor disorders. *Gastroenterology* 1980;79:144-54.
21. HORGAN A, HUDDA K, EUBANKS T, McALLISTER J, PELLEGRINI CA. Does botulinum toxin injection make esophagomyotomy a more difficult operation? *Surg Endosc* 1999;13:576-9.
22. BECKINGHAM IJ, CALLANAN M, LOUWJA, BORNMAN PC. Laparoscopic cardiomyotomy for achalasia after failed balloon dilatation. *Surg Endosc* 1999;13:493-6.

Sažetak

LAPAROSKOPSKA EZOFAGOMIOTOMIJA NAKON NEUSPJEŠNE PNEUMATSKE DILATACIJE U BOLESNIKA S IDIOPATSKOM AHALAZIJOM

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Ahalazija je relativno rijedak poremećaj probavnog sustava kod kojega je odsutna normalna peristaltika jednjaka, te je znatno smanjeno ili odsutno opuštanje donjeg ezofagusnog sfinktera kod gutanja, što je uzrokovano degenerativnim promjenama parasimpatetične inervacije. Svi oblici liječenja su palijativni, a uključuju medikamentnu terapiju, endoskopsko ubrizgavanje toksina botulina u donji ezofagusni sfinkter, pneumatsku dilataciju balonom i kirurško liječenje. Kirurški pristup pruža najbolje dugotrajne rezultate, a može se izvesti kao otvoreni zahvat ili endoskopski zahvat koji daje odlične rezultate praćene svim dobro poznatim prednostima minimalno invazivne kirurgije. Opisan je slučaj bolesnika koji je liječen dilatacijom balonom i laparoskopskom ezofagomiotomijom.

Ključne riječi: Ahalazija jednjaka – terapija; Ahalazija jednjaka – kirurgija; Jednjak – kirurgija; Laparoskopija – metode; Dilatacija balonom; Kirurški zahvati – minimalno invazivni