Peroral Endoscopic Myotomy (POEM) in a Patient with Complete Heart Block—a Case Report

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Abstract Achalasia cardia is the commonest esophageal motility disorder. Recently, a new endoscopic procedure—peroral endoscopic myotomy (POEM)—has emerged for treating this chronic and debilitating condition. It has shown comparable success rates in prospective studies with conventional Heller’s myotomy with lesser rates of postoperative reflux. Literature regarding this procedure from India is scarce due to its limited availability. This case report illustrates the use of POEM in a patient with a permanent cardiac pacemaker and demonstrates its safety and efficacy in such a situation.

Keywords Achalasia cardia · Cardiomyotomy · POEM · Heller’s myotomy · Endoscopic myotomy

Introduction

Achalasia cardia is the commonest esophageal motility disorder causing dysphasia and impairment of quality of life. It results from failure of relaxation of the lower esophageal sphincter (LES) and reduced esophageal body motility. Conventional treatment for this condition is either endoscopic balloon dilatation or injection of botulinum toxin in the LES or surgical–laparoscopic Heller’s myotomy.

After emergence of the natural orifice transluminal surgical approach, Pasricha et al. [1] turned this idea into transesophageal endoscopic myotomy based on submucosal tunneling and performed a successful endoscopic myotomy in a porcine model. Inoue et al. [2] performed

the first series of peroral endoscopic myotomies (POEMs) for the treatment of achalasia in 17 patients. Selected centers all over the world are performing this procedure.

Here, we present a case of an elderly patient with an indwelling permanent cardiac pacemaker who underwent POEM for achalasia cardia.

Case Report

A 63-year-old male patient presented with dysphagia and regurgitation of food for the last 6 years. He was diagnosed to be having primary achalasia cardia based on endoscopy and high-resolution manometry. He had undergone multiple sessions of endoscopic dilatation with partial response.

Four years ago, he had an episode of syncope and was found to have a complete heart block and underwent placement of a permanent pacemaker (PPI). The pre-procedure high-resolution manometry showed the presence of type I achalasia cardia with median LES pressure of 52 mmHg (Fig. 2a.) After an informed discussion about possible options, POEM and laparoscopy, the patient and family consented to undergo POEM. The procedure was performed under general anesthesia. The pacemaker was converted to asynchronous VOO mode to avoid interference with diathermy during the procedure.

The POEM Procedure

A high-resolution gastroscope (Fujinon EG530WR) with a transparent ESD cap (Olympus Corporation, Japan) was used. Gastroesophageal (GE) junction was identified at 45 cm from the incisors; it offered significant resistance. The residue was cleared off from the esophageal mucosa by

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Fig. 1 The POEM procedure. **a** SM injection of saline solution on the posterior wall of esophagus at 28 cm to create a cushion prior to mucosal incision. **b** Endoscope in the SM space creating the SM tunnel by sharp dissection of the loose areolar SM tissue (*thick arrow*) using Hybrid knife™; the circular muscle layer is seen clearly at 6 o'clock position (*thin arrow*). **c** End-on endoscopic view of the completed SM tunnel; the circular muscle layer is seen clearly at 6 o'clock position (*thin arrow*). **d** SM injection extending beyond GE junction—seen as bluish hue and SM edema on retro-flexion from stomach (*arrow*). **e** Completed myotomy (divided circular muscle fibers are clearly seen—*arrow*). **f** Closure of the mucosal defect using endoclips. **g** Follow-up contrast swallow showing free flowing contrast across GE junction, no leak

copious irrigation of normal saline. Hybrid knife™ and Vio300D (ERBE Elektromedizin, Germany) were used for submucosal injection, incision, dissection, and myotomy. CO₂ insufflation was utilized throughout the procedure. The site of mucosal incision was at 28 cm from incisors (Fig. 1a). Submucosal plane was created and dissection was carried out in an antegrade manner up to 5 cm beyond the GE junction (Fig. 1b, c). Blood vessels were coagulated using Coag-Grasper™ atraumatic forceps (Olympus Corporation, Japan). Dissection beyond GE junction was confirmed by give-way feeling after crossing the LES and by observing a bluish submucosal hue in the fundus (Fig. 1d). Once tunneling was complete, myotomy was performed starting 2 cm beyond the site of proximal incision. Circular muscle fibers were divided in a linear fashion up to 3 cm beyond the GE junction (Fig. 1e). Once the LES fibers were divided, a significant reduction in resistance was experienced for endoscope passage. After completion of myotomy, mucosal incision was closed using seven hemoclips (Fig. 1f; Olympus Corporation, Japan). Total procedure time was 146 min.

No arrhythmias were noted during the procedure. Pacemaker was reverted back to synchronous mode post-

procedure. The patient was started on full liquid diet on the next day after a normal chest and abdominal radiograph and a normal contrast study. Free flow of contrast across the GE junction was seen (Fig. 1g). He was discharged on second post-procedure day.

Follow-up manometry at 4 weeks showed a reduction in LES pressure to a median of 4.7 mmHg and improvement in body motility (Fig. 2b).

Discussion

POEM has been reported only from one center in India to date [3]. Prospective series in world literature have demonstrated comparable rates of success between POEM and laparoscopic Heller's myotomy [4]. Safety of POEM has been well established in animal and human studies. Potential complications include bleeding, mediastinal leak with resultant mediastinitis, or pleural injury causing pneumothorax; the cumulative reported incidence being 16 % in one large series [5]. Post-procedure gastroesophageal reflux (GERD) has been reported with a varying frequency. Being a relatively new technique with limited data on long-term follow-up, it remains to be seen if the incidence of GERD after POEM varies from that of postsurgical or laparoscopic cardiomyotomy, where anti-reflux measures are a standard component of the surgical procedure [6]. Although POEM does not offer anti-reflux prevention, only the circular LES muscle fibers affected by achalasia are divided. It is therefore possible that the anatomic integrity of the LES is better preserved, thereby minimizing postoperative reflux.

Our patient had significant relief from dysphagia with objective improvement in manometric results. He was

Fig. 2 Manometry findings. **a** Pre-POEM—high LES basal pressures. **b** Post-POEM—reduction in basal LES pressures

started on diet the subsequent day and discharged. At 1-month follow-up, endoscopy showed minimal esophagitis that was asymptomatic.

Our case presented a unique challenge wherein an ample amount of electrocautery was to be used in a patient with an indwelling permanent pacemaker. Such patients are known to develop electromagnetic interference (EMI) due to the use of surgical electrocautery with an increased risk of intraoperative cardiac arrhythmias. EMI refers to the effect of an EM field on the function of any electronic device [7]. Factors that determine the EMI of endoscopic electrocautery devices with implanted devices include intensity of the generated EMF, use of monopolar cautery, and distance between the electrocautery application and the leads of the implanted device [8]. During POEM, monopolar electrocautery was used in the posterior mediastinum, which was very near the pacemaker device. The risk of EMI with resultant arrhythmias was therefore significant. By changing the synchronous mode (VDD) of pacing to an asynchronous mode (VOO), EMI was prevented and the procedure could be safely performed. The patient did not have any episode of arrhythmia during the entire procedure.

Our case report describes only the second use of this new endoscopic procedure (POEM) in India and is the first in literature to demonstrate its safety in the clinical setting of a complete heart block and cardiac pacemaker.

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