**Per-oral Endoscopic Myotomy; Indications and Techniques**

Hitomi Minami, M.D., Ph.D.
Department of Gastroenterology and Hepatology, Nagasaki University Hospital, Nagasaki, Japan

**Introduction**

Esophageal achalasia is a benign esophageal motility disorder resulting from impaired relaxation of the lower esophageal sphincter (LES). The etiology of the disease is still unknown. The principles of treatment involve compulsory disruption of sphincter at the esophago-gastric junction (EGJ), which includes balloon dilatation, botulinum toxin injection, surgical myotomy, and endoscopic myotomy (POEM; per-oral endoscopic myotomy). Pasricha et al. subsequently reported the first endoscopic muscular resection using a porcine model in 2007, Inoue invented the novel method of endoscopic myotomy for esophageal achalasia and performed the first case in 2008. POEM has since been introduced in many institutions throughout the world. Indications of POEM have become wider with new technical amendments being introduced as the procedure is both successful and minimally invasive.

In our hospital, 120 patients (male: female 54: 66) aged from 18 to 85 (mean 54.2, median 53 y.o.) underwent POEM since the introduction of the procedure in August 2010. This included 23 cases of sigmoid type achalasia and 5 patients with prior failed Heller’s myotomy. Mean disease history was 13.1 years (1~55 years, median 7 years).

**Indications for POEM**

1. **Esophageal achalasia and related diseases**

   Basically, all patients of esophageal achalasia can be the indication for POEM. Primary esophageal achalasia (type II) is the most common indication for POEM with a higher incidence than related conditions such as diffuse esophageal spasm (DES), Jackhammer esophagus. Patients with esophageal achalasia without spasm of esophageal body, sufficient endoscopic myotomy provides complete release of the tight esophago-gastric junction. DES and Jackhammer esophagus are also reported to be treatable with POEM. However, the ideal length of the myotomy is still controversial.

2. **POEM after previous interventions**

   Previous intervention such as botulinum toxin injection and balloon dilatation tend to cause greater fibrosis
and distort the anatomy making POEM technically challenging. This is particularly evident in patients with sigmoid achalasia as these patients also have a longer history compared to other achalasia patients. Despite these challenges, POEM was successfully performed in such circumstances albeit requiring greater operative experience and skill.

Onimaru et al., and Vigneswaran and colleagues reported excellent results in 19 patients who underwent POEM for failed surgical cases with significant improvement in both subjective patient parameters and objective outcomes. The theoretical advantage of POEM for patients with failed surgical myotomy is that the approach for a re-do myotomy is endoscopic in somewhat virgin territory allowing for any length of myotomy that is desired. This may be the treatment of choice for such patients and should be the subject of a randomized controlled trial to clarify this.

Technical aspects of POEM

1. POET (Per-oral endoscopic tumor resection)

Inoue et al introduced the concept of endoscopic nucleation of submucosal tumor (SMT) located in the esophagus or gastric cardia. This technique is an application of POEM with similar dissection techniques. Initially, a submucosal tunnel is created starting from 5 cm above the tumor. The tumor is then carefully dissected and removed en bloc from the muscular layer. The specimen is then retrieved through the submucosal tunnel and the mucosal defect closed with clips. This technique has been successfully used to resect submucosal tumors involving muscle up to 4 cm in size. This offers a safe and minimally invasive natural orifice surgical technique with a lower incidence of post-surgical stenosis.

Future prospects of POEM

POEM can be applied to treat a variety of esophageal motility disorders including all types of achalasia, diffuse esophageal spasm, jackhammer and nutcracker esophagus. However, there is still ongoing discussion about the role of POEM in the management algorithm of achalasia and where it stands in relation to balloon dilatation and surgical myotomy.

POEM has also provided access to the muscularis propria and further evaluation of muscle biopsies are crucial to greater understanding of motility and functional disorders of the esophagus and stomach. Sumiyama et al reported the first in vivo endocytoscopic image of muscle and ex vivo molecular imaging of myenteric neurons. It is with techniques such as POEM to enter the submucosal space that has driven research in the etiology of esophageal achalasia and its related disorders which further our understanding enabling us to come one step closer to improving management of such diseases.

Conclusions

POEM was introduced as the treatment that achieves both low-invasiveness and high curability, and has brought great amount of attention to the etiology of the disease itself. Further evaluation about the actual techniques and clarification of the etiology of the disease is awaited.
References


