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Peroral Endoscopic Myotomy in a Porcine Model: A Step to Achalasia Patients

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See “Peroral Endoscopic Myotomy for Treating Achalasia in an Animal Model: A Feasibility Study” by Byoung Wook Bang, Young Chul Choi, Hyung Gil Kim, et al., on page 54-58

Achalasia is an idiopathic motility disorder that results from degeneration of the myenteric plexus in the wall of the esophagus and the lower esophageal sphincter (LES).¹ In esophageal manometry, achalasia is characterized by impaired relaxation of LES and loss of peristalsis in the body of the esophagus. Achalasia results in severe dysphagia for solids and liquids. Additional symptoms can also develop such as chest pain, regurgitation, aspiration, weight loss, and irreversible dilatation of the esophageal body.

The therapy for achalasia focuses on the forced relaxation of the LES by endoscopic method or surgery. The treatment modalities using endoscopy or surgery have mainly included endoscopic pneumatic dilation and laparoscopic Heller myotomy (LHM). Recently, peroral endoscopic myotomy (POEM) has been introduced as a novel endoscopic procedure for the treatment of achalasia. A submucosal esophageal myotomy was first described in a porcine model by Pasricha et al.,² and POEM was first performed to achalasia patients by Inoue et al.³ Since 2010, several small-sized case series for POEM have shown safety and excellent short-term outcomes.⁴⁻⁶

The advantages of POEM are theoretically based on those of endoscopic operation such as no skin incisions, decreased pain, and less blood loss. Furthermore, POEM incorporates the advantage of LHM consisted of durable surgical myotomy and single procedure. A recent porcine study showed that the preservation of longitudinal muscle layer does not com-

promise the effectiveness of the myotomy.⁷

In a paper published in *Clinical Endoscopy*, Bang et al.⁸ reported a study that evaluated the feasibility of POEM in a porcine model. The authors showed successful POEM procedure and no definite perioperative complications in two mini pigs. After 2 weeks from POEM procedure, the histopathologic evaluation of the necropsy specimens revealed complete loss of the inner circular muscle and replaced fibrosis at the myotomy site. The authors concluded that POEM is a technically feasible treatment in the animal model.

This study has several limitations. First, the authors used only two pigs in the study. Second, the observation period was short for follow-up after the procedure. Third, the authors did not perform esophageal manometry to analyze the difference of LES pressure before and after the procedure. However, this study seems to be a step for transition of the treatment method for achalasia in the near future. In addition, this study was the first animal study of POEM in Korea. The porcine model is the most useful animal model for training in POEM because of its anatomy being similar to that of humans, although the normal porcine esophagus is thinner than the human achalasia-affected esophagus. And the porcine esophageal submucosal space is softer and more easily dissected than in humans. However, *ex vivo* porcine explants are a useful model for training of POEM as well as *in vivo* training.⁹

Several clinical data for POEM in human have been recently published. They suggest that POEM may soon replace traditional esophageal myotomy as the surgical treatment of choice for achalasia. A major advantage of POEM is the ability to control myotomy length. In POEM, myotomy is usually performed more than 10 cm and may be as long as 25 cm in previous case series.¹⁰ In contrast, surgical myotomy can be performed only a maximum of 8 cm in the length. POEM also permits any myotomy length required and in any direction,

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without injury to surrounding structures. Therefore, POEM can be considered for surgically failed cases or previous POEM failure cases. These are very important and major advantages of POEM.

In study of Bang et al.,⁸ the authors did not detect any evidences of complications in necropsy. However, previous human studies reported postoperative subcutaneous emphysema and pneumomediastinum on clinical grounds or computed tomography scan.⁹ Mild forms of pneumomediastinum or subcutaneous emphysema had no clinical consequences such as pneumomediastinum during thoracoscopic surgery. Other complications such as peritonitis, pneumoperitoneum, and mucosal damage at the esophagogastric junction have been noted, too. However, most complications were ameliorated by conservative and medical treatment.

Further long-term studies with a large number of patients from different centers are awaited. In Korea, few centers have performed POEM for achalasia patients since November 2011. The first Korean study of POEM in human will be published soon. However, further studies with a greater number of animals are still needed to evaluate other issues such as repeated sessions of myotomy, multiple myotomy at different sites, or training system using *ex vivo* or *in vivo* animal model.

Conflicts of Interest

The author has no financial conflicts of interest.

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