

Preface

One day in May of 2009, I was scheduled to perform endoscopic submucosal dissection (ESD) for a patient with a 1.5 cm long high-grade intraepithelial neoplasia (HIEN) in middle esophagus. The patient was transferred to the pre-operating room and the informed consent was obtained. Then routine steps of performing ESD went on one by one: the anesthesiologist prepared the patient with tracheal intubation, the patient was posed at a left lateral position, magnifying endoscopy, EUS and iodine chromoendoscopy. Right after iodine chromoendoscopy, I had to pause the operation for a while because the lesion was an 8 cm long circumferential one, which was greatly different from the pre-operational endoscopic diagnosis of a 1.5 cm lesion from another tertiary hospital. In 2009, the third year when I carried out ESD, I believed I was skilled in performing ESD and preferred to perform diagnosis and treatment for patients referred to me with indications of ESD from other tertiary hospitals and did not repeat the diagnostic endoscopy at a single time, and thus it was not the first time for me to encounter such a challenge during decades of my endoscopy career. I had to make a choice of performing ESD or not at that time. If the operation continued, I had to ensure the patient's safety, but it was a very challenging case which required a new solution for better outcomes. It was quite acceptable to quit in that situation, but I needed to find a good excuse for myself.

I am not a man who gives up easily and I am always ready to challenge myself. The surgery was carried on after a few minutes of struggling. First I adhered to the guideline that HIEN should be completely removed with a clear tumor free margin. Then I followed the standard process of ESD to remove that lesion. The boundaries were marked first, along with submucosal injection and circumferential incision of the mucosa deep to the submucosal layer respectively at the distal and proximal end, and then circumferential dissection was performed from the proximal incision. I had thought that the lesion could be dissected from the proximal to the distal end directly, but the operation had to be paused after 2.5 cm of circumferential dissection since the esophageal lumen was completely blocked by the incompletely dissected mucosa.

Everyone was nervous at that moment. The Chinese idiom "riding a tiger" would best describe the situation. If we stopped there, the procedure could be incomplete

and fail, and the lesions would not be completely removed. If we continued the surgery, it would be very difficult! The only way at that moment was to keep trying. We continued to achieve mucosal lifting by submucosal injection and separated the mucosa from the muscularis propria, with the endoscope going under the submucosa.... and the challenge with this process was different from what we did in the past. The marking edge became invisible then; however, the only way was keep trying to continue the operation. That's when we suddenly found a hole ahead of the tube. Could it be a perforation?

I was so nervous and could feel my heart beating at the moment, and I could not stop thinking about the horrible prognosis. However, I still kept trying to explore a little bit further, and suddenly the distal incision and normal esophageal linings were visible ahead of the endoscopy. I was much more relaxed. There was no perforation, and the endoscopy has just passed through the submucosal layer and through the distal incision into the esophageal lumen. A tunnel was established that travelled through the submucosal layer from the proximal top to the distal end across the entire lesion and this was a new creative technique. And it was a revolutionary landmark in gastrointestinal endoscopy.

Finally, it came through! Six hours had passed. Then we continued with the cycles of injection, separation, hemostasis and injection again, and after 9 h of endoscopic manipulation, the dissected tubular esophageal lesion had been completely removed and it had been sucked out when the endoscope was withdrawn. The removed tissues left the body slowly from where it had lived for 60 years. It was taken out completely by this new creative endoscopic technique.

I succeeded but was also exhausted and almost fainted at the end of that 10 h procedure. That 10-h procedure is the longest in my history of endoscopic operation. It was quite meaningful and worthwhile. It made me understand one fact that establishment of a submucosal tunnel could help us dissect the long circumferential lesions completely. By establishment of a submucosal tunnel, I resected several following long esophageal circumferential lesions successfully, and also came up with the new technique to treat and prevent the narrowing of the channel with retrievable full covered metal stents.

Year 2009 is a year of harvest. I presented a special report of the "Treatment of Esophageal Circumferential Lesions through Tunnel Technique" in an annual national digestive endoscopic meeting in Beijing. And I drew cartoon diagrams with real endoscopic pictures to help clarify the definition and the process of this new technique. I called it the tunnel technique because it is similar to canal construction in the field of engineering. That's when the medical term "tunnel technique" was created for the first time in China.

Time flies and 2010 soon arrived. As I am a faithful reader of the *Endoscopy* journal, one day an article caught my eyes. The word "POEM" appeared in a prominent position in the magazine. Wasn't this the tunnel technique? Why didn't I think of this? I thought that maybe I was so conservative. In the field of medicine, safety is very important, but how can we ensure patient safety? Then I started series of experimental animal studies of tunnel technique and did clinical studies of tunnel technique. I understood the meaning and value of this technique. This technique

divided the digestive tract into two layers. One layer was preserved and the other layer was treated to prevent perforation. And we started the research of gastric cardiac achalasia treatment with the POEM technique which has been gradually implemented and developed in our Gastrointestinal Endoscopic Center. With the successful application of tunnel technique in the dissection of submucosal tumors from the muscularis propria of the esophagus, the experimental research on reaching the mediastinum through tunnel technique also succeeded.

With the strong support of the Digestive Endoscopy Society of the Chinese Medical Association, the first Chinese digestive endoscopic tunnel technique forum was held in the ancient capital city of Xi'an in 2011, and the second forum was held in Taiyuan in 2012. The digestive endoscopy tunnel technique created a safe bridge between internal medicine and surgery, and it has started its journey in China.

Since 1987, I have engaged myself in performing endoscopic diagnosis and treatment and those most memorable achievements included ERCP (since 1990s), EVS and EIS (1990s), EMR (1990s), IDUS (1999), endoscopic fundoplication (2001), per-gastric endoscopy into the abdominal cavity (2001) that was later formally named NOTES, proposal of Ling A/B/C/D classification for post-liver transplantation biliary stricture (2005), ESD, proposal of LDRf classification for digestive varices, creation of digestive endoscopic tunnel technique (2009), use of full-covered metal stents for post-ESTD esophageal stricture (2009), POEM (2010), tunnel technique for treatment of large esophageal lesions, proposal of Ling classification for achalasia (2011), completion of RCT comparing POEM, BTI and BD (2012), ESD for early esophageal cancer on top of esophageal varice (2012), new conception for POEM like glassess style antireflux myotomy and myotomy in combination with BD (2012). My achievements in endoscopy in these years was a result of my interest, persistence and diligence in digestive endoscopy. And, it is also a result of the careful guidance and generous support from the older generation pioneers in this field, a result from the ideas which arose from communications with the older and younger generation of Gastrointestinal experts. It is impossible to get these achievements without the support and enthusiasm from the senior experts, professors and the leaders of the hospital and department. Thank you all very much.

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