

**PING-HONG
ZHOU:**

Good morning, ladies and gentlemen. It's my great honor to be here again. In this section, I will talk about the difficult endoscopy for a secondary resection, traction methods, and other assistive techniques for challenging cases.

So with wide use of endoscopy, we can now find many, many lesions on an endoscopy, such as early gastric cancer, early esophageal cancer, and some gastrointestinal submucosal tumors. So how to manage such submucosal tumors? So this is the approach performed in our center when we find a submucosal tumor in the gastrointestinal tract. After EUS and CT evaluations, for some intracavity lesions, if the patient has no symptoms, no indications, just follow up. If the patient wants to remove such lesion, or the lesion was about 2 to 5 centimeters, we decided to remove such lesions on the endoscopy. If the lesion comes from the second or third layer, we use a snare or endoscopic submucosal excavation to remove the lesion. If the lesion comes from the fourth layer, that means that the lesions comes from a deep layer, so in the esophagus, if the tumor is smaller than 5 cm, we always perform the STER. That is, we make a tunnel to remove the whole lesion. If the tumor is larger than 5 cm in the esophagus or the tumor is located in the stomach, duodenum, or colorectum, we always perform the endoscopic excavation, even in full-thickness resection.

So we first reported our work in 2011. So at that time, we reported our series of full-thickness resection work for gastric submucosal tumor with a 100% complete resection rate and without any complications. So for these lesions located in the gastric body, from CT scan we can see 1/2 of the tumor was extraluminal. So how to remove such lesions? I think for the endoscopic resection, that means perforation is inevitable. So we changed [INAUDIBLE] from the passive to the active [INAUDIBLE]. So we cut through the mucosa around the tumor. Then we cut the submucosal tissue. We cut through the muscle, and even including the serosal layer. That means a full-thickness resection around the tissue of the tumor.

So with IT knife, you can see here. This is the serosal layer of the tumor. So after the full-thickness resection, you'll find that this is the greater omentum, and this is a defect in the stomach. And in the resected specimen, this is the serosal layer. And this whole procedure is the full-thickness resection.

So this lesion looks very, very flat. Actually, it is totally extraluminal. So we first remove the mucosa, then cut through the muscle layers. After that, the whole lesion was totally dissected.

Let's look at this lesion. So from the endoscopic screening, we found the lesion here in the main portion of the stomach. CT scanning showed the lesion located here, so this lesion is in the extraluminal group. So we first make a hole in the stomach. Then, we found the lesion in the abdominal cavity, and this is the tumor. So after that, remove the whole lesion within the abdominal cavity. And here's the respected specimen, and this is a connection part of the tumor and here's the stomach. So the last diagnosis of this lesion is a GIST.

And this is another submucosal tumor located at the appendiceal orifice. The tumor was about 1.5 centimeters. So how to manage such submucosal tumors? EUS showed that the lesion comes from the muscle layer and was diagnosed as a GIST. So we decided to remove the whole lesion with his appendix through colonoscopy. So we decided to use the technique of full-thickness resection to remove the whole lesion and his appendix. So we made a full-thickness incision around the orifice. That means around the submucosal tumor in the orifice. So we cut through the whole layer of the cecum. So after that, we put the scope into the abdominal cavity and dissected his appendix from the mesentery. So during the procedure, we found that the bleeding came from the artery in the mesoappendix.

So we just coagulated this bleeding artery with [INAUDIBLE] and dissected the whole appendix from the [INAUDIBLE]. So after the full thickness resection, we can find this defect in the cecum. And there's an abdominal cavity, and there's a dissected [INAUDIBLE] appendix. And this is an appendectomy with full thickness resection with a colonoscopy.

So how to close the defect after full thickness resection? This is my first case of the full thickness resection in 2006. So this is the defect in the fundus of the stomach. So on the gastroscope, we can see that in this. Before this case, I had never seen the liver, had never seen the [INAUDIBLE] from the stomach. So at that time, I used several clips to close that defect in the fundus.

Nowadays, I think that metallic clip is always used after the full thickness resection. Sometimes, we apply and look around the metallic clips just in order to, for the strengthen the effects of the closure. So for this, for the help of the endoloop, such defect can be successfully closed with endoloop and several clips.

So combined with the endoloop and the clips, a new technique named string suture was performed now in China. So in the past, we always used an upper channel scope. But now, always use the [INAUDIBLE] scope to perform such procedure. So one channel for the endoloop and one channel for the clips.

So we'll just use several clips to fix the endoloop to the edge of the defect. So we always use seven, eight, or 10 clips. After that, we can close our endoloop with this special hook such that the defect can be closed.

So this is very simple, and it is very fast. As you know, in China, you know, we still don't have the surgeon devices such as over-the-stitch. So over-the-stitch is a very, very useful surgeon devices. But we did not have it on the market. Maybe next year, we can have it on the market in China.

So for the big defect in the esophagus, sometimes it is very, very difficult to close such a defect. As we know, the esophagus is a luminal organ. So for such huge defect, we always use the full-covered retrievable stent for large defect in the esophagus. So it's very, very easy to perform such a procedure. So [INAUDIBLE] two weeks later, such stents can be removed, and the wound can be healed very well.

So you know, regarding the full-thickness resection, perforation, or defect, the closure of the effect is not a problem. What's a big problem? I think big problem is the bleeding. Sometimes, we cannot manage such bleedings on the endoscopy. So for the surgery during the first resection, the main problem is bleeding. So even especially the bleeding comes from the serosal layer.

So this bleeding comes from the serosal layer during a procedure. So it's very, very difficult to catch such bleeding vessels from the stomach. So I tried to use the coagular grasper to catch such bleedings. But it failed. At that moment, I tried to use the big clip from the Boston Scientific-- that is Resolution-- to close the whole layer. That means including the mucosa, the submucosal layer, muscle layer, throat layer, including the bleeding vessels. So you can find these bleeding vessels still bleeding. Cannot clip the full-- can't stop with a coagular grasper.

So this is Resolution. I used a coagular grasper to stop the-- use Resolution to stop the bleedings. So now, the bleeding stopped.

So another evolution, another challenging case here. So from this screen, you can see that the front of the screen is red. So why? It is bleeding. So here is another bleeding comes from the serosal layer. So how to manage? So at that-- and this is a live demo case in China. So at that time, I changed to use a big snare to catch the whole lesion. And I cut it. So after that, the bleeding stopped. So this is a big snare. I just catch the whole tumor. And I cut it. And bleeding stopped.

So this year, last year, I had another case for the full thickness resection. And this is lesion actually located at the abdominal cavity between the liver and the stomach. After the full thickness resection, of the full thickness access in the stomach. So checked the lesion. And so the lesion was surrounded by gastric coronary vein. So this is a tumor, and this is a coronary vein.

So the lesion was surrounded big veins. So how to manage? Can we removed such lesions with a snare on the endoscopy? So we used a coagular grasper to stop the bleeding, to manage the bigger vessels. After that, the whole lesion was successfully removed.

So nowadays, after full thickness resection, we always we flex a scope in the abdominal cavity to check the whole layer of the stomach to see if there any bleeding vessels in the serosal layer. If we find it some minor bleeding from the serosal area, we can stop such bleeding in the abdominal cavity.

So for the bulk endoscopic procedure, nowadays, I always think how to make the endoscopic procedure even more safer, faster and simpler. So this is a gastric ESD I performed in 2012. That means seven years ago. Lesion's very, very big, about 15 times 12 centimeters. With hybrid knife, I hope, I think I can finish such procedure within three to four hours. But actually, I finished such procedures with seven hours, from the 3 PM till 10 PM.

So so after that, I considered, how can we shorten the procedure times? So ESD for the larger mucosa lesions, the bigger problem is how to maintain that direct visualization of the submucosal layer. So a simple technique that used the dental floss traction by facilitate ESD procedures were conducted in the world. [INAUDIBLE] in his next lecture, he will introduce many, many techniques about the dental floss traction.

So this is a clip-with-line method that you once used during the ESD technique. And this is a pulley traction. This is one clip and another clip is a pulley traction. Sometimes we used a continuous traction method. That means from the [INAUDIBLE], we can use the traction method to catch the tissue. And this is a magnetic anchor method.

So sometimes, that we can use an external forceps method. So this is a working channel on an endoscopy. And this is an external forceps. So we can also use the double-channel-scope method, even the double-scope method. So it's just in order to facilitate the whole procedure, robot-assisted method now is can conducted in Hong Kong and in [INAUDIBLE].

So this is a submucosa located in duodenum. The lesion was about 1 centimeter. So can we remove such lesions within fewer minutes? So nowadays, for the tumors are smaller than two centimetres, even from the muscle layer, I always choose a snare to catch the whole lesion and dissect it within a few minutes. So this is very simple. Even after the dissection, we can see the small perforation in the wand for this. Now, for the suturing, it's very, very easy to use several clips to close such small defect.

So last year, another live demo in China. So the lesion was about 3 centimeters. Originally, we performed the full thickness resection with IT knife, which is a hybrid knife. During the live demo, I just ask a nurse to queue my biggest snare. Everybody don't know what I will do. So I just used a snare to catch the whole lesions and remove such lesions within five minutes. So it's very simple and very, very fast.

So after that, we can see the defect about 2 centimeters in the fundus. So it is very easy for close for such a defect with several clips and the loop. And this is a serosal layer on the tumor and the defect in the fundus. So for the tumors smaller than 3 centimeters, I always choose the big snare to remove the lesions.

So big problem is whether the full thickness resection can be more simple, safe, effective with traction assistance and of the dental floss. So we tried to use dental floss traction during the full thickness resection. So we use clips and dental floss to catch the mucosa on the tumor so that the tumor can be exposed and the dissection can be performed very, very easily.

So for the full thickness resection-assisted dental floss has its own advantage. First, dental floss traction can help to expose the tumor boundaries so that operation field is clear, thus simplifying the operation process and significantly reducing the procedure time. And the second, dental floss traction can help to find the bleeding vessels for the prevention and early treatment of that bleeding. So and the third, I think, when tumor was completely resected, dental floss can also help to prevent the tumor from slipping into the abdominal cavity and help to remove the excised tissue.

So but such technique even has its own limitations, such as first, the metal clip during the procedure sometimes maybe fall off from the tumor. And the second, preparing such traction devices during the procedure sometimes is time-wasting.

So this is a full thickness resection-assisted pulley traction during the whole procedure. So from our preliminary experience, so traction method for challenging cases, first, it help to expose the tumor boundaries. And second, it makes it easier to identify the bleedings and prevent the tumor tissue from entering the abdominal cavity. So it can have the direct view, simplify the operation process, reduce the procedure time.

So full thickness resection is a minimally invasive technique that produced promising clinical outcomes as a minimally invasive approach to a resection of the gastrointestinal subepithelial tumors. So ladies and gentlemen, challenges still exist in the professional training, device promotion, and development. Thank you very much.

[APPLAUSE]