

CHRISTOPHER GOSTOUT: Well, good morning, everybody. We're about a minute or so from actually starting the live cases. And I just want to encourage everybody today to speak up. Share your thoughts. If you don't understand something, we'd be happy to explain it. If you don't like what you see, we want to hear that too. Because we want to understand why. And otherwise we want this to be a really, really interactive event. We've got a total of six hours of live cases. We should have at least three hours of lively discussion in-between those cases.

We will try to ask the endoscopist today-- I don't want to say endoscopist. I try to steer away from using the word endoscopy. I prefer to say endoluminal interventions, transluminal interventions. Because that kind of pigeon holes endoscopy into lower reimbursement status. And the kind of stuff we're seeing today is not, obviously, traditional endoscopy.

But at any rate, we'll try to interrupt the endoscopist and ask them questions when we can. Sometimes they prefer to do all the talking themselves. And that's OK. And we'll be polite. And sometimes they're a little too distracted to kind of catch what we're trying to ask them. But we will try to be as interactive as possible.

SPEAKER 1: So just as a show of hands, how many of you are new first time attendees?

Pretty good.

[SIDE CONVERSATION]

[SIDE CONVERSATION]

CHRISTOPHER GOSTOUT: OK. We're starting our first case with Dr. Zhou, master of POEM. And we're getting a glimpse of the lumen. Here comes the clinical scenario.

SPEAKER 2: Morning. We have a POEM here for after a failed Heller for Achalasia with Dr. Zhou.

So we have a 74-year-old gentleman with a past medical history of coronary artery disease, status post drug-eluting stent with subsequent CABG and aortic valve replacement, hypertension, and COPD. Who presents for treatment of Achalasia. Duration of symptoms were 72 months. He's an ASA Class III patient. He was previously treated with a robotic-assisted Heller myotomy with a posterior fundoplication back in 2013.

Presently he has no weight loss or retrosternal pain. But he has dysphagia and regurgitation with each meal, giving him an Eckardt score of six.

So in this esophagram, we see that's a stage two esophagus, 3.2 centimeters in width. And it's a non-sigmoid esophagus.

On high resolution manometry, he's found to have an Achalasia Type II with a basal pressure of 27.6 and an IRP, 19.8.

Two weeks ago, he underwent endoscopy with EndoFlip. And over here you'll see very low distensibility at 0.5.

PING-HONG Good morning. Hello.

ZHOU:

CHRISTOPHER Good morning.

GOSTOUT:

PING-HONG Yeah. [INAUDIBLE]

ZHOU:

So this gentleman was diagnosed as Achalasia Type II. Once had a Heller myotomy with a Toupet fundoplication. Now I put the scope into the patient's esophagus as you can see. The lumen was enlarged.

Push up forward. Forward. This is, I think, the EG junction.

Push. Push. Push. I can feel a little bit of resistance in this area.

And now the scope was in the stomach. So when I reflect the scope, you can see there's surgical changing in the fundus. This is the EG junction.

So the patient's EG junction, through the mouth about 40 centimeters. So the lumen is stretched. Lots of [INAUDIBLE].

Today I will perform the POEM for this patient.

CHRISTOPHER And what will you do? Anterior or posterior? How will the postoperative appearance of the fundus guide your decision as to which approach you'll take.

GOSTOUT:

PING-HONG Yeah. For the Heller myotomy, you always cut through the muscle. And make a different foundation in the anterior wall in the EG junction. So now the patient is on the supine position. So I will make a tunnel or cut to the muscle in the posterior wall. So always I make the incision or make a tunnel entrance about 10 centimeters proximal to the EG junction. So I will make an entrance 10 centimeters proximal to the EG junction, this area. In the 6 o'clock is a posterior wall.

ZHOU:

This is a HybridKnife T-type from ERBE, Germany. Open the knife, please. The tip of the T-type knife. So the solution I always use is saline. Where is the saline? With a little bit indigo carmine. No nephrine.

And this [INAUDIBLE] setting. For a POEM case, ours use forced coagulation in effect two. And the time interval is 3, 2, 4. So I always use this setting for the whole procedure of the POEM. Make an incision. Cut through the muscle for the hemostasis. No changing. I never change the soft coagulation or swift coagulation. Just the one setting, one mode.

CHRISTOPHER Have you always used that setting? Or is this what you've eventually evolved to finding to be the best for you?

GOSTOUT:

PING-HONG So I think such a setting can make the whole procedure very, very easy. So I never change the mode or change a setting.

ZHOU:

CHRISTOPHER So in the audience, how many folks are using ERBE that can relate to these settings?

GOSTOUT:

PING-HONG So now I use the tip of my part in the mucosal.

ZHOU:

It don't work?

OK.

But it don't work.

CHRISTOPHER You're trying to use the forced water jet to create your cushion.

GOSTOUT:

PING-HONG Maybe some problem with the pump.

ZHOU:

CHRISTOPHER Just to kind of review things. The patient had a Heller myotomy. So that's an anterior approach. And then had a

GOSTOUT:

wrap, which also will be anterior. And hence the reason to go posterior. It should be pretty wide open.

PING-HONG So why we choose a posterior wall? You can find the knife comes from the 6 o'clock. So what are we doing? Just

ZHOU:

fix the knife. And I touch the mucosa with my right hand to push and to pull the scope. So this would make the whole procedure very fast.

Now we're changing another pump. Another new pump.

Sometimes if the mucosa is very, very thickened, you cannot inject the saline into the submucosal layer. First we just cut the mucosa. Then inject the saline into the submucosal layer. First cut.

SPEAKER 3: I'm going to change the knife.

PING-HONG OK.

ZHOU:

CHRISTOPHER So he had mentioned that he mixes indigo carmine dye with saline. No epinephrine. And pretty standard

GOSTOUT:

solution.

PING-HONG For the incision, in China, we always make a longitudinal incision about 1.5 centimeters. In the past, some do a

ZHOU:

transverse incision.

For the transverse incision or transverse excess, you can put the scope into the tunnel very, very easier. Put the clip occludes of the suction transverse incision--

CHRISTOPHER We're going to switch you. We're going to interrupt you to switch to room 1 with Dr. Stavros while you're getting

GOSTOUT:

the irrigation water system in operation.

OK, Stavros. We're with you. You're looking rather casual there, my man, for such serious business.

STAVROS Long Island Life.

STAVROPOULOS:

CHRISTOPHER Yeah. I see that. So when we're all done, you're going to take the shirt off and show us your tattoo with it?

GOSTOUT:

STAVROS [LAUGHS]

STAVROPOULOS:

No tattoos. I'm a traditional guy.

So look I just want to show you briefly, so I can start the POEM going, the EndoFlip 2.0.

You can see the balloon shape, which is what you see on a typical EndoFlip. But now the pressures are being recorded on this time strip, which is moving. Let me show you. So I'm going to move it a little.

And you're going to see there's not much happening. So you cannot tell that this line is moving.

But you see this is like manometry. That down is time 5, 10, 15, 20, 25, 30 seconds, 40 seconds. And then the y-axis has basically the electrode number. And the color shows you the pressure or the distensibility, or the diameter.

So basically you can see now we get this pressure contour that is a bit like manometry. Real-time manometry.

You can see there's a fixed narrowing at the GE junction that is not changing.

This patient, the HRM was a question of whether it's Type II or Type III. This is a very thorny question because about, I'd say, 20% of manometries, the manometries is not sure. There are pressurization ways, but there's also some spasm distally. So it's not clear if it's Type II or Type III. For us surgeons, it's very important. Because Type III needs a long myotomy. Type II needs a short myotomy.

So how do you figure this out? There are alternative ways as you gain experience. The barium on Type III, sometimes you can see this lumen facing very tight contractions in the distal esophagus. You can look down the scope. And sometimes you can see a tremendous amount of activity going on during the beginning as you start cleaning the esophagus for the POEM.

Now we have an extra modality. This was published by Northwestern. Looking at this tracing as it runs across the screen. And you can see here, there are no contractions at all. So that favors Type II.

In a Type III, you would see this retrograde contractions running through the 16 sensors. This endoscopic balloon is longer. The normal one is eight centimeters because it's supposed to record the pressure at the GE junction. This is 16 centimeters long to show you a motility-like profile of the distal esophagus.

So you're going to see no activity really. It's just a fixed pressure. A fixed high pressure and small diameter at the GE junction. No activity in the distal esophagus.

So this is what I wanted to show you. So basically we're going to treat it like a Type II Achalasia. And do a short myotomy as opposed to a long myotomy with a Type III, 15, 16, 17, or longer myotomy.

So now you can move into the other rooms. I'm going to start the tunneling. And you can come back and forth in the rooms to show as the tunneling progresses in the different POEMs. I'll be starting my entry now. Hopefully you will show the entry by Zhou. Or you'll see the entry by Inoue. And then you can see how we all use different knives to extend the tunnel. So--

CHRISTOPHER OK. Great.

GOSTOUT:

STAVROS Thank you.

STAVROPOULOS:

CHRISTOPHER It's a nice demonstration of how EndoFlip can be very useful in any kind of luminal remodeling across the GE

GOSTOUT: junction. Whether you're doing a POEM and you're looking at the before and after. Or if you're doing an anti-reflux procedure, it can really help guide procedures like this.

OK. So I think we'll go back to Dr. Zhou in the first case.

[SIDE CONVERSATION]

SPEAKER 4: Good morning, everyone. I'll go over the case for Dr. Stavropoulos. This is a Per Oral Endoscopic Myotomy for Type II Achalasia, as he went over the EndoFlip tracing. This is a 39-year-old woman with past medical history significant for a class one obesity, who presented for management of her Achalasia. The duration of symptoms was 15 months. ASA Classification II. Prior treatment involved suboptimal bougie dilation with 46 French Maloney in April of 2017.

The Eckardt score total is 11, based on the symptomatology of weight loss, dysphasia, retrosternal pain, and regurgitation. This is the esophagram showing Stage I, 2.2 centimeter width of the esophagus. Non-sigmoid orientation. These are the high resolution manometry tracings that Dr. Stavropoulos was referring to. Basal LES pressure of 54.9 and IRP of 29.3.

So we'll go ahead and do the procedure.

CHRISTOPHER OK. We're also going to get a patient history for Dr. Inoue. This way we'll have all the patients summarized in
GOSTOUT: our brains as we go back and forth to the different rooms.

So while we're waiting for that patient history to come up, Dr. Zhou-- just for those who don't use ERBE, which looks like the majority of the people here. What he was trying to do was doing a forced water injection across the mucosa without the benefit of a needle injection. Which is the purported value of the ERBE system, which a lot of people like. It's kind of relatively a traumatic

OK. We'll get the clinical scenario behind the pediatric case that doctor Inoue is going to do.

SPEAKER 5:

Good morning. This is going to be a pediatric POEM for Achalasia. The case is an 11-year-old girl with Down syndrome, Hashimoto's thyroiditis. Status post repair of complete atrioventricular canal defect and duodenal atresia who presents for treatment of Achalasia. Duration of symptoms are 116 months. She's had self-induced vomiting since two years of age. ASA Classification II. She had a regular manometry in 2009 that showed complete aperistalsis with incomplete LES relaxation and hypertonic LES, consistent with classic Achalasia.

Prior treatment has included pneumatic balloon dilation. Four times, in 2008, 2009, 2011, and 2013. Patient has an Eckardt score of six with no weight loss or retrosternal pain. But has dysphagia with each meal and regurgitation with each meal.

This is the esophagram. You could see Stage II, 4.7 centimeters, non-sigmoid esophagus. And you could see the progression from 2011 to most recently 2018, as it's become more dilated.

This is an EndoFlip that was just done on March 12th. You can see the various readings, including a low distensibility of 2.1.

And this is the high resolution manometry tracing. You could see the Basal LES pressure is 19.8 and the Residual LES pressure is 16.

HARUHIRO

Hello.

INOUE:

CHRISTOPHER

Good morning.

GOSTOUT:

HARUHIRO

CJ, can you hear me?

INOUE:

CHRISTOPHER

Yes we can.

GOSTOUT:

We can't see you anymore. Now we can. We can both hear you and see you.

HARUHIRO

Yeah. Thank you. So this is directed at the esophagus as you can see. This is a pediatric patient. Type I Achalasia. Proximal part of the esophagus dilated. And also this patient received several times balloon dilation. So LES looks not so tight. This is a part of the LES. I'm gradually advancing the scope. We can recognize a palisade vessel here. You can see it. OK.

INOUE:

So this is LES. A little bit of pressure, but muscle tight. Junction is generally open at beginning of space of stomach. And then a little flex. Not so tight. So like this. Because it was a patient who received several times balloon dilation. So we back up.

Position of the [INAUDIBLE] junction is 35 centimeters from the patient's teeth. And then back up. So in this case, it's not necessary to put the long myotomy. Proximal fundus are totally dilated. And then back up. And in this case I will put the posterior [INAUDIBLE].

We can choose anterior also. But I think--

CHRISTOPHER GOSTOUT: Yeah. That's what I was going to ask you if having four balloon dilations, does that influence that decision in any way? Do you see more fibrosis from one approach versus the other? Or it's pretty random?

HARUHIRO INOUE: So most of the case of who receives a repeated balloon dilation is the junction, it looks not so tight. So in this case, if you do [INAUDIBLE] or 16 remarkably not so high. But the patient has the stack of the barium in the esophagus. And a repeated symptom of vomiting.

So back up seven centimeters from the junction. In this case, I think a short myotomy is OK. So we also use a saline plus blue dye. So first the injection. OK.

At the time injection, please confirm the lifting of the mucosa. OK. So five or six cc of injection. The most important is the lifting of the mucosa.

So now we are inserting the TTJ.

CHRISTOPHER GOSTOUT: For those who haven't done this yet, you're looking and you're watching this submucosal injection. It's rising. You can never use enough, OK. Because you got to remember this is an intramural method. So it doesn't matter how much of the lumen you're obscuring with your injection. You want to get yourself a nice plane within the submucosal that you could comfortably fit in advance.

HARUHIRO INOUE: So now we cut the mucosa approximately 32 centimeters. OK. Once again. Yes. I think a little bit more. OK. Place the TT knife into the submucosal space. And then cut a little bit more. OK. So that's enough.

And then we have to dissect some submucosal fibers using a splay coagulation. As a cutting current, we use Endo Cut I. For submucosal dissection, we need to dissect the submucosal fibers real good.

And then we will [INAUDIBLE] three uploads to the [INAUDIBLE].

OK. Flush. So flushing the water also creates a submucosal space.

In this case, a little bit fibrosis. But it's OK, I think.

Now I'm trying to back and forth in the scope. And then trying to get in the submucosal space. OK. Once again. OK.

CHRISTOPHER GOSTOUT: So the submucosal space is pretty easy to create. You can use a variety of things. You could use a soda straw and blow into it. And you could puff it up and get a nice space. He's using water and you'll see using the endoscope as well to dissect and open up the submucosal space. Works very, very nicely in the esophagus.

HARUHIRO So in order to get in the submucosal space is a little bit difficult in this case. So now I'm injecting the distal end
INOUE: of the mucosal flap in order to lift the distal end a little more. OK wait. OK.

CHRISTOPHER So why do you think it's tough to get into that submucosal space? You think the mucosa is just too resistant?
GOSTOUT:

HARUHIRO Yeah. Some [INAUDIBLE].
INOUE:

OK. Thank you. So once we get in the submucosal space, it's OK.

This part is the most difficult, I think. Generally. So at the time, we tunnel. Turn rotate the endoscope 180 degree with a flush.

CHRISTOPHER Yeah. I can see you're using a lot of rotational torque to try to encourage the tip of the scope in there.
GOSTOUT:

HARUHIRO A little bit fibrotic. So we have to dissect a little bit more. In a straight position. OK. And then go out.
INOUE:

CHRISTOPHER With these difficult entries like this, are you worried about inadvertently injuring the muscle layer
GOSTOUT: unintentionally?

HARUHIRO Yeah. That's right. So now, as you mentioned, we are trying to dissect a little bit submucosal fiber across
INOUE: through the muscle layer, southeast.

Hopefully we can get a better space. Wider space. OK. Maybe we can get in. Once we get inside of that, it's OK.

We can see a lift inside of the image. We can recognize the submucosal muscle needle out. OK. So we will dissect here. So a little bit dissection to the muscle layer also.

So this is the submucosal muscle. Splay onto the muscle. I hope we can get in the space.

OK, like this. So now we can recognize our circular muscle. So our top half of the image is a submucosal space.

CHRISTOPHER Yeah. It looks like you're finally getting in there now. This is an excellent example of difficult entries. Because
GOSTOUT: your scope winds up coming in perpendicular when you want to really be along the same longitudinal axis. And as you drive in perpendicularly, you're creating some risk. You can inadvertently drive into the muscle layer. You could perforate the muscle layer.

HARUHIRO Yeah. Thank you very much.
INOUE:

CHRISTOPHER And then you might have to select a different route after that.
GOSTOUT:

HARUHIRO Yes. That is the technique we use.

INOUE:

CHRISTOPHER This is definitely not your typical entry. Right?

GOSTOUT:

HARUHIRO Yeah. So now we are in our submucosal space. And after this, it's very easy. So now the injection.

INOUE:

[SIDE CONVERSATION]

Keep injecting. OK. Move out.

So like this. Now we can recognize very well our submucosal muscle and the submucosal layer. So it's not so difficult.

CHRISTOPHER OK. It looks like you've mastered the submucosal space. We're going to EndoFlip to room one right now and join

GOSTOUT: Stavros.

OK. Now you got a radically different view of submucosal space.

STAVROS This is a posterior POEM. You can see here on this, now Type II we decided, patient. You can see the opening. I
STAVROPOULOS: do a sort of transverse opening. Because it's easy. And it's easy to get in. And for overstates, it's easier to close a transverse opening without narrowing the lumen. Because he has a very narrow lumen than doing a longitudinal closure. If you use clips, you should do a longitudinal closure because it's easier to close.

You can see those contractions, right? That's for the manometry people. You see what's going on the esophagus. There's continuous contractions here that is very active. You see what's happening there?

CHRISTOPHER Right. It's pretty obvious.

GOSTOUT:

STAVROS But we didn't see it on the end of flip as retrograde contractions. So we are dealing with it as a Type II situation.

STAVROPOULOS: So the z-line is at about 39 here. So we start the tunnel at about minus 6 or so. Some people start at minus 10. So this is it, posteriorly. These are the landmarks. The spine is on the left. You can see here. Gravity here at 6 o'clock. Spine. And that is what we got. About 5 o'clock.

So then you get in. And then you can see here the muscle in the back. And we're about to enter the cardia. So you begin to see those spindle veins here. Let me do a little near focus. And you can see here the underwater magnification with near focus. You can see the spindle vein very nicely. These are in the areas where the muscle is very tight. You can see the other parts of the GI track too. So these are little aneurysm of dilation.

So you can see the cardia beckoning in the distance there. You see the nice easy, open space that we will get shortly after we pass this sphincter here. And then we'll do 2 centimeters and do the double scope transillumination. We use the I-type HybridKnife. You can see it's straight, very precise. And we inject saline.

And the settings on the cautery is Endo Cut Q, 3, 1, 1. Basically a very intense cutting current. And then we use force when we find vessels. Force is at effect 225. Sometimes I use 240 depending on how the conductance of the individual patient is. And that's how we coagulate the vessels.

And you can see that I show this on my lecture the mark we put to maintain posterior orientation. If you can focus and zoom on this part of the endoscope right here.

CHRISTOPHER Stavros, could you give us another little peek into the cardia? I want everybody to just put that in your mind's
GOSTOUT: eye. You can see just kind of a little ridge of muscle.

You see how that submucosa opens up suddenly? Then you kind of know you're finally entering the cardia. It's got a very distinctive appearance after you pass that speed bump.

STAVROS Can you zoom more? Or that's maxed?

STAVROPOULOS:

CHRISTOPHER OK. So you have your marker on the scope.

GOSTOUT:

STAVROS That's the green marker here. So you can see with that marker completely at 12 o'clock towards the ceiling, the
STAVROPOULOS: muscle is exactly at 6 o'clock. So as long as my marker on the scope is up and the muscle is at 6, I know I haven't spiraled. OK.

And now this is the cardia. Even just with insufflation, it opens up. So this is clearly the cardia. So we are continuing now with the dissection. This is the tricky part. Number one is passing through the muscle without injuring the mucosa. But number two is not running into a huge vessel in the cardia. And there are plenty of such penetrators.

Can you go up on the force to 40?

So here I'm going to use increasingly forced current to avoid accidentally cutting. They can be submerged. You can see the vessels there can be tricky to see. And if you cut one of those, these are much bigger than the esophageal body vessel. So that's the other thing that you need the attention. And one is crossing a tight sphincter. The other is not cutting one of the penetrators of the left gastric here. So [INAUDIBLE].

And then if you find a big one, if you can avoid it and deviate around it, this is sometimes better than trying to coagulate. See that's a small one. You can see this vessel here. This vessel is an artery because it has that pale contour around it. But it's small enough that this could be appropriate to coagulate with a knife.

CHRISTOPHER Stavros, when do you select between spray and forced? Can you, again, give us a general overview of your
GOSTOUT: decision making in those?

STAVROS I go back and forth. I'm in a forced period now. Probably if you look at my videos from last year or the year
STAVROPOULOS: before, I was basically using spray. They're very similar currents. Force is more controllable. But if you get an intense small [INAUDIBLE] from an ill-defined area. And you try with force, again and again. With force you have to be very precise. And you can't get it, then you can switch to spray. Spray is more like ABC. You don't have to be very precise. You just blast a two millimeter area and you get done.

But for the same reasons, you can end up hitting, accidentally sparking the mucosa. And then it gets unpredictably, because it's 4,000 volts. So it will go through the mucosa and then burn the surface where the resistance suddenly goes high. Because of the luminal air and water. So it will then blast the mucosa, having skipped the entire submucosal cushion where conductance is high. So spray is a little more risky. And it tends to clog the HybridKnife much more than forced, which doesn't usually clog. So, yeah, there are minor differences.

CHRISTOPHER OK. Thank you. We're going to switch to room two right now, OK?

GOSTOUT:

STAVROS Thank you.

STAVROPOULOS:

CHRISTOPHER We'll be back.

GOSTOUT:

OK. I see you're well on your way here.

PING-HONG I almost finished the tunnel making. So during the tunnel making, we can sometimes find some vessels penetrating from the muscle layer to the submucosal layer. This is a thick vessel, I think. There's an artery. So **ZHOU:** for this thick vessel, for beginners it is suggested to use as a Coagrasper to manage it. As we know, the HybridKnife have many, many, functions. One of the functions is hemostasis. So we can use this knife to manage such vessels.

How to manage? So you never use the tip to touch the vessel. We always use arm part of the knife to touch a vessel. Then coagulate it and cut it.

CHRISTOPHER Do you ever leave vessels just the way they are now and just avoid them? They're obviously nourishing the **GOSTOUT:** mucosa that we've separated. So do you ever leave them in place and just work around a vessel?

PING-HONG I always dissect vessels from surrounding.

ZHOU:

I always use the arm part to touch the vessel and to coagulate it. And there is no bleeding.

Here is also the submucosal layer. I just cut it. And this is the end of the tunnel. Here is another vessel. So just with the same technique, touch your vessel in the middle of the vessel. First coagulate, then cut it.

CHRISTOPHER So if you keep in mind what you saw with Stavros earlier. You see that appearance of the cardia, how that **GOSTOUT:** submucosa just really opens up. It becomes a real gauzy looking area.

PING-HONG So this is the end of the tunnel. Here is another thick vessel. I usually coagulate. Coagulate, not cut.

ZHOU:

CHRISTOPHER OK. We're going to shift back to Stavros. He's going to show us in contrast the use of a Coagrasper in a similar **GOSTOUT:** scenario.

PING-HONG OK.

ZHOU:

STAVROS OK. So this is a vessel penetrating in the cardia. You can see it has a victory sign. It's a V with two vessels
STAVROPOULOS: penetrating. The left is an artery because of the pale thick wall. This can go either way. So you can use forced starting farther away from it. It's probably an artery and a vein together. The vein is that bulgy, thin wall. The dark red vessel. And the artery is that pale muscular looking one. Wrapped together. There's one next to it.

You can try to use force. That's a bit of a gamble. Because first of all, the arterial lumen can be difficult to co-opt. Because of the heat sink effect. And number two, it's under tension. See, it's stretched. Which means if you injure the wall even a little without eliminating the lumen, it's going to tear. And then you have two bleeding ends of a one millimeter, 0.6 millimeter artery. So I'd better not gamble and use the Coagrasper.

CHRISTOPHER Stavros, I'm going to ask you the same question we asked Dr. Zhou. Do you sometimes just leave them? If
GOSTOUT: they're not going to be in the way of your myotomy, why fuss?

STAVROS Right. But the z-line is at 39 and about 40.5. And the most common reason for a failed POEM is an inadequate
STAVROPOULOS: cardia myotomy. So I have to go through there. And they're right in the middle of my field. So if you try to avoid them, which I do when at the edges. But the scope is closed. The cap could avulse them. Without even you seeing it. On withdrawing the cap, you just rip one of those. And then you have a problem. So this I cannot divert around. So I think they have to go. They are just in the middle of my field.

There's a Japanese study, interestingly, that describes a very predictable v-sign of vessels that should tell you that you need to stop there. So that's not quite that. But it's definitely something before its publication, for years we are calling them the stop sign. Because once you start seeing these multiple penetrators branching out of the muscle, you have probably got within a centimeter of being at an adequate cardiac extension of the tunnel. But I think I need another centimeter or so before I do the transillumination to confirm another [INAUDIBLE]. I'm just going to get them.

You can try to get both of them at the root. But if you rip there and it's bleeding, that's going to be right in the muscle layer. So that's a little more difficult to deal with. So you should go to the middle of it. And for arteries, you should do what the surgeons do. Like do two points even. Because they can be very pesky. The Olympus Coagrasper is a little hollow. Not as much as the hot forceps. But these are a little hollow. So you'll see what happens. You can leave a lumen. So let's see. Close. So I'm going to do the left bundle first.

And then after you finish, it's ripping already. See? Because it's under tension. And it ripped before these heads was coagulated. See there's a bit of oozing. So let go. So now we need to cut both the other vessels, but also the root of the first vessel, with a little bit of muscle to make sure we have everything controlled there.

CHRISTOPHER Stavros, do you make a specific effort to stay fairly distant from the mucosa?
GOSTOUT:

STAVROS Absolutely. Because you can see the current already traveled along the pathway of the vessel. So this is
STAVROPOULOS: probably maybe the most common cause of cardia mucosal injuries by experts. Is difficult vessels, maybe vessels that were accidentally cut and they're bleeding massively. Where things get a little bit chaotic and then you end up burning the mucosa.

See now we have two ends. This is coagulated. You need to see at least a millimeter of coagulum. If you just did the tip, the minute the cap squeezes the lumen, it could pop the coagulum and it could start bleeding. And this is the other half, which looks pretty good. Open. Now if it doesn't get unstuck like this, you may end up ripping the vessel. So you can do a little pulse of Endo Cut to get rid of it. OK.

CHRISTOPHER GOSTOUT: Great. That's great. It was real nice demonstration of preventive hemostasis. We're going to room three now with Dr. Inoue.

HARUHIRO INOUE: OK.

CHRISTOPHER GOSTOUT: OK. So where are you?

HARUHIRO INOUE: I will explain this. We are dissecting the lower esophageal sphincter but via backup. So we have already created the submucosal tunnel and started myotomy.

CHRISTOPHER GOSTOUT: Have you run into any surprises from the prior dilations? Did that alter your appearance or challenge your entry?

HARUHIRO INOUE: Yeah. In this case, we found lots of fibrosis. So it looks easy beforehand. But when we start the procedure of the [INAUDIBLE], the patient have lots of fibrosis in the submucosal layer. So a little bit difficult.

So we have already created the submucosal tunnel. And then this is our starting point of the myotomy. You can literally, hopefully, recognize the circular muscle bundle, that the muscle fibers lands horizontally. And then a longitudinal muscle behind. We have already dissected the circular muscle. And then we continue the dissection toward the GE junction. And the muscle fiber a little bit torturous.

But this originally be longitudinal vessel. And then we dissect the circular. And then we create some widths. So widen the space then our longitudinal muscle separate. And it looks like oblique. But this is a longitudinal muscle.

And then go down to the junction. So we have already dissected the circular muscle. A little bit of resistance. And then maybe this is behind a longitudinal muscle behind it. This must be a diaphragmatic crus. So then it's very difficult to pass through it, because she's a pediatric patient. So spaces are very narrow.

CHRISTOPHER GOSTOUT: Is it your intent to do a full thickness myotomy at this level?

HARUHIRO INOUE: Yes. Still, I'm trying to do a circular myotomy. Partial myotomy not a full.

So in this patient, the problem is the diaphragmatic crus. You can see it behind this [INAUDIBLE] one. Behind the longitudinal muscle layer is a diaphragmatic crus.

CHRISTOPHER Is that up at the 12 o'clock?

GOSTOUT:

HARUHIRO Yeah, 12 o'clock. That's right.

INOUE:

CHRISTOPHER Do you see that little pink area?

GOSTOUT:

HARUHIRO Yes. 5 o'clock also same. This is the diaphragmatic crus. And then now I'm trying to pass through it but it's very difficult. So we can easily confirm the diaphragmatic crus like this. Diaphragmatic crus make a contraction.

INOUE:

Keep it closed.

This is a easy demonstration. So this is the level over. Now close the--

CHRISTOPHER Kind of an electrical stimulation of the crus.

GOSTOUT:

HARUHIRO Yeah, electrical stimulation. But no reaction. Still this is not the diaphragm. Diaphragm will contract when we stimulate it. So this part is very tight and fibrotic.

INOUE:

Now the level of incision length of the endoscope is 35. So I will come back to a recent lumen and then check it. OK.

CHRISTOPHER So the concern here is whether or not he's really passed into the stomach. Because of the amount of fibrosis.

GOSTOUT:

And it's really important to take a look at the cardia to see if you can identify some dye that has now passed into the cardia. And if you've dissected down into the cardia, the overlying mucosa should start to look pale. So you'll see kind of a blue coloration and overlying pale mucosa, and you know you're in there.

HARUHIRO That's right. And now we are placing the endoscope 35 centimeters from the patient's teeth. So this must be a

INOUE:

junction. But we have not yet reached this area. So we have to continue step by step carefully.

CHRISTOPHER It is very tight in there.

GOSTOUT:

HARUHIRO Yeah, tight and a hard compact body. That makes the procedure a little bit difficult. But anyway, we will

INOUE:

continue. Once again, getting a submucosal space a flush a little bit. OK.

So this part is well done. And then as you recommended, we have to do the full layer dissection at the level of the junction.

So in this image, left hand side is the mucosa, back side of the mucosa. Right hand side is the muscle layer surface. But the endoscope is a little stuck here.

CHRISTOPHER Yeah. So it's really, extraordinarily tight. And you're running a high risk of inadvertently injuring the mucosa.
GOSTOUT: And getting a tear at that pinch is a real mess to try to handle. So I think you're going to try to cut the muscle to open it up and to give you a better path. So that's also a technique that can work in a tight scenario. Start the myotomy in a localized area.

We are going to switch to Stavros real quickly. OK? We'll be back.

STAVROS So we've finished the tunnel in the cardia. And this is what I was talking about, the two scope transillumination.
STAVROPOULOS: Dr. Inoue showed in his lecture, too described by this Portuguese group, [INAUDIBLE], back in 2013. Very useful in difficult POEMs to make sure that you extend the tunnel appropriately. Because you see it's two centimeters into the cardia. I left the dissecting gastroscope at the end of the tunnel. And I put a pediatric scope next to it in the stomach just to show the transillumination.

And you can see we kept the orientation perfectly. This is where a posterior POEM lies behind the scope. An anterior POEM lies at the bottom at 6 o'clock in this retroflex view. So this is useful when I do the anterior randomized trial. And I believe [INAUDIBLE] randomized to posterior. It's important to make sure that what you call anterior and posterior do not become the opposite during spiraling of the tunnel.

So this is all good. So now we're ready to start the myotomy. But before doing that, let me show you the real stop sign. Very similar to what the Japanese have described as a sign to stop, a big bifurcating red tree penetrating from the muscles. I'm removing the XP scope. And now we switch to the other one. This takes five minutes.

Haruhiro described the randomized trial where he took 70 minutes for this extra transillumination. But it depends on whether you have a second tower or not. Here we bring our portable tower. Sweet. That allows to also record the image from the XP. And then we switch back. It takes less than five minutes.

So here, now I'm back on the dissecting gastroscope. And you can see this big branching tree entering from there and supplying all these mucosa here. And I'm already at 42, and you see the tunnel is adequate on transillumination. So now I'm ready to start the myotomy.

So this is the sphincter. If it's very tight, sometimes I'll start cutting distal to proximal. Because in a very tight sphincter, if you start the myotomy here, when you reach the sphincter it can be very difficult to get back into the cardia. Because the scope is bulging into the mediastinum.

But here it's not so tight. So I'm going to start the regular way, proximal to distal, about two centimeters below the opening. So this is the opening. We're going to go two centimeters and then start the myotomy. If you want you can see the start of the myotomy or move to Dr. Zhou to see what he has.

CHRISTOPHER Yeah, we're going to move to room two.
GOSTOUT:

OK. We're here.

PING-HONG OK.
ZHOU:

CHRISTOPHER Yeah.

GOSTOUT:

PING-HONG Now I begin to cut the circular muscle. For the myotomy, I always use a technique named push and pull
ZHOU: technique. So I just fix the knife. Put the knife between the space between the circular muscle and the longitudinal muscle. And put the scope forward. So what do you do? Just push on the left so that the muscle can be cut. Then we'll be making the procedure very faster.

CHRISTOPHER Do you think for beginners this might be a little risky, inadvertently jumping up and hitting the mucosa?

GOSTOUT:

PING-HONG In the sphincter area, especially in the EG junction, you feel sometimes if you push on the left of the knife, the
ZHOU: tip of the knife will touch the mucosa. So the mucosa would be easier if you touch it. So sometimes on the strict side, I always put the knife on the muscle and I pull back.

CHRISTOPHER And when do you do full thickness? Do you do it across the EG junction, and then switch to circular only up into
GOSTOUT: the esophagus? What's your preference?

PING-HONG I always make a [INAUDIBLE] sectional myotomy around the EG junction. Or with two centimeters proximal to
ZHOU: the EG junction.

So here is a longitudinal muscle. You see the longitudinal muscle is very, very thin. Sometimes if the cap touches the longitudinal muscle, the longitudinal muscle will split automatically.

CHRISTOPHER Yeah, this is a very nice demonstration of the longitudinal muscle.

GOSTOUT:

PING-HONG For the [INAUDIBLE] sectional myotomy, I always put the knife outside of the longitudinal muscle.

ZHOU:

Then push your scope forward.

Push. Push. And this is four seconds.

This are is the EG junction area.

CHRISTOPHER So for the audience, you can see there's no longer any muscle fibers there. You're just seeing kind of the bland
GOSTOUT: looking perijunctional tissues.

PING-HONG So we always use this technique, push and pull technique, to make the myotomy so that the average procedure
ZHOU: time for POEM only 30 minutes in our center.

And this is a [INAUDIBLE] muscle.

CHRISTOPHER Now that push and pull technique, is that something that you could use with other needle knives? Or you think
GOSTOUT: it's just specific for the one you use?

PING-HONG Only one knife. No specific knife.
ZHOU:

And now I've finished the myotomy. So I can use this knife-- I'm going to use this knife to manage the [INAUDIBLE] vessels within the tunnel. So for the [INAUDIBLE], there is no change or exchange some other instruments either we make the core procedure very, very convenient--

CHRISTOPHER So you can see how that space is opening. So--
GOSTOUT:

PING-HONG Yeah.
ZHOU:

CHRISTOPHER --you don't even need to do an EndoFLIP. You can just kind of see how loosening--
GOSTOUT:

[INTERPOSING VOICES]

--that muscle really opens that whole diameter--

[INTERPOSING VOICES]

PING-HONG And now you can see the stomach is open. I reflex the scope to check-- [INAUDIBLE] to check the EG junction.
ZHOU: It's very difficult.

CHRISTOPHER So as you're inspecting from the mucosal side, you're also looking for inadvertent coagulation marks, right?
GOSTOUT:

[INAUDIBLE]

If you see a coagulation mark on the mucosa overlying your tunnel, do you do anything? Do you put a clip on it? Or do you just kind of acknowledge it's there, and we just keep an eye on it?

PING-HONG So I always use a clip to close those injuries, you know, on the mucosal side. So now I check there was any
ZHOU: bleeding within the tunnel that could-- the tunnel seems very clear.

CHRISTOPHER Yeah, it looks really good.
GOSTOUT:

PING-HONG No bleeding, so this is a result of the circular muscle in the outside of the tunnel.
ZHOU:

OK, I finished the myotomy, the main procedure of the POEM procedure. And next I will use a clip to close the entrance. So during a core procedure, we must now check on the patient to see if there's any [INAUDIBLE] that is tightening, if there's any, subcutaneous emphysema, and so on.

CHRISTOPHER GOSTOUT: Right. So we're looking for extravasated gas that may have tracked outside through longitudinal muscle layer or through that full-thickness portion of the cut. And you have to do an abdominal decompression.

And otherwise, you need to let your procedure room staff not get shocked when the patient wakes up and their face is all puffy from the subcutaneous emphysema that can happen. It resolves pretty quickly.

PING-HONG ZHOU: So this clip comes from the [INAUDIBLE] scientific. So we can rotate this clip by myself, by my right hand.

CHRISTOPHER GOSTOUT: Are you very compulsive placing clips? Do you want like one clip exactly next to the other? Or just generally closing the opening is fine with any number of clips? Or do you really try to stack them?

PING-HONG ZHOU: Yeah, the first clip, it suggests to close to the normal mucosa. Close, please.

SPEAKER 1: Close.

PING-HONG ZHOU: Fire.

[CLICK]

OK, and this is the first clip. Its place-- you put across a normal mucosa, you see? You see?

CHRISTOPHER GOSTOUT: Right. You've placed it across the normal mucosa, kind of pinch it and kind of-- and close-- make it a little easier to start to close the actual incision.

[INAUDIBLE], rotate, rotate, rotate. OK, stop. We just put the arms of the clip across the incision, across the incision. Then we suction. Close, fire.

[CLICK]

That's OK. One more, please. One more, please. OK. [INAUDIBLE], please.

So I will put on clip between these two clips. I think it's the distance it needs to be.

Close, please.

SPEAKER 1: Close.

PING-HONG ZHOU: Fire.

[CLICK]

Yeah. One more, please. One more, please.

SPEAKER 1: Do you want me to put an extra one, too?

PING-HONG Ah--

ZHOU:

CHRISTOPHER So, as you see, we did already three clips. And the cash register is ringing as you're adding more clips.

GOSTOUT:

[INTERPOSING VOICES]

So you have to be confident in your clip placement. Make sure it's, you know, it's sealed. You don't have to go crazy and stack 10 clips there. But you just need to make sure you've got the mucosa closed.

PING-HONG Close.

ZHOU:

CHRISTOPHER It seals pretty quickly. The time--

GOSTOUT:

PING-HONG Fire.

ZHOU:

[CLICK]

CHRISTOPHER --that is, within 24 hours or so.

GOSTOUT:

PING-HONG One more, please.

ZHOU:

CHRISTOPHER OK, we're going to switch to room 1 and rejoin Stavros. Bye, bye.

GOSTOUT:

STAVROS So we are done with the myotomy here. You can see that penetrating vessel actually from both sides of the **STAVROPOULOS:** muscle there and tearing. And there's a bunch of muscles and vessels that you have to avoid when you dissect.

This is that membrane that we keep intact--

CHRISTOPHER Right. So, as we asked Dr. Zhou, you're also doing full-thickness across the EG junction?

GOSTOUT:

STAVROS Right. See, I start-- this is circular only. You see in the esophagus? So the circle is maintained here.

STAVROPOULOS:

CHRISTOPHER Right.

GOSTOUT:

STAVROS It splits, however, because of pressure from the skull, see? But then at the sphincter with the full-thickness, so **STAVROPOULOS:** starting here is full-thickness all the way down to-- I don't know. This is-- what is this? Maybe I should cut it?

[INAUDIBLE]

CHRISTOPHER Yeah, there's some big vessels, as you can see, beyond that membrane. So you have to be kind of careful even though you're going full-thickness. That's the intent.

STAVROS [INAUDIBLE] OK, so anyway, some people think that submucosa, or maybe here in the serosa that contributes to that tension in the sphincter, I don't know. But this is now a complete myotomy. And we're going to close with [INAUDIBLE].

Oh, let me show you that pull-- the pull/push technique is also possible with this knife, and also the [INAUDIBLE] knife. What is the push/pull? Because I'm not sure if Professor Zhou was very clear. So basically, when you have a tight sphincter, when you start, you cut this way. You push the scope and you hook and cut, hook and cut, hook and cut. That means you cut from-- they are starting with the mucosa.

Once you get to the sphincter, where things are really tight, this technique would end up burning the mucosa. So at least for half the thickness of the sphincter, you hook the muscle from the top, and then you cut by pulling that scope backwards and pushing that dial down.

Here you have to be careful not to injure them in their sternum. In the push technique, you have to be careful not to injure the mucosa. So you just push, hook, cut, push, hook, cut. On the sphincter, you hook, push down, and pull until you are through the sphincter. That's the push/pull. It's very useful when the sphincter is tight and mucosa is very close to it.

CHRISTOPHER Yeah, that's a good point.

STAVROS So that's it. You can switch to another. You can maybe come back for the suturing?

CHRISTOPHER Yeah.

STAVROS OK.

CHRISTOPHER So we just saw a closure of the tunnel with clips, using four clips, and it would be nice to come back and have you close this transversely with a suturing device.

STAVROS And you can see the opening now, right? There's a little bit of injury from the end of [INAUDIBLE], but nothing really. No burn or anything from the POEM. And you can see it's a very nice open thing.

OK, so we'll switch to the OverStitch. The stitching and the closure will take less than five minutes.

CHRISTOPHER All right, we're going to quickly switch to another room while you're getting that loaded up.

STAVROS So come back when it's all ready for stitching. OK, bye.

HARUHIRO Yes, so welcome back. So now--

INOUE:

CHRISTOPHER Yeah, so did we make it through there?

GOSTOUT:

HARUHIRO Yeah, yeah. So almost done, but this patient had lots of fibrosis.

INOUE:

So injection, please? Injection, [INAUDIBLE].

I can demonstrate the submucosal space. So this is a full-layer myotomy. This--

[INTERPOSING VOICES]

CHRISTOPHER Front window, there, yeah?

GOSTOUT:

HARUHIRO Yes, front window. And then now the seven o'clock direction is the back side of the mucosa. But this patient has

INOUE: a lot of fibrosis in a submucosal layer. So I can show you.

So we have to dissect this fibrotic layer. So effectiveness of the POEM is limited. So anyway, using the injection needle, so-- we can demonstrate the submucosal fibrosis. Now I am inserting the injection needle.

OK, needle out.

SPEAKER 2: Needle out.

HARUHIRO So backside of the mucosa, you can see at 7 or 8 o'clock. And then there's some muscle fibers and this one.

INOUE: This one is a submucosal space, but with the fibrosis.

So injection, please.

SPEAKER 2: OK, injection.

CHRISTOPHER So this is a really, really difficult case. This is not your standard POEM. [INAUDIBLE], in patients who've had a
GOSTOUT: prior balloon dilations and prior manipulations, I actually mix-- and I've said this before-- MESNA with my submucosal fluid cushion because it softens fibrosis.

And so I actually don't use this method. I use a balloon dissection method. And so I'll inflate the balloon and then I'll squirt the MESNA with the dye-colored saline solution ahead of me and get that fibrosis loosened up as I'm tracking my way down and dissecting--

HARUHIRO So--

INOUE:

CHRISTOPHER This is a really difficult case because of the fibrosis.

GOSTOUT:

HARUHIRO Yeah, yeah. It's a very, very nice comment. So in this case, we may use-- we may-- it's better to use a MESNA, or
INOUE: a hyaluronic acid. So anyway, so we can recognize we have some muscle bundle is attached to the back side of the mucosa.

So in this situation, a hook knife is best. So now we took the muscle and then cut we cut the muscle bundle step by step. So it takes a long time, but this is a more simpleton process. So without dissection of these muscle fibers, its effectiveness poor, means very limited.

Anyway, this is a space. And then flux the muscle layer, which are attached to the back side of the mucosa up, and then cut. So it's a very step-by-step. We cannot do this--

OK, this is submucosal space. This is a muscle, should be cut.

CHRISTOPHER Yeah, that's really close to the mucosa, isn't it?
GOSTOUT:

HARUHIRO That's right, yeah.
INOUE:

CHRISTOPHER So it's basically stuck.
GOSTOUT:

HARUHIRO Yeah, OK. So please control the direction to 3 o'clock. OK.
INOUE:

CHRISTOPHER So a question came up. What is MESNA? MESNA is multi sulfhydryl compound. It was initially developed to make
GOSTOUT: it easier to expose surgical planes in the pelvis and the retroperitoneum.

It fell out of favor and now it's used to prevent radiation cystitis. So it's used prophylactically in patients getting pelvic radiation. We re-activated MESNA in our developmental endoscopy unit because of its original development to create surgical planes. And we used it to see if it would facilitate dissections, such as ESD and POEM.

And we've done head-to-head studies, demonstrating that it actually speeds up the procedure and can make fibrotic scenarios more palatable and easier to perform. But MESNA is stocked in every pharmacy, basically, because of its use as a prophylactic agent in radiation cystitis.

OK, sorry, Haru. There was a question on what MESNA was.

HARUHIRO Oh, yeah, yeah. And then now, I'm trying to dissect the muscle fibers, which is connected, attached behind the
INOUE: mucosa. Cutting muscle bundle one by one. So otherwise make injury into the mucosa layer.

This is a back-- now the 7 o'clock is the back side of the mucosa. And then this is a muscle bundle.

CHRISTOPHER This is definitely not a beginner's case. And even in the hands of an expert like you, it's going to be a challenge
GOSTOUT: to get an excellent outcome and a result here.

HARUHIRO Yes, but hopefully we are cutting beyond the junction, I think, getting better situation. OK. OK, this is a muscle
INOUE: bundle, should be cut.

[STATIC]

Now we are 35 centimeters. So I think almost OK. So after this, we will perform our double-scope check-up. And then, like this case, it's very difficult to-- OK.

SPEAKER 2: Is that good?

HARUHIRO Yeah, position is very good. Hook knife position is very good. We have to hook the tissue, but we don't-- we
INOUE: have to be very careful. At the 3 o'clock direction, we see another organ. So we should be careful. OK.

CHRISTOPHER So as you see, to the extreme left, just past the edge of the cap is the mucosa. And to the right--
GOSTOUT:

HARUHIRO And that's right, that's right.
INOUE:

CHRISTOPHER And in the background, we've got some kind of an organ there. And so Dr. Inoue is just fiber by fiber--
GOSTOUT:

[INTERPOSING VOICES]

HARUHIRO OK, that's right.
INOUE:

CHRISTOPHER --just catching these adherent muscle fibers to the mucosa and is trying to dissect that off.
GOSTOUT:

HARUHIRO OK, I think we can approach-- Yes, I think at this moment, I think we have cut the muscle enough, so we will
INOUE: confirm the--

CHRISTOPHER Double-scope?
GOSTOUT:

HARUHIRO Double-scope, yes.
INOUE:

CHRISTOPHER OK. While they're setting up the double-scope, maybe we can switch to Stavros and watch him suturing.
GOSTOUT:

A question came up, is there data comparing OverStitch closure versus clips? And I'm not aware of that data, economic data. You know, how much does it cost?

HARUHIRO Yeah, yeah. It looks OK. It looks fine.
INOUE:

CHRISTOPHER But that depends on how many clips, right? If you're a clip minimalist, it'll be least expensive. And if you're a clip
GOSTOUT: zealot, you're probably spending way more money than you would have if you'd just sutured and closed. But I'm not aware of any hard data.

HARUHIRO Wait a moment.

INOUE:

CHRISTOPHER I think there is this outcome--

GOSTOUT:

STAVROS The distensibility-- the distensibility at 30, one to what? OK, so--

STAVROPOULOS:

[INTERPOSING VOICES]

CHRISTOPHER Hey, Stavros, do you have data on clip versus suture closure?

GOSTOUT:

STAVROS Yes, but let me show you EndoFLIP first. I know it's a little not so interesting, but look. Where is-- what was that

STAVROPOULOS:distensibility on the pre?

SPEAKER 3: 1.5.

STAVROS So the distensibility of the sphincter was 1.5. That's in the range of untreated achalasia, which is around in the

STAVROPOULOS:ones. And it went now to a distensibility at 30 of 12.

For example, the Northwestern people said that if you keep it somewhere between four and eight, we will mainly meet that data. I think they had 30 EndoFLIPs. Between four and eight, the distensibility is the sweet spot.

If it's more than eight, you may get reflux. If it's less than four, your POEM may fail. So we are 12. We're below way beyond the eight. That's definitely another [INAUDIBLE] myotomy. We have tried--

CHRISTOPHER And just the appearance of the image, the EndoFLIP image, is striking.

GOSTOUT:

STAVROS It's here.

STAVROPOULOS:

CHRISTOPHER Yeah, it's just a wide open channel.

GOSTOUT:

STAVROS You see here? Here?

STAVROPOULOS:

CHRISTOPHER Yes.

GOSTOUT:

STAVROS Because he's showing you the EndoFLIP 2.0. We need this picture here. There, you see how now there's no

STAVROPOULOS:waste? You remember before there was a tight waist here?

CHRISTOPHER Right.

GOSTOUT:

STAVROS Now there's hardly any waste.

STAVROPOULOS:

[INTERPOSING VOICES]

CHRISTOPHER Yup.

GOSTOUT:

STAVROS So now let me show you the suturing. So we published data on 35 clips versus 35 suturings. That was four years ago. Yeah, four years ago, with the data from where-- the publication was 2015.

The suturing was 880. But then at that point, we're getting the OverStitch for \$700, so different. Now it's \$900. So the equivalent now would be something like close to \$1,000.

The average POEM needs six clips, so depending what clip you use. Our data were 920, we're mostly resolution. But if you use resolution, about 206 clips, it's \$1,200. If you use something cheaper, at \$100, it could be \$600.

So I think the cost is so close in the United States. OverStitch is three or four times more expensive outside the United States. But in the United States, it doesn't make sense to me to use clips because look how securely I can close these.

The centers in Europe that do second-look endoscopy have found displaced clips at significant numbers in at least 10%, 15% of POEMs. None of it, interestingly, resulted in a leak or a clinical consequence, but it's not a happy thought, really. There's no way you'll get any displacement or opening with these sutures here.

CHRISTOPHER Just for curiosity, years ago-- we're talking back 2007 when I developed the tunneling method-- we looked at what did it take to close a tunnel? Could you leave it? Could you just pull out of the tunnel, leave it? And the answer to that was yes. You can, actually.

GOSTOUT:

Although, I would not do it in a POEM case. It depends on what you're using the tunnel for. You could fill a tunnel with fiber and glue. I don't know how much that costs, but that worked, actually. Tissue sealants work. So any way to close the tunnel and, last resort, just leave it, which I would not do in a POEM case because of the risk of leakage into the chest cavity.

Stavros, you're like doing that in split seconds, right?

STAVROS Mm, we have a record at Winthrop.

STAVROPOULOS:

CHRISTOPHER You're done, right?

GOSTOUT:

STAVROS The record at Winthrop for 550 POEMs is one minute and six seconds. Not on a posterior POEM, which is always shorter than anterior.

STAVROPOULOS:

So, yes, it's definitely less than three minutes. So this is it. OK, deploy. See, I try not to close the lumen. And this a very-- she's a stage one patient with very narrow lumen, but it looks OK.

And this is the opening here. Nice and open now. You can get in with a therapeutic scope and suck the air, and that's it.

CHRISTOPHER OK, nice job.

GOSTOUT:

STAVROS Thank you.

STAVROPOULOS:

CHRISTOPHER OK, we're going to go into a room three with Dr. [INAUDIBLE].

GOSTOUT:

[SIDE CONVERSATION]

HARUHIRO So we need-- we need a bottle-- we've--

INOUE:

CHRISTOPHER Ah, very good. We can--

GOSTOUT:

[INTERPOSING VOICES]

HARUHIRO --bottle, impossible.

INOUE:

CHRISTOPHER Yeah, let's see where you are. So we're using the double-scope method now, right? And we--

GOSTOUT:

HARUHIRO We need a bottle.

INOUE:

CHRISTOPHER We need to find out if you've gone down far enough below the EG junction.

GOSTOUT:

[SIDE CONVERSATION]

HARUHIRO Ah, OK.

INOUE:

SPEAKER 4: OK.

So now we are inserting the double-scope. See another nasal scope is already in the stomach. Can you see the both images?

Now you can see a pediatric scope image. So now I'm trying to insert the submucosal and the scope. Hopefully you can see a tip of the endoscope soon.

CHRISTOPHER Yeah, we're keeping our fingers crossed that you're going to be across that junction there.

GOSTOUT:

HARUHIRO Yes. OK, now we are passing close to junction, I think. So we need a transillumination-- Ah, not this one. OK.

INOUE:

SPEAKER 2: Got it?

HARUHIRO OK.

INOUE:

[SIDE CONVERSATION]

Not yet.

SPEAKER 2: What if we dim the lights in the room?

SPEAKER 4: Yeah. [INAUDIBLE]

HARUHIRO Much [INAUDIBLE], come close.

INOUE:

SPEAKER 2: This way?

HARUHIRO We don't see any, right?

INOUE:

CHRISTOPHER I don't see any transilluminated lights, so--

GOSTOUT:

HARUHIRO Yeah, not yet. So we have to continue a little bit more.

INOUE:

CHRISTOPHER Yeah.

GOSTOUT:

HARUHIRO We cannot see a light yet. So we have to continue a little bit. And then, so please return back to the esophagus.

INOUE: And now the baby scope is returned back to the esophagus and the [INAUDIBLE] the current position of the submucosal endoscope.

Ah, I'm sorry. This side.

CHRISTOPHER OK, we could switch to the mini-scope.

GOSTOUT:

HARUHIRO Back up, back up, back up. So insufflate.

INOUE:

SPEAKER 2: --air? [INAUDIBLE] insufflation.

HARUHIRO OK, now we are connecting the CO2 insufflation. And soon, we can get the-- OK. OK. And then, now he is
INOUE: inserting the scope. Do you see the light of the submucosal endoscope?

So now the position is 32. So please advance the endoscope a little bit. Keep insufflating. Yeah, yeah. So there's still--

Please calculate, please measure the insertion length. So EG junction is certified. And then slowly back up the pediatric scope. And then we can see a submucosa in the scope light.

Ah, here. So still-- still--

CHRISTOPHER You have a long ways to go.
GOSTOUT:

HARUHIRO Yeah, a long way, 4 centimeters. So, yes, we have to continue. [CHUCKLES] OK?
INOUE:

CHRISTOPHER Wow, this is going to be very tricky dissection.
GOSTOUT:

HARUHIRO Yeah, yeah. But we have to continue the dissection, otherwise impossible. OK, so suck the gastric air.
INOUE:

OK, you may hold the pediatric scope here, OK? So I will, I have to continue. But the severe fibrosis it's a little bit difficult. But anyway, we have to continue. I think it's better to come in back. Yeah.

SPEAKER 4: OK.

HARUHIRO Otherwise, impossible to do.
INOUE:

SPEAKER 4: Yeah, we have a way that's--

[INTERPOSING VOICES]

HARUHIRO You can-- [INAUDIBLE]. Once the pediatric scope out--
INOUE:

[SIDE CONVERSATION]

SPEAKER 2: OK.

SPEAKER 4: OK.

SPEAKER 2: Baby scope is out.

SPEAKER 4: Baby scope is out.

SPEAKER 2: You got that?

SPEAKER 4: Yeah.

[SIDE CONVERSATION]

CHRISTOPHER GOSTOUT: So while they're getting the main scope in place and our view in place, he's 4 centimeters short of where he needs to be. And if you remember the last image, there is a little coagulated muscle bundle that was literally stuck in the mucosa. Now, he's going to have to figure out a way to get in-between that and work his way down into the stomach.

HARUHIRO INOUE: Yeah, that's right. So CJ? CJ?

[INTERPOSING VOICES]

[SIDE CONVERSATION]

CJ?

CHRISTOPHER GOSTOUT: Yes, sir?

HARUHIRO INOUE: Yeah, yeah. The other reason why I generally recommend the double-scope so we can confirm which part of the lower esophagus or stomach the sub mucosa endoscope position is, so the other reason why we have to do the double-scope.

Anyway, this patient, the submucosa myotomy is not enough. So we have to continue at least 4 centimeters. But that's a severe fibrosis. And then I, using hook knife, carefully, carefully continuing. So it takes a little bit more time.

CHRISTOPHER GOSTOUT: Right.

HARUHIRO INOUE: OK, so back up.

[SIDE CONVERSATION]

CHRISTOPHER GOSTOUT: Have you ever given up on one tunnel and then started a different tunnel to see if it would be less troublesome?

HARUHIRO INOUE: [CHUCKLES] Yeah, yeah. That is another option, another option. But a single tunnel is, of course, generally better. If we create, there are two directions. It's all the more [INAUDIBLE] circumferential.

So this is a pediatric patient, so I don't want to make another tunnel. It's maybe OK. But the circumferential submucosa dissection, not comfortable. Too much invasive, I'm afraid, a mucosal necrosis. So I think it's better to continue at this site.

OK, once again, so-- I don't have our CO2 insufflation, please! OK. OK, now we get, now we get the CO2.

OK, so at this moment, we have to be very careful. Air insufflation is off, and then CO2. OK, so it's OK. So now I insert the endoscope again. OK.

[SIDE CONVERSATION]

[CHUCKLES] But the junction-- not the junction, but the lower esophagus is very high. OK. So fortunately, this case is a mucosa layer is not so fragile. So we can continue, but tough job. [INAUDIBLE] So we have to dissect this muscle, otherwise we cannot approach--

SPEAKER 2: [INAUDIBLE]?

HARUHIRO No, no, TT. Ah, hook is better. Hook knife is better.

INOUE:

SPEAKER 2: Hook?

HARUHIRO Yes, thank you.

INOUE:

CHRISTOPHER So you're talking about the muscle at 12 o'clock?

GOSTOUT:

HARUHIRO Yeah. I'm trying to cut the muscle at the 3 o'clock. Because we cannot insert the scope through this lumen. So we have to cut this, maybe originally longitudinal, but this bundle avoid the insertion of the scope. OK.

INOUE:

So this is a precise maneuver so we have to be very careful not to make an injury behind organ. Now I'm inserting the hook knife, OK. The hook knife out.

[SIDE CONVERSATION]

OK, OK. OK, now I'm trying to hook the tissue up.

CHRISTOPHER So you're going to hook and pull?

GOSTOUT:

HARUHIRO Yeah, that's right. Oh, whoa, whoa. Please fix the location, direction of the hook knife. OK, OK. OK, this is a muscle, should be dissect--

INOUE:

OK, then I hope we may have the space, getting a space. And then, we have to dissect the 7 o'clock direction. Ah, so injection needle, please. We have to confound the submucosal layer.

OK, so watch carefully. OK, now I can only recognize-- Now I am inserting the injection needle.

CHRISTOPHER So you're going to try to, I guess, kind of push out those muscle fibers and create a submucosal plane?

GOSTOUT:

HARUHIRO That's right.

INOUE:

CHRISTOPHER We're looking towards the left side of your endo view?

GOSTOUT:

HARUHIRO Yeah, that's right. So this is a lot of fibrosis. This one is a submucosal tissue, I think, OK? Injection.

INOUE:

CHRISTOPHER Yup.

GOSTOUT:

HARUHIRO Like this, so we can confirm the listing of the swelling of the submucosal plane. And then I'm approaching to the distal end of the previous myotomy, but very tight. So--

INOUE:

CHRISTOPHER OK, just to kind of put it in everybody's perspective, you see that big hole? That's the full-thickness myotomy, don't want to go there anymore.

GOSTOUT:

HARUHIRO [CHUCKLES]

INOUE:

CHRISTOPHER And to the extreme left cusp of that cap is that submucosal plane that briefly opened up when he injected. And he's got to try to sneak in there and avoid that big hole now. He's gonna-- This is a pretty-- This is going to be a masterful maneuver.

GOSTOUT:

[SIDE CONVERSATION]

HARUHIRO Whoa. But abdomen is very soft. I think-- yeah.

INOUE:

CHRISTOPHER It's a good sign.

GOSTOUT:

HARUHIRO So, please, please--

INOUE:

[SIDE CONVERSATION]

So it's OK? The oxygenation is OK?

SPEAKER 4: Yeah.

SPEAKER 5: Oxygenation is fine.

SPEAKER 4: Yeah, his oxygenation is fine.

SPEAKER 5: Yes.

HARUHIRO 71 is the saturation. OK, so we have to check-- so respiratory check, how respiration, the sound. OK.

INOUE:

SPEAKER 4: You want stethoscope?

HARUHIRO So this is the CO2, OK?

INOUE:

SPEAKER 2: SpO3 is 96, I think.

HARUHIRO 96, it's OK.

INOUE:

[SIDE CONVERSATION]

Oh, it looks OK.

CHRISTOPHER OK, can you tell us what you're doing right now?

GOSTOUT:

HARUHIRO Yeah, yeah. So you mentioned that the blood pressure is a little bit low?

INOUE:

SPEAKER 4: Lower, yeah. OK, now it's better.

HARUHIRO How much?

INOUE:

SPEAKER 5: 78--

[INTERPOSING VOICES]

SPEAKER 4: It was 67 before. Now it's 78. That's better.

HARUHIRO Now it's better.

INOUE:

SPEAKER 5: Yes.

HARUHIRO So now we check the patient's condition, and then how respiration is good, and then how abdomen is soft and
INOUE: then no pneumoperitoneum. We have already tapped the abdominal wall. And then our gas is out. So how
abdomen is definitely soft, so no compartment syndrome. Respiration is really good.

[INTERPOSING VOICES]

CHRISTOPHER Is there any crepitus?

GOSTOUT:

HARUHIRO Yeah, yeah. So we can continue the procedure. We can continue the procedure. And then, once again, so air is
INOUE: off. [INAUDIBLE] point.

OK, gradually, gradually we advance in the scope. So one of the major reasons why it's very difficult to approach
our distal end of the tunnel is the-- so major reasons, the patient is a pediatric, so our body is very compact,
simple reason.

And then a second reason, I think the phrenoesophageal ligament, so that the diaphragmatic crus, is down low because the patient is still young, so not large enough. Those are reasons why makes the approach to the distal end difficult.

Now I'm approaching, but gradually, gradually, using the movement of the left and right and the up and down. And I limit the insufflation in order not to make the gas deposition.

CHRISTOPHER Haru, we're going to switch to clinical presentation. And we'll come back to you, OK?

GOSTOUT:

HARUHIRO Yeah, yeah. Thank you. [INAUDIBLE]

INOUE:

[SIDE CONVERSATION]

SPEAKER 6: Good morning, everybody. Dr. Stavropoulos' next case involves an endoscopic full-thickness resection for a gastric gastrointestinal stromal tumor. This is a 58-year-old man with a history of hypertension, diabetes, BPH, hemorrhagic CVA with no residual deficit, was presenting for treatment of gastric GIST.

Patient was found to have this just incidentally on CT scan, which was performed to evaluate the hepatic nodules seen on an ultrasound. These are the CT images with IV contrast. As you can see, there is a 4 centimeter enhancing posterior gastric wall lesion abutting the splenic vein. There's an arrow showing the splenic vein.

This is the EGD, which was done in March of this year. It shows the central ulceration along the lesser curvature of the lesion, and the posterior wall of the proximal stomach. These are the EUS images of 4 centimeter hypoechoic subepithelial lesion, originating from the muscularis propria without any exophytic components.

Pathology was positive for spindle cells with the CD117 positive, but negative for desmin, smooth muscle actin, and S100.

So the plan is for full-thickness resection of the GIST, and the benefits are listed.

[SIDE CONVERSATION]

CHRISTOPHER So, Stavros, the lack of extra-- you know, a tumor outside the gastric walls, that make you feel pretty good that
GOSTOUT: this is going to be a lot easier to handle than having a lot of just hanging outside the gastric wall?

STAVROS Yes, I feel better. If you have a lot of extra luminal-- well, it may be psychological-- a lot of extra luminal
STAVROPOULOS: components would require the endoscope to really do nodes, which can be psychologically disturbing. But sometimes these tumors behave very nicely.

They have a nice firm exterior. Or you roll them into the stomach, and everything is OK. I would trade extra lumen now, say, 30% for a better location. Because the location could be really important. I would also trade the extra luminal component for not having proximity to large vessels, which this tumor has.

It's just the two main vessels. You get these other ones in the lesser curvature that are surrounded by the left gastric itself and all its branches. This is like a minefield. At least here there are two mines, the splenic artery and the splenic vein. And you know where they are. And they're huge so you know what to avoid.

So there are not a lot of vessels that are dangerous. There are two that are very dangerous, but very well defined. And the extra luminal component is like 10%, 15%. You show the-- there's a little bulge that was compressing the splenic vein. We have to make sure we pull it away from there without dissecting blindly.

So this is not the tumor. It's a GIST. We did an FNB, which we're--

SPEAKER 3: [INAUDIBLE] No [INAUDIBLE].

STAVROS But-- no mitosis?

STAVROPOULOS:

But it looks like an ugly GIST. There's this ulceration. And then there's an even bigger one on the retroflex side. You can see there's a crevice in the back of this GIST, here, with a very deep ulceration going into the wall. You see that?

So this, I would venture, will have a sort of intermediate the risk profile. Also for some reason, our two or three out of the 87 EFTRs, I don't know, 60 were GIST.

We've got three with mitotic rates in the five to eight range. They're all in Chinese patients that grew up in China. So I'm not sure if there's some kind of an environmental thing. But those high risk-- and this patient is a Chinese patient.

And you can see the coverage here on the back wall of the GIST. And the front has just this little ulcer, punctate ulceration there. That may even be from a biopsy, who knows.

So we'll have to strategize here. This procedure just should not be rushed because of safety. So we are going to start going proximal to the-- First, I'll make an incision in the back wall.

You should always make an incision even though if the outline looks very clear. Once you get in the midst of the [INAUDIBLE], and you try to extend around the tumor, this deep, well-defined incision in the submucosa guides you where to do the myotomy. So it's very important.

So we're going to retroflex and do the back wall, which is a little tricky, and then do the somewhat easier front wall. And then we'll decide whether to use a pulley. This is posterior, so gravity is kind of pulling it posteriorly.

And we want it, number one, to hang into the lumina. Number two, to hang away from the splenic vessels. So once I have a flap going, I'm gonna try some OverStitch pulley from here to the front wall and out the mouth.

OK, so this is the lay of the land. You can go back to Professor Inoue--

CHRISTOPHER Yeah, we're gonna go back to Dr. Inoue,

GOSTOUT:

STAVROS --and then come back.

STAVROPOULOS:

CHRISTOPHER --OK?

GOSTOUT:

STAVROS OK.

STAVROPOULOS:

HARUHIRO OK, so thank you, thank you. Welcome back. So now, insertion depths of the endoscopies are 36. Hard
INOUE: squamocolumnar junction walls are 35. But, like our previous double-endoscope, this submucosal endoscope, tip of the submucosal endoscope, not yet leaks the gastric side.

So we have to continue, but the space is very narrow. So it's very difficult. So without needle, just the outer [INAUDIBLE] is what keeps the needle in. And then make an injection into the submucosal layer. But the almost limitation of the scope control, angulation is limited.

OK, wait a moment. OK, injection, please.

SPEAKER 4: Injection.

SPEAKER 2: Injecting.

HARUHIRO OK, wait a moment and watch carefully. Yes, this is the submucosal space. And you can see circular muscles
INOUE: here. So we can dissect this circular muscle. So we will continue a little bit more.

But this spot is a totally full-layer dissection, ventrally. But, that of course, a full-layer muscle dissection is not a problem.

CHRISTOPHER Yeah, it looks like you're going to have to just kind of pick your way down slowly and dissect off that muscle.

GOSTOUT:

HARUHIRO Now we can use the [INAUDIBLE], so it's OK. I think this is the-- yes, OK. So at this moment, it's better to use a
INOUE: hook knife, OK. It's the same to our ESD in a fibrotic case.

Anyway, so we have to cut these muscle fibers, which attached to the mucosa layer, so this one. This one is a muscle layer, should be cut. OK, so please pass me a pedal. OK, OK.

So like this way. So please control the direction of the-- OK, so behind we can see vessels. So we help to be very careful not to make an injury onto the vessel.

OK, needle out. So control the 2 o'clock direction. OK, hold it. So behind, we can see the cells, so--

CHRISTOPHER Do you think using something like hyaluronic acid or methyl cellulose will make this easier?

GOSTOUT:

HARUHIRO Yeah, yeah, I think so. So do you have a [INAUDIBLE] MESNA, you have?

INOUE:

SPEAKER 4: I'm sorry, what?

HARUHIRO Hyaluronic acid or MESNA?

INOUE:

CHRISTOPHER You know, methyl cellulose? Hydroxypropyl methyl cellulose, do you have any of that?

GOSTOUT:

HARUHIRO Now I'm asking to the staff. OK, wait--

INOUE:

SPEAKER 4: We don't have hyaluronic acid. We have [INAUDIBLE] or I have [INAUDIBLE]? It's similar.

HARUHIRO OK, ah-huh. Just wait, just wait. OK. So severe fibrosis. OK, we are trying to cut this. This is a submucosal layer.

INOUE: Ah, at this moment, we can recognize a spindle vein.

So this is the some spindle vein. So we are closely approaching to gastric side, but we have to be very careful. Also because this vein is a very large so we don't want to cut this. OK, OK.

CHRISTOPHER Way off on the extreme left on the other side of that hook knife, you see those little spindly vessels? That's kind of that tip-off that you're getting close to the EG junction, the palisading vessels. So he's gingerly separating that muscle layer that's attached. It's actually attached to the, for the most part, to the mucosa.

HARUHIRO (CHUCKLING) Yeah, yeah. So it's a very difficult fibrosis. It's the same--

INOUE:

CHRISTOPHER Yeah, I'll bet you wish you never got this case. You know, I can think every year I've been participating in this course, you always seem to get the real bad fibrotic cases.

STAVROS Wow, wow, wow! (LAUGHING) It's OK. A little bit dangerous. OK, you have to be very careful, step-by-step.

STAVROPOULOS:

SPEAKER 5: Just so you know, the peak pressure is up again.

HARUHIRO OK.

INOUE:

SPEAKER 5: It's 32. It's this one.

HARUHIRO Peak pressure of the chest?

INOUE:

SPEAKER 5: Uh, yeah. I don't know--

[INTERPOSING VOICES]

HARUHIRO Respiratory?

INOUE:

[INTERPOSING VOICES]

Respiratory peak, yeah, OK. So I'm waiting. I got now with the peak pressure a little bit high so I stopped insufflating.

CHRISTOPHER GOSTOUT: What where we're talking about-- he's talking about the pressures, intrathoracic pressures. So he's spending a lot of time above the diaphragm. And that gas has got to go somewhere. It can go in the chest and create a lot of mischief with a tension mediastinum. It could also drop along, and you can get a pneumothorax at the same time.

HARUHIRO INOUE: At this moment-- no, no.

CHRISTOPHER GOSTOUT: So this complication is good to interact with the anesthesia regularly. Ask him how pressures are doing, are they having trouble ventilating, what's the blood pressure, to kind of get a sense of what's happening gas-wise in the chest.

SPEAKER 5: --yeah. Do you want someone to physically hold it so more comes out? We could hold it.

SPEAKER 4: I can hold it for you if you like.

HARUHIRO INOUE: Sorry? Sorry?

SPEAKER 4: We can hold the--

SPEAKER 5: Because it's not--

[INTERPOSING VOICES]

SPEAKER 4: --position.

HARUHIRO INOUE: Yeah, no. Abdomen is very soft so I think it's OK.

SPEAKER 2: [INAUDIBLE], right?

SPEAKER 5: Yes.

SPEAKER 2: OK. So [INAUDIBLE] if he needed it.

HARUHIRO INOUE: OK, so--

CHRISTOPHER GOSTOUT: So while he's maneuvering, I had asked him earlier about hyaluronic acid or methyl cellulose. Those are both thickening agents that you would add to your submucosal fluid. By using that, you might be able to distend that little, tiny submucosal space enough that gives him a little more wiggle room to use his hook knife without injuring the mucosa.

So if you noticed, when he was injecting the saline, it was just squirting back at him previously. And if you use some kind of a bulking agent, you can kind of keep it there as opposed to having it squirt back.

[SIDE CONVERSATION]

HARUHIRO No we are surface 6 centimeter.

INOUE:

[SIDE CONVERSATION]

OK, OK. It's OK.

SPEAKER 2: OK.

HARUHIRO This is outside the stomach lining. I have to cut this. Now 35.

INOUE:

CHRISTOPHER Haru, we're going to switch to a different room right now, OK?

GOSTOUT:

HARUHIRO Yeah, yeah. It's OK.

INOUE:

CHRISTOPHER We'll come back.

GOSTOUT:

HARUHIRO So I try to dissect as deep as possible. So we have already advanced 1 or 2 centimeters, previous condition,
INOUE: previous situation. OK, this is a circular muscle here.

STAVROS OK, tell Yahagi that the other patient is not here.

STAVROPOULOS:

[SIDE CONVERSATION]

CHRISTOPHER OK, Stavros, we're watching you. You're working on your circumferential mucosal incision.

GOSTOUT:

STAVROS Yes.

STAVROPOULOS:

CHRISTOPHER So it's kind of like the ESD method applied.

GOSTOUT:

STAVROS Right. So basically we're slowly cutting around the distal end, like we discussed. It's not very exciting. But I think
STAVROPOULOS: Haru needs a break. So I have to bore you a little bit with a distal incision here.

CHRISTOPHER All right, so tell us, what are you using to make your circumferential incision? Your ERBE knife?

GOSTOUT:

STAVROS Yeah, so yeah, the ERBE knife. So the stomach is very thick. So it's very helpful to have a knife that can inject
STAVROPOULOS: with a lot of force because needle lifting is not always very, very discreet in the stomach. And you may be also in the wrong layer.

So here, basically, we make a little hole in the mucosa, and then we inject into it. And then you have to use under-cut frequently to get rid of the coagulum. So here you can go in the hole you make. That's the way to inject, with a hybrid knife, very thick tissue like the stomach. So you make a little hole, right there.

See, this is still not penetrating the mucosa. So once you have penetration, then you inject. And then you get nice blue submucosa. And you can extend your incision.

You now want to be in the proper depth. If you are too superficial you'll get a lot of bleeding because you'll get the mucosa of vessels that arborize everywhere. You need to be well into this submucosa.

So I've done the back wall on the left. Now I'm going to do the back wall on the right.

CHRISTOPHER Very nice. Now we're going to go back to the Dr. Inoue.
GOSTOUT:

STAVROS OK.
STAVROPOULOS:

HARUHIRO Yeah, OK. So, Stavros, we are very sorry for interrupting you. But anyway, so now we have already finished the
INOUE: submucosal fiber. As I showed you, the other point of a double-scope, we have already advanced 2 centimeters.

So I'm not sure we have already reached to the stomach side, but anyway. So please note this is a natural lumen endoscopy. So lumen is a dilated esophagus. This is a natural lumen. And then advance endoscope gradually.

This part may be the fibrotic layer, but anyway. So junction is open like this, like this. So in the case of a [INAUDIBLE] patient, of course a squamocolumnar junction is not open like this.

Now, I'm just insufflating the CO2, very mild pressure. Then, the junction is open like this. So I think it's a limitation of the POEM procedure, in this case. Maybe this part is a little bit remaining fibrosis.

So during procedure, when I keep the endoscope in a submucosal space and insufflating a CO2, the patient's respiratory pressure is going up. So I think a little bit critical so we have to stop it.

Now, we stopped the submucosal dissection and coming back to the natural lumen. And then patient condition is a totally stable. So in this case, the patient is the pediatric patient, a compact body, so this is a limitation of the procedure.

But otherwise you can see junction is open like this, so I hope, hopefully she can eat better than before, better than before. And also if necessary, we can combine the [INAUDIBLE] dilation in this case. So--

CHRISTOPHER It looks like the tunnel stops right where that transition from pink to pallor, as you come back--
GOSTOUT:

HARUHIRO Yeah, yeah.

INOUE:

CHRISTOPHER Right there, right?

GOSTOUT:

HARUHIRO Yeah, right.

INOUE:

CHRISTOPHER That's kind of where it stopped.

GOSTOUT:

HARUHIRO So we have already dissected until here. But remaining 2 or 3 cen-- yes, 2 or 3 centimeters, this part is soft. So
INOUE: maybe this layer is severe fibrosis.

And then watching the [INAUDIBLE], it seems the fibrosis covered the circumferential, like this. So I think this case is-- this is a limitation of this procedure. It's OK?

CHRISTOPHER Right, we're with you on this. It's a pretty dangerous procedure to continue on because of the fibrosis.

GOSTOUT:

HARUHIRO Yes, hopefully she can eat better than before, OK?

INOUE:

CHRISTOPHER OK. Very good.

GOSTOUT:

HARUHIRO Thank you, thank you

INOUE:

CHRISTOPHER All right, we're going to go back Stavros.

GOSTOUT:

STAVROS --that transillumination?

STAVROPOULOS:

SPEAKER 7: No, it didn't go into the corner!

[INTERPOSING VOICES]

STAVROS Hello.

STAVROPOULOS:

CHRISTOPHER Hello, have you done your circular cut?

GOSTOUT:

STAVROS On the distal side. OK, so I'm making that most difficult turn, which is the grav--

STAVROPOULOS:

CHRISTOPHER I was just going to ask you how you were going to do that.

GOSTOUT:

STAVROS Well, it's the gravity side of the turn. So I'm just-- the cap and the tumor are bumping heads. And I'm just
STAVROPOULOS: injecting and pulling hard. And it looks like I'm going to make it.

And I retrace the incision frequently. Because of how thick the stomach is, you want to be well into the submucosa. Because that's going to help you when you're doing the myotomy from the front. It will tell you where to turn. So it's very important to have a good, discrete well-visualized incision.

We have a little bit of fluid pulling here because this is the gravity side. So I'm injecting right in there. See the lift? Even with a hybrid knife, the lifting is underwhelming as we get close to the greater curvature. But we do what we can. So inject right under the mucosa and try to create a very well visualized submucosal mode.

Now, what works sometimes when you get difficulties in the stomach like that is to take the snare and use it to continue the circumferential incision with a snare. So far, I don't need to do that. But you'll see, I may need to do it later to define the tumor better. But we are making progress.

CHRISTOPHER So the message here is that the circumferential mucosal incision is useful, but it can be pretty challenging to get
GOSTOUT: around and completed.

STAVROS And you may think you'll not need it in the back because you're going full-thickness, so who cares about the
STAVROPOULOS: mucosal incision? But it can be extremely disruptive to completing the resection if you don't have a nice well-defined margin in the distal side of the tumor.

So even now, for example, I'm trying-- I think it's time to turn left, but I don't have any markers. So I have to come back and take a look. Maybe I veered a little farther from the tumor. So see, that could happen when you do the myotomy, which would be worse.

So this is the back wall. Now I think we can proceed-- I think we can proceed from the front. Oh, the paralysis wore off a little bit, but we're getting on it.

CHRISTOPHER Does a retroflex view help at all? Or have you been doing that without telling me?
GOSTOUT:

STAVROS Well, the retroflex is essential here because I'm doing the anal side of the tumor. Now, let's go to the front.
STAVROPOULOS:

Now, does it help for full-thickness? I think it does, similar to ESD. It provides a more stable scope to make to make the incision. But having said that, on this type of tumors, I end up doing most of the dissection-- after I complete the incision, I do most of the dissection from the front for full-thickness. For ESD, I persevere on the retroflex position as much as possible.

OK, let's see where we are from the front. Here we go. So I see the incision now there. And I see the incision here. So I might be able to continue from the front, but I'll see.

Maybe I'll show you, if it works, let me show you the snare technique. Sometimes it can speed things up. So I could just inject a little there-- open. Ah, yeah. Again, the technique is you can make a little hole until about half the knife is well embedded. And then inject and get a nice bleb.

And now let's use the small hex. Here, I don't really need this technique. So far the incision is going well. But if you get frustrated with the circumferential incision in a very thick-walled, very vascular stomach, you can try to speed up this way.

Open. All right, close. Well, that goes that. See--

CHRISTOPHER So you're--

GOSTOUT:

STAVROS --that makes a much--

STAVROPOULOS:

CHRISTOPHER --you're EMRing your way around, right?

GOSTOUT:

STAVROS Right. See that? We just missed a big vessel there. Not very good--

STAVROPOULOS:

CHRISTOPHER Well, you're a lucky man today.

GOSTOUT:

STAVROS [LAUGHS] No, the snare actually helped here. So we need to-- and did we get a bit of muscle here? Interesting.

STAVROPOULOS: That's that-- you know, that's the incision I made to injection.

So you can see the depth that I put the needle knife before injecting. So it's a little deeper than I thought I was. Let's get-- the knife, let's go back with the knife.

See, now that I could see, I got rid of that fold that would have made the circumferential incision difficult. Now I'm down to flat territory and thin-looking mucosa. So now the knife will work like butter.

But, see, overcoming that-- I don't know if was-- yeah, some stray fold from the greater curvature that was creating a bump. Cutting through these bumps is very distasteful. You know, everything gets coagulated because of how thick the bump is, et cetera.

Now, I remove the bump with a snare. I'm going to coagulate the vessel. Looks like a vein, but who knows. So I'm gonna use spray here.

[SIDE CONVERSATION]

CHRISTOPHER So somebody had a question earlier about spray versus force. You can see how that literally sprays, it just

GOSTOUT: scatters the coagulum throughout the field there.

STAVROS So we inject, we spray, and then we cut. OK, very thick. So we have still a lot to do here. But very soon you'll be

STAVROPOULOS: able to see Dr. Yahagi doing this challenging colon ESD.

I think there was also a question about how you remove a 6 centimeter-- one of those tumors that is 6 centimeters-- through the mouth. There are a number of ways. If 6 centimeters is the long dimension and the short is like 3, which is often the case with leiomyomas in the esophagus-- they're kind of like lengthy tumors, like sausages-- then you just remove directly away.

Then, if you have something that is round and is bigger than 3.5 or so, that cannot be removed very easily. So that you can cut in two or three pieces and remove it. But then you lose the ability to record that you did a complete capsule-- intact capsule resection, which is important for GISTs. Because rupturing that capsule in a GIST is one of the high-risk--

See here? That's what happens if you go too superficial.

CHRISTOPHER Stavros?

GOSTOUT:

STAVROS Yeah?

STAVROPOULOS:

CHRISTOPHER A question came up, why aren't you using more methylene blue to highlight where you're cutting?

GOSTOUT:

STAVROS Well, yeah. I prefer a very light blue. I do use methylene blue. I just use very, very light because it allows me to see the vessels earlier. I think that the dark blue is useful sometimes when you have fibrosis and muscle and you're trying to find what's muscle and what's fibrosis, and things like that.

But for regular submucosa, I think with a more transparent blue I could potentially, especially with POEM, I can see those vessels. I'm more likely to see them, I think, before cutting them. That's my theory about why--

You know the randomized study of hybrid versus TT knife in POEM that they did in China, the case control study? So it's obviously a faster POEM with a hybrid because you don't have to use a needle to inject. But it also showed consistently, both in the case control and the randomized, that you have less bleeding episodes.

And that's because, I think, you inject more with a hybrid, spread the submucosa nice and transparent, you can see the vessels earlier.

CHRISTOPHER That make sense.

GOSTOUT:

STAVROS Somebody's trying to have an offline discussion with me. So maybe you can temporize a little, CJ, as I go tend to something briefly. Is that OK?

CHRISTOPHER Yep. OK. So while we're checking on things here, any questions that have popped up? Anything you've seen so far that's a little confusing? This is a pretty tedious circumferential incision, which you can get into.

It's not always as slick as you see when ESDs are being performed and things are nice and flat and you can watch your margin evolve. This is pretty thick, heaped-up, gastric rugal tissue and--

[AUDIO OUT]

So Dr. Inoue's case was stopped because he couldn't make any further progress. It was too risky. No questions?
All right. So things that Stavros--

STAVROS Yes, I'm back on. OK.

STAVROPOULOS:

CHRISTOPHER Oh. [INAUDIBLE]

GOSTOUT:

STAVROS So what were we talking about? We were talking about the extraction. And then what? Something, I think, you
STAVROPOULOS: mentioned something. I don't remember.

CHRISTOPHER Oh, we were talking about the methylene blue--

GOSTOUT:

STAVROS Oh, yeah the methylene blue.

STAVROPOULOS:

CHRISTOPHER --the density of methylene blue. You had mentioned size and extraction, what you can get through the
GOSTOUT: esophagus. So if you have a 6 by 6, and not a 6 by 3, you don't have a sausage, you have a grapefruit, what are
you gonna do? You gonna cut it in half?

STAVROS I'd rather chop it up. Or you can ask your friendly surgeon to remove it.

STAVROPOULOS:

CHRISTOPHER That's right.

GOSTOUT:

STAVROS And we have done this a few times. That it's not-- they don't like operating on posterior proximal tumors, OK?

STAVROPOULOS: They have to mobilize the whole stomach and often use the robot to sneak into the hiatus to try to get the
proximal extent of the tumor in the posterior [INAUDIBLE]. So they don't really like that.

There are reports describing intragastric surgery. It can make multiple holes in the front of the stomach and put
rigid instruments to get to the back of the stomach to do basically what we do when we doing an EFDR, but with
rigid instruments.

So they are very, at least at my institution, they are very happy with me taking it out, especially from those
difficult locations. And then if it's too big to extract, they can do a very small gastrostomy, maybe 2, 2 and 1/2
centimeters, because of how elastic things are and how much power they can apply with rigid instruments.

So I make a small gastrostomy in the easy, super accessible part to them for the stomach in the antrum. They
don't need to get any mesentery or coagulate any vessels. They just look at the part of the stomach wall that is
exposed between the lesser and greater curvatures anteriorly, no mesentery.

You just see as stretched-out gastric wall, make a little hole. They remove the tumor in a specimen back from a
umbilical port. That's the only large port, the 10 millimeter [INAUDIBLE]. Just yank it out. They squeeze it out.

And they have two smaller ones, one 5 millimeter for a camera, one 5 millimeter for an Endo Stitch. And they close the gastrostomy. Basically, I leave the tumor in the stomach. They go, they make small incision, take it out, takes like 20 minutes, 25, 30 minutes.

CHRISTOPHER So you can say to your patients ahead of time that that's an option that might be necessary to take it out?
GOSTOUT:

STAVROS Yeah, we did that with this patient, in fact.
STAVROPOULOS:

CHRISTOPHER Have you ever just cut it in half? How about just cutting it in half and pulling it out the esophagus?
GOSTOUT:

STAVROS Right, but then--
STAVROPOULOS:

CHRISTOPHER Do your pathologists go crazy over that?
GOSTOUT:

STAVROS --you have no capsule data. No, no one block. There's no such thing as R0 for these tumors because you're not
STAVROPOULOS: giving the pathologist any surrounding tissue. You're just giving the tumor, the tumor with its capsule hopefully intact.

But you need a non-block, intact capsule resections. If you just morselize it, you're not going to be able to assure the patient or the oncologist, if it turns out to be high-risk GIST, or anybody else that you did a good job. That's the only downside.

OK. So this is-- see, for example, this pesky thing here. Give me the snare. You know, sometimes that knife-- in the thick-walled stomach, creates this confusing, unsightly, and generally meddlesome pieces of mucosa that obscure the planes, and whatnot. So snare helps here.

Open. OK, close. OK, that's a little better. But maybe we can try to get that too, like here. Open. Close. OK. OK, so that extended it nicely here.

CHRISTOPHER Yeah, you know, I like that method. It really gives you some good visibility of the circumferential.
GOSTOUT:

STAVROS It makes a nice, broad incision, unlike the knife. So you can get the solder of two more, visualize much better
STAVROPOULOS: sometimes. Here it's flat. So I don't think it's going to work, but you can always try. Like, deflate the stomach and give it another try.

So I have to deflate, make it all more pliable. And then-- no. And then, OK, I see what you were trying to do. And then we can try to cut this too.

But, no, I think here we'll be better off with a knife. We'll see. OK, open. Oops, sorry. No, I thought open. Open. Open all the way, yeah? OK. OK, try that.

Go [INAUDIBLE]! Now open. Yeah, I don't think this is going to work here. But the other difficult will be the left side here. So I think the snare is going to come handy again when we try to do this dependent left side.

But for now, let's continue with a knife. The most useful it is when you make an incision with a knife and it's very superficial and the edges are so close you can hardly see any blue submucosa. Then you can take the knife and cut [INAUDIBLE] and totally expose the submucosa.

Let's see, we have a lot of water accumulating. So we put him on left decubitus position, to move the fluids onto the greater curvature. We always have to plan ahead when you make a full-thickness hole, try to keep the hole away from a dependent area.

So he's on the left. Normally, do them supine. He's on the left decubitus to pull the liquids towards the greater curvature.

Oh, yeah. You see the difficulty with the incision in the stomach? Now it's all folded up there, not giving a good look. Let's try to inject.

Maybe I'll come backwards from my left incision there. So the left incision is down. On where? It's down here. OK.

[SIDE CONVERSATION]

This is the incision there. I'm almost there. OK.

OK, this is the two incisions meeting on the left. Let's see, but constantly I have to broaden the incision.

OK, so now we just have to make these two meet in the front. And then we can dive in. OK.

CHRISTOPHER A lot of work just to prepare the eventual assault on the tumor.

GOSTOUT:

STAVROS Yeah. So you inject. See here? Injection is very nice, no folds.

STAVROPOULOS:

OK, now let's try to broaden it a little and coagulate.

CHRISTOPHER So you're using the spray for this kind of general coagulation?

GOSTOUT:

STAVROS Yeah, because it's-- I don't want to bother with being specific. I just randomly blast the area where that is
STAVROPOULOS: bleeding, hoping that it's going to stop. I guess sometimes it doesn't.

There's a vessel. So let's try to be a little more specific.

CHRISTOPHER OK, Stavros, we're going to switch rooms, OK?

GOSTOUT:

STAVROS OK. OK, you know what? Given the hard force of [INAUDIBLE], I give up. I'll use the forceps. Because if I keep **STAVROPOULOS:** burning like this, I'm going to end up on the capsule of the tumor, which has even bigger vessels and it will also damage to the capsule.

OK, well I think Dr. Zhou's room should have switched to the ESD for Dr. Yahagi. I'm just not sure what is going on with that. Haru just finished, so that will take a while.

Dimitri, what's going on with that?

SPEAKER 8: [INAUDIBLE] is about to start.

STAVROS Oh, I'm sorry, I'm sorry. Yeah, Zhou actually will do a STER on a esophageal GIST OK, yeah. And she should be **STAVROPOULOS:** able to start shortly.

Open. Close. See, I checked to make sure I got a bleeder, which I did. And then I used soft-- I just have to remember to use it for quite a long period of time, make sure it's all drawn.

OK, open. So, OK, that's it. Now, let's continue-- See--

SPEAKER 8: Stavros, we're going to go to the case presentation with Dr. Zhou.

STAVROS All right.

STAVROPOULOS: