HONGGANG YU: The topic I would like to present here is AI in GI, the third eye of endoscopy. Because of the time limitation, I don't want to introduce more about the background. Maybe I'll go ahead just directly to introduce the Endoangel. That's a product we developed by ourself to-- that's artificial intelligence based quality control products for daily endoscopy.

We want to use it to solve this problem in gastrocopy-- monitor blind sports and to detect early gastric cancer. In colonoscopy, monitor withdrawal speed and detect at adenoma. So that's the basic mechanism for Endoangel.

Now I would like to introduce an application in colonoscopy. So you can see in this video, the Endoangel can recognize the ileocecal valve and appendediceal orifice. If one of these two parts of the colonoscopy column was identified, that means the intubation procedure is completed. And then the insertion time can be calculated.

So this insertion time is only one minute and 46 seconds. And then we can start with your procedure. So the second function is just a-- we can pro-- sorry, just detect some kind of sleep manual.

For example, when we withdraw a tip of the colonoscopy, when we meet some kind of very sharp angle, for example, the hepatic flexure. These part, maybe the tip of the colonoscopy is very difficult to be controlled. So maybe it suddenly slips out.

If that happens, so we must go back to redo it. So the Endoangel can recognize these movements and then remind you, go ahead. Go back to the previous place.

For example, now you can see, remind you view is lost. Please return. And then, if we go back, and then the previous view is reached. So that means you can go ahead to withdraw the tip of colonoscopy.

OK. So now the third function of Endoangel is monitoring with your speed. So you can see in this video there's three clips. I'm not sure what happened. It does work. OK. So now, the first one is less than five minutes.

So you can see at the left hand side, there's a panel very similar to the car panel. The pointer always points to its red zone. That means over speed. If you withdraw your colonoscopy in this speed, you cannot see anything clear.

Now the second video is five minutes. But the point always points to the blue zone. That means critical speed. The various-- that means you're too fast. So you should slow down. Otherwise, you cannot see anything clear.

So the third one is more than six minutes. So you can see the point of always points green zone. That means the speed is perfect. You can see everything very clear, and the withdraw movement is very even and smooth.

So the fourth function is detect the colorectal polyps by itself. So you can see the scale reminds you there's polyp over there. With the help of the Endoangel, we have got some results.

So in our department, the polyp detection rate, mean number of polyps per procedure, increase largely. And the mean withdraw time prolong 1.7 minutes. So Endoangel assured each procedure should both in six minutes. That's the international standard.

Now I would like to introduce the application in EGD. So you can see there's the-- in this video, you can see. Usually we divide each stomach into 26 parts. So you can see left hand side, there's data.

That data reminds you how many parts you have already detected. And down [INAUDIBLE], there's a video image that remind you how many parts you have already detected and how many parts of the stomach you have not detected yet.

So finally, the data show 26. That means you have done a good job. That the EGD is good enough. So that's result-- that's our results. Because this function is very important.

You can see in these figures in our department, if [INAUDIBLE] help of Endoangel. My colleague lost about 20% of the stomach. That means each procedure, four to five parts of a stomach did not detect it.

Endoangel can largely solve this problem. With the help of Endoangel, only one part was missed. So the second result also confirmed the first result.

Endoangel also has another function is automatically-- make, automatically, make the photodocumentation. So, with the help of this function, we don't need to use our foot to depress foot petal to make the picture. It can make the picture by itself.

And also, we also we developed a very interesting function. Endoangel can detect early gastric cancer by itself. So you can see, this case is a very difficult case. And we-- this patient has done three times of gastroscopy. But each time shows low grade dysplasia.

So these patient come to my department and I arrange a magnifying endoscopy for him. So you can see, there's a scale. I'll remind you this is a lesion. And if the scale show green color, that means that's benign lesion. And if become red, just like that, that means this part is a malignant lesion.

So, just because of the prediction of Endoangel, we resect these parts, this lesion completely, and just by using the ESD method So our pathologist confirmed the prediction of Endoangel.

We have organized three types of-- three types of competition between Endoangel and endoscopys. Each time Endoangel defeats endoscopys. But we have done that with experiments half a year ago.

During last three months, we have organized multi-center trial. Just in this multi-center trial, we have detect about 5,000 case of gastrocopy. And in this 5,000 cases, we detect about 20-- 23 cases of early gastric cancer.

All this cancer was confirmed by its pathologist. And these results is much more interesting than the previous result because this diagnosis was confirmed-- was made in real time. We also get some unexpected results. We don't let Endoangel to learn how to detect or diagnose the esophageal cancer and oropharyngeal cancer.

But just one of my colleagues, just for fun, use it to detect 17 cases of esophageal cancer. Each time, makes correct diagnosis. In the two cases, oropharyngeal cancer.

The first function is automatic, define the range of GC lesion. This is ongoing research. So if that's successful, maybe in the future, before ESD, we can use Endoangel to make prediction for the range of the early gastric cancer. And we can make the mark outside red zone.

We have already viewed endoscopic image database with millions of image data. Now those data increased every day because we have eight very famous Chinese hospital participate in the Endoangel project. That's the parents of Endoangel. So you can see the down [INAUDIBLE] in the Endoangel screen.

We have already-- a few of our paper has already been accepted. One is accepted by *GUT,* and the larger, by *Endoscopy.* We have 12 national invention patents and one software copyright.

Finally, I should use my hometown, that's Wuhan, a very beautiful city-- just a very important science and education base and integrated transplantation hub in China. That's my hospital, a very big hospital. We have 6,000 patient base.

So this two floor beauty is my endoscopy center. So each year we done-- last year, we have done 800 cases of ESD and 700 cases of ERCP. Thank you.

MODERATOR: So there is a question from the audience, which is about the performance characteristics of your model. Which I think you presented sensitivity, specificity, NPV, and positive predictive value. Having receiver operated curves would have helped, sort of. But my question also is about how large was your data set in terms of the training data set? And--

HONGGANG YU: OK. I'm sorry. You, just go ahead. You mean how many images I have used for training, right?

MODERATOR: You used Convolution Neural Networks I think I saw, right? Is that right? CNNs.

HONGGANG YU: Each function at least 100,000 images for the training.

MODERATOR: Say that a-- say that again. A hun--

HONGGANG YU: 100,000.

MODERATOR: 100,000 images?

HONGGANG YU: Yes.

MODERATOR: And these are labeled images?

HONGGANG YU: Yes. We ask our experts to label each. And then, for example, the 26 part of stomach, if you want to-- how to say-- Endoangel to recognize, we should ask our colleague to label it. So for each part, at least for example, the [INAUDIBLE], we organized to-- how to say-- 10,000 cases-- images, not cases, images. If cases, that's quite huge.

MODERATOR: Thank you.