Welcome to the University of Maryland Medical Center in Baltimore, where you are about to see a very uncommon operation used to correct a very common cardiac problem.

The abbreviation we as doctors use for this operation is “TECAB,” meaning “Totally Endoscopic Coronary Artery Bypass.” This procedure will be performed using a special machine, the da Vinci robot.

Because the coronary artery bypass is performed using the robot, there is no need to crack the chest. The surgery requires just three micro-sized scars, and the patient typically makes a full recovery in just about three weeks. Now let’s join the doctors. “OR-Live,” the vision of improving health.

Hello, everyone. Welcome to Maryland. Welcome to Baltimore. Welcome to the University of Maryland Medical Center here in OR-26. This is a HYBRID operating room, and today we will perform a completely endoscopic coronary artery bypass grafting procedure using robotics. We call this operation a “TECAB,” “Totally Endoscopic Coronary Artery Bypass” grafting.

Let me first introduce our team here. My name is Johannes Bonatti. I’m a cardiac surgeon here at the University of Maryland Medical Center. Next to me is Kimberly Swartz. Hello. Nurse first assistant who has worked in the majority of cases with me, very experienced. Then we have Sherri Dixon, our scrub nurse, also a lot of experience with robotics now. And Dr. Atiq Rahman, fellow here for robotic cardiac surgery and innovative artery bypass grafting, very experienced surgeon who has become expert now in totally endoscopic coronary artery bypass grafting. Natalie Elborner over there, who is preparing the heart-lung machine, is our perfusionist. She will handle the heart-lung machine and the remote access profusion system. Next to her, Gary Garcia, who will coordinate the whole operation here. On the anesthesia side, Patrick Odonker, leading the anesthesia team, working with Teresa Nemitz. It is a special challenge to perform TECAB from the anesthesia side. Bobby and Lander, our echo techs, will observe the heart function in echo.

The first thing we’re going to do is Atiq will expose the groin for heart-lung machine cannulation. You can perform this operation in two ways. One would be on the beating heart and one would be with the stopped heart. Today we’re going to do the stopped heart. This version may be the more precise one and the one we have most experience with. Okay.

Atiq will move on here, and Kimberly and I will start placing the ports. Concerning port placement, we have a more-or-less rule of the thumb. We would palpate the jugulum here and the xiphoid and form a triangle. This usually leads us to the fifth intercostal space here on the anterior axillary node. This is where we’re going to make the incision for the camera port. Okay. Let’s go.

Do you have a knife for me, Sherri?

Yes.

Thanks.

Can we have the camera lights on.

The camera light is on, please.

Here.

Can you put this Bovie to 50 for a second, please.

Set Bovie up to 50. Yes, please.

I will ask Teresa to put the left lung down at this point.

It’s down.

It’s down already. So we use a double-lumen tube.

We have those Weitlander. He likes it better than those broken ones.

It is important to Bovie all these portholes early on, because later on you may have bleeding from the port site into the chest that is very annoying, so we make sure we Bovie all these portholes correctly. Mets, Please. Okay. Now you see we go in here in a way that we enter the chest in a tangential way. Good. We’re entering the chest already. Can I have the small trochar first.

Yes.

That’s great. Thank you. I use one of these small trochars first before I put in the camera port. I feel no resistance. It’s looking good here. I can enter the chest nicely. Then give me the camera port, please. Kimberly is going to prepare the CO2 line at this point. If you want to have a look at this port, it’s a 12-millimeter endoscopic port with a side arm for CO2. It’s got a trochar that I can pull back later on. And now we’re going to go inside the chest. Slight screwing, if you wish, maneuvers go into the chest. Okay. Good. Okay. At this point we’re going to -- Kimberly, can you connect this.

Yes.

We’re going to remove our trochar and start inflating CO2 at a pressure of eight please, and can I get the camera, please.

Through the groin, you make a four centimeter incision and I will expose the femoral artery and vein and you have to cannulate. To go on heart-lung machine conventionally you, of course, open the sternum and cannulate the aorta and the right atrium. In this operation, since we are not going to open the sternum, we’re going to go through the biotic arms through four sites and we’re going to go on the heart-lung machine, the only way is peripheral bypass. And the most ideal position is to do it through the femoral arteries.

And as Dr. Bonatti perhaps mentioned earlier, we have done pre-op testing on this patient to make sure his vessels are able for bypass, meaning doing the CT angiograph for the peripheral arteries.

Okay. Again, fifth intercostal space, anterior axillary line is where we are with our camera. This leads us just above the pericardium, the left ventricle to the IMA bed, which we would find around here. And what we use is camera 30 degrees up. You see that? So we have an angled camera here. This is a 3D camera, and the surgeon has got a beautiful 3D-vision on the structures inside the chest. Okay. Let’s see. Here we are. Okay.

What I would suggest is that you switch to the camera picture now and I can explain something. Okay. What we see here is we enter the thoracic cavity, so we’re inside the chest now. We see
the heart beating behind what we call the “pericardium,” the sack where the heart is included. There’s some fat on the pericardial sack, which we will remove later for entry. And the bypass vessel is the so-called “internal mammary artery.” That’s an artery, as opposed to veins, which we used earlier on for coronary surgery. A very durable bypass running here and supplying the chest wall with blood.

And what we see here is what we call “phrenic nerve,” and the aortic arch and the subclavian artery also come into site. So we have free view here to the structures inside the chest, and we can proceed. Again, this is endoscopic surgery, endoscope, meaning looking inside, completely endoscopic artery bypass grafting because you see if you want to switch to the camera view also, Kimberly is going inside the chest with the scissors here, and she will continue placing the port.

Okay.

Let me open a little more.

I know. I went a little tight, huh? You want a little more?

Yeah. I would open it a little more. She is committed to making these ports minimally invasive, meaning as small as possible. There is some rational behind that. If the ports are a little too large then we would have CO2 leakage, which makes our view inside the chest difficult, so I think she’s got it the perfect size now. And you saw how the port and the trochar were entering here. Very nice. Very nice. Similar distance from the camera port. Let me see. I guess this one is perfect here, this perfect.

Okay. Nice?

Yeah. This is more difficult to localize with the camera, so we just look into the anticipated direction of the port, and Kimberly is making the port hole with a regular surgical scalpel. This is our phase nine position. The surgeon can control this camera from the robot, and through these ports he inserts the instruments. Very good. Okay. Now Gary is moving forward with the da Vinci robot. He will come over here, and what we have to make sure is that the patient cart with the robotic arms stands exactly perpendicular to the camera port here. All right.

The femoral artery will be used to give blood back to the patient. We use the vein for taking the blood away from the patient to the heart-lung machine. It’s purified. It’s oxygenate and given back to the patient through the femoral artery, and that’s how the loop for the heart-lung machine is completed. So the patient is still being profused throughout the case, even when we stop the heart. So that’s where I’m exposing the arteries right now, which is almost done.

Excellent. Okay. If we can move forward with our da Vinci machine now. Please come forward, Gary. We are often asked how much time it takes to set up this machine and docking it. This is something in the 20-minutes range. Realistically it takes a little longer in the beginning, and the docking can be made in approximately 10 minutes. Okay. Good.

We’re in the safety zone.

Okay. One important things is that the arms are --

Can you bring the patient down a little bit?

-- not too close to each other. Very nice. This is important. We have our patient side monitor here for observation of the endoendothoracic maneuvers, and we’re now going to dock the camera arm to the camera port. Very nice. We are already there. You saw this. And the camera is going in here. Heart inside the pericardium, and we have a perfect view on the structures inside the chest. Good. Slide in a Vaches [PH].
Shall we tell them the key?

Yeah. Okay. Yes. Good. All right. Move forward. Here we are. And I follow her inside the chest. Very good. Okay. Good. This I can hear hers turn blue, which means the instrument is activated and I can use it. Very good. We dock the second. There are two joints here, which enable multidimensional movements inside the chest. And see here, I can move the instrument at this joint. I can move it here. And these rows are controlled by the robotic connectors and enable these multidimensional movements with six degrees of freedom. And the instruments are placed into the port and then connected to this connector plate. All right. We connect the cautery line to the cautery blade. Port placement is done if you want to record this, and I myself move over to the consult.

Robotic surgery works without tactile feedback, so I have to rely on visual information here. And in order to be safe, we have decided to work with the electrocautery here at 20 watts. It makes it safe. Okay. Good. All right.

What we see here is already the mammary artery behind this fascia here. And what I do now is I remove all the fat from the bypass vessel in order to have a good view and access to it.

Gary?

Something which is important, Dr. Rahman and Kimberly on the table are preparing the heart-lung machine cannulation already at this point while I am preparing exposing --

Turn that down here to 30. Thank you very much.

-- while I'm preparing the internal mammary artery for bypass. Good. All right. We see I can have a close-up here up to ten-fold, and you see here how the artery is pulsating behind the fascia. Here is some muscle. Here we have the apex or tip of the heart, and we should take down our bypass down to here so that we have enough length.

Now I incise the endothoracic fascia, as we call it. This is tissue covering that artery, and this is all done by what we call "electrocautery." Cutting with an electric knife ensures that there is less bleeding. Okay. Incise it here and around here, always making sure that the bypass vessel is pulsating. In the open setting I do basically the same. But I can, in between, go ahead and check if there is adequate pulse on the vessel. I cannot do the same with robotic arms. So you will appreciate that this type of surgery is cleaner as open surgery because there is less tissue trauma and less bleeding, and we also like that aspect of this new type of surgery.

The internal mammary artery is now visible coming out here (INAUDIBLE), as we call it. And we have started to take down this vessel without any adjacent structures. This makes the handling easier and has also been shown that the flow rates are higher if you do that. Coming up to the upper end of the vessel here. Our target is to go here. The phrenic nerve takes off at this site also. And let me just expose the whole vessel underneath the endothoracic fascia before we finally get it out. There's some fat around. This is called the endothoracic fascia or connective tissue. It then turns into the transverse thoracic muscle here.

This bypass vessel has an extremely long durability, which is counted in decades. So 10, 20, 30 years of bypass durability is definitely an offer, and we have to make sure that we preserve this bypass vessel very well in order to achieve this. So I go around the vessel here. What you see is the vein. This is the artery pulsating. No other method, no other bypass or stent can reach the durability of this bypass graft. So once this is placed correctly this leads me to the LAD internal memory artery bypass graft to the LAD. We have a real long-term option.
So again, this is under T guidance. Anesthesia tells me that I am in the descending thoracic aorta. That means I’m on the right track. Once that is done then we sequentially dilate the vessels before we advance the cannula line. Because of the cannula, I can’t.

Oh, you can’t get your fingers in?

I can, but it’s not -- it’s not a close up. As close as this. Come up. We have this 21 French cardio arterial cannula for arterial profusion. On this right side, this is the 25 French quick-draw Venus cardiac visions cannula as well, which will draw back, go to the heart-lung machine and bring it back to the aortic line. This small cannula, which is a 6 French cannula in the distal femoral or the superficial femoral artery, and we use that because these 21 or 23 French arterial cannulas depending on what the size of the patient’s artery is, could be near occlusive, and we want to continue profusing the leg despite being completely heparinized throughout the case or anti-coagulated throughout the case, so that’s what this is doing. And you can see it’s connected to the arterial line. So the arterial line will profuse the rest of the body, and through this small cannula it’s going to profuse this specific right leg only in this case. So we’ll go ahead and proceed with the insertion of the endo occlusion aortic balloon.

Again, TEE is of extreme importance here, and we have to coordinate with our anesthesia colleagues here. Can I have a clamp, please, tubing clamp. So you just occlude this insertion, open the cap completely. There’s a valve there. At time it’s difficult to insert it if you don’t do it that way. Then you retighten it a little bit, remove the clamp. You don’t bleed much around it, and advance there the cannula in. Once it’s inside the aorta cannula, then you advance the wire. And again, then you’re going to tell me, and I’m going to observe myself on TE where the wire is.

Patrick, I’m coming up. So on the TE echocardiography they are viewing currently the eighth aorta, and we’re going to see when the wire reaches there. And it’s there. And you just see it just bouncing around the valve area. So we are there now. So now I’m going to advance the balloon on top of the wire. So the balloon is in place right now. There’s usually some slack or redundancy in the balloon once we initially insert it, so I’ll have to retract or pull it back a little bit once we go on bypass, and then it’s without any slack in the right position, and we can inflate it for occlusion when it’s needed.

Internal mammary artery.

That’s a new word. That’s a new word, huh?

Naked or skeletonized. It’s easy. I’ll understand it, but without any veins. And then just pull this. Okay. Good. All right. So now I have the IMA out of my way. Can I have a long tip forceps left and cautery right. Cautery 30, please. Yeah. What we first do is remove the fat from the pericardium. This is fat covering the heart, if you wish, in its sack. Sometimes a little tricky, but looking good. Good. Okay. The Vaches left, please.

Yeah. Yeah.

It worked though.

Huh? It worked, what you did.

Yeah. Right.

So I put this, what we call “bulldog,” on the bypass vessel. Okay. Very good. And then you give me pot scissors on the left. You see how the -- okay. I will start out here and maybe cut it back later. Okay. Very good. I want to show that there is good flow in the IMA. Okay. Good. All right.
We are right now on the heart-lung machine, meaning the heart-lung machine is artificially doing the work of the heart for the patient. The heart is stopped. And to keep the heart stopped, we have to stop the flow to the heart -- the blood flow to the heart, and for that we use in balloon. And to immediately stop the heart from beating, we use the material or chemical, which is composed of different chemicals, and we call it cardioplegia, and that is basically stopping the heart, and that’s where we are right now. So we are on the heart-lung machine, and the heart is completely stopped.

In this case I will show this on the angiogram also. We have an anatomic different situation. There is a very tiny LAD on the angiogram and a very large branch that is definitely occluded. It is diseased. And it’s this vessel here. I just have to go briefly back to the angiogram and look at my target here. Okay. I just want to explain here. We have the right heart chamber here, and here the left chamber of the heart. In this case the branch, the typical branch that is running between the two heart chambers is located more on the side of the heart. We have seen this on the cardiac cath film, and we’re going to expose this additionally with our stabilizer.

So I think we’ll come in here with another port. The new system that we have here has got four arms, and we use the forth arm to expose our coronary artery here. And you see how this fourth port is coming in.

I need to compress you a little bit.

Yes, that’s fine. And this arm will be docked to the additional -- this port is docked to the fourth arm of the system, and then we bring in our stabilizer.

All right. Coming back in.

Yes, very good. So slowly, okay, I show how the instrument is coming in. Okay. It has got suction pulse on it. All right. Very good. Perfect. Okay. Good. So now I can control this instrument. I switch my foot pedal here and then we’re okay. Is there some collision here.

Yes. I’ll move the arm.

Yeah, one second. Okay.

Good. All right.

Better?

Yes, it is. Perfect. Okay. So, Atiq, you remember those side branches on this vessel going in there, and we’re exactly there. This is perfect exposure. Let me see. Okay.

I’ll just go a bit more proximal; right? Because the lesion is way --


Suction going on.

Look at the left instrument arm. Okay. Bypass vessel close to the coronary artery, so then we measure our length again.

We moved it. Yeah, we’ll do that. I actually do it more. Patrick, could you open that.

Yeah.

Open the pericardium more?
No. Wait a second. We are nice here. Okay. Let me just -- what I have to do is to bring -- okay. What I do is I check on the rotation of the bypass here. Let's see. Yeah. Looking good here. I have to find a more-or-less disease-free landing zone. This is something challenging, so for our audience, again, this is the coronary artery. Yes. Okay. And we see some fat calcium plaque here on the vessel. This part is a little challenging also because without tactile feedback, this is all feeling -- quote, feeling different than in the opening setting. But as you see here, we get a chance to expose our target to get it out of the epicardium, how we call it.

And it looks as if we are in an acceptable landing zone here, and I will open the vessel on the running cardio. I'm in there. Make sure that I don't poke the back wall of the vessel. Okay. Here we are. I open it. Cardio is still running. Pulse right, please. So how much cardio do we have in.

250.

250? Give 300, and then off, okay? I want to make sure that I have perfect view on my coronary artery here, and that's the reason why I'm placing this tape around it. Okay. I should go a little more upstream. Okay. It goes around the -- maybe to talk a little bit about the dimensions here, the coronary arteries have a diameter in the two to three-millimeter range, at least the places where we are working on. And the magnification of the operation robot helps me a lot, as does the 3D vision. So what we have here is this is up to ten-fold magnification, this gives a perfect view. You have an operating microscope, if you wish, and this is also microsurgery we are doing, and we see that our view on the target is much better now, okay, with much less backflow. Okay. Give me Potzes is right again. We open it a little more.

We call those white tapes "silastic tapes," and that can help dramatically getting a better view on the coronary artery. See here how we are exposing it. We've got this part, and we go in here and cut a little more open. Yeah. Okay. You see here the markers on my scissors show five millimeters. One, two, three, four, five, and I've opened the vessel the length of approximately three to four millimeters and extend it a little bit. It's a reasonable length now. Okay. And the diameter is approximately, I guess, two millimeters. Not exciting but okay.

So let me -- and at this point, I think I'm happy that I left a little more of length because we are pretty much downstream on the coronary artery, and I just, for safety reasons, would like to keep this part. We'll make maybe one more flow check later on. Let me see here. Okay. To prepare it for the -- in surgical terms, a connection between a coronary artery and the bypass is called "anastamosis," okay. Coming from old Greek language, ancient Greek, to make an opening between two channels. So I think we are almost ready to go. Okay. Can you give me the Vache forceps, please.

The Vache; right?

Yes.

Do you need any irrigation?

No. Can you come in with the pick up and hold this for a second and we can check the free flow again. We want to make sure that this is okay. So what we developed over the last years was transthoracic assistance, so Dr. Rahman is coming in with a pick up here, with a forceps and grabbing -- wait a second. Close it. No? Come a little upstream. Okay. Close it now. Close it. Yeah. Okay. That's perfect. Can you move upstream a little bit? No, the other direction. Okay. Just hold it there, and then we can check the free flow one more time. Stay there Atiq. Okay.

Looking very good. Okay. Lift it a little bit. Lift it.

It's wanting to turn the other way around.
All right. Now we are fine. Very good. Okay. Let go, please. Okay. Now I get another check of the orientation of the bypass. That’s very important. I have to make sure that there’s no twist at all. And this looks good. Okay. All right. Micro forceps in both sites.

Okay.

First micro forceps is here and the other one is there. I go grab my suture. Suture, meaning the surgical term for the thread we are using to stitch all this. Wait a second. Okay. Here we are. Good. All right. So now if you want to record the first stitch of our anastamosis. We want to let our audience know how long it takes us to do that.

What’s the balloon pressure?

Dr. Rahman is asking Natalie what our balloon pressure is, how much is it? Huh? What is the balloon pressure?

280.

280. That’s pretty normal range. Sometimes we go above 300, but we have perfect conditions here. Don’t want to change perfect conditions at this point. Okay. Good. I make sure that I see the needle shining through the wall of the artery. That tells me that I’m not occluding anything, and we park our needle here, and then we go for the second stitch here. This is a so-called “running suture.” The material is prolene, polypropylene, and will not resolve. It will stay in there. It’s custom-made by Kim.

Yeah. Okay. Yeah. We saw that earlier, right? Yes. Okay. So next is -- this stitch is always a little challenging, the first one. I have to grab the bypass here and poke through its wall. Here we are. Very good. Okay. Then once we are aligned with the coronary artery, it’s getting easier. But what you can appreciate is that there’s no tremor at all. That is one of the major advantages of this type of surgery, that every tremor is filtered. Okay. Good. Okay. And we keep on going. At this point, when we have reached the very end stitch here, I asked Natalie to start re-warming. What’s our temperature now?

34.5.

34.5, that’s good. So we start re-warming at this point. And as mentioned earlier, there are two methods. You can do this on the stopped heart, as we are doing today. Under cardioplegia, as we call it, with the heart-lung machine. No tremor, completely tremor-free work. High precision of every stitch here. You can also work on the beating heart. Much more challenging because you have magnified movements of the heart. But that’s what we’re going to show next time. Okay? It also works. But I just like this type of operation very much because of the level of precision that it gives. Okay. See that? I see all the -- if I want to have a close up here, let me just show you that, going inside the anastamosis, yeah, you see all the details, and that gives me a feeling that I’m constructing a perfect graft here, perfect bypass.

We are often asked how you learn this. Important question. Hours and hours of suturing on models before you go to a patient. Dr. Rahman is laughing because he’s just through that phase. More than 200 anastamosis in a model. Now he’s ready to go. It’s very helpful. It’s like a pilot is training in a simulator. The postage is also very important. Pay special attention that you don’t poke the back wall of the anastamosis. Again, I have tried to see the needle here shining through. And I make sure that there is no slings on the suture lines, which, of course, would cause a leakage. A few more toe stitches here.

If you see those needles without magnification, they are pretty small, as you may have seen earlier. Pull after every stitch here. And Natalie is re-warming. What is our occlusion time now, endoaortic occlusion time, cross time? Yeah, 46 minutes. That’s absolutely acceptable. The
heart will tolerate up to -- for coronary surgery I think three hours of heart arrest. Three hours of stopping the heart is absolutely acceptable with good cardioplegia, and we have reached the -- we have 20 minutes on cardio. We just wait until we have finished our last stitches. A little too deep, this one. This is better. Okay.

And again, I’m happy that we picked a healthy part of the vessel for suturing. That makes it much safer concerning leakage or narrowing. This has to be perfectly open, because if it’s not then there is danger to the heart muscle. So this also speaks for the method here; that we have a high precision method. Okay. Very detailed information that we get through the -- I’m looking, by the way, through 3D binoculars on the console. So this is an even more impressive view. One or two more stitches and then we are done. Let’s see. Yeah. Yeah.

One more?

Yeah, I will do one more. But I also want to put this one back and slide it over. Good.

So now the surgeon goes ahead and takes these two end parts of the thread, of the suture, and we want to poke this one here. And we have a last look on the back wall of our anastomosis.

Looking good. No slings. And then we tie this off. Can you give a shot of cardio, please. Open the branches, yes. And you see how elegantly we can assist through the thorax, through the chest wall. Kimberly is coming in through that blue port that we put in the earlier. She’s grabbing our needles here. Okay. Excellent. We don’t want to leave those in. Give you the last one.

Okay. The next one, okay. Wait a second. All right. Grab it. Yes. Excellent. And we’re going to remove our silastic tape. I don’t want to have the heart beat at this point. Those maneuvers are really much more difficult if the heart is beating. So a few more minutes to remove this is worthwhile. Okay. So the bypass is constructed, and I put this one over here into the fat so that I’m not losing it inside the chest. Okay. Good.

So, again, blood running from the artery that is going into the left arm through the internal mammary artery, into the coronary artery. And we open our bulldog here. And from now on the heart is supplied with blood coming from this bypass, so the blood is running through the internal mammary artery into the coronary artery that you see here, running into this direction and also into that direction. The blockage is somewhere -- the narrowing of the artery is somewhere up there. We don’t see that. The surgeon has to know this when he goes into the operation from the cath film.

Can you come in with the irrigator, if you want to. Okay. Irrigator is coming. Okay. Wait a second. Okay. We are good. Yeah, use saline first and then Papaverine. So we clean this here and we also use some Papaverine. Papaverine is a substance that dilates our bypass. Very nice. Okay. Good. I think it’s looking very good here. This oozing will stop with reversal of our heparin. And we are good. Okay. Perfect. Put back the irrigator. Good. Okay. Here is our -- let’s see.

Sometimes the heart just starts beating. We still only have flow through the bypass, so let’s give it a try, whether we can activate the heart. If this does not work we will deflate our occlusion balloon. You want to go ahead and do that. Please deflate the occlusion balloon. I think this is important for our audience. What we are doing now is we deflate this balloon in the aorta, and thereby, blood is flowing into the native coronary arteries also. What we can do is remove our stuff here.

Okay.

Clamp is off.

Yeah. Good. All right. Come in with your forceps. Uh-huh. Grab the thread. Okay. Yes, very good. Okay. Here we are. Good. There's still some cardioplegia. That's the reason why it's not contracting on its own, but we will be there soon. Okay. Give me the wire. And, Aliq, you prepare a placing wire and a clip; right?

Okay.

So we can also pace the heart here. Usually when we are discussing this it starts beating, as we see here. Okay. It's always the same. When you decide on placing a pacemaker, it starts contracting. Good.

You want us to wait?

Sure. We are fine.

Okay. Dr. Bonatti had completed his procedure, and what we are here to do is to take some pictures of the completed graft to make sure that it looks fine. If it doesn't, it can be revised while we're in the operating room, and that's the plan. So we're going to do a regular coronary angiogram, which is pictures of the coronary arteries, by injecting dye into them, which we normally do in a separate cardiac catheterization in the lab. We're doing it here today in our HYBRID lab, in which we can do bypass surgery and coronary angiography at the same sitting.

This the Dr. Scott Catson, who is an interventional cardiology fellow, and I'm David Zimrin in the cath lab director here, and we're going to start taking some pictures. So we have the catheter, and we're going to thread that up to the patient's bypass graft using X-ray, and there you are. So what we're going to do is manipulate this catheter into actually the artery that leads to the arm, the subclavian, which is where the bypass comes off. Let me just saw it for a second there.

So what Dr. Catson's doing is manipulating the catheter and hopefully put the tip of that right at the beginning of the bypass. Let's take a picture just like that. So hold on one second. Okay. You want to fluoro for a sec. And I'll just give you a puff to make sure we're still good. Why don't you fluoro? All right. You want to just turn that a little bit more. That will be perfect. Okay. Now we're going to fill with dye and we're going to take our picture. And there's our bypass filling the target artery, and it looks wide open.

Looks guide, huh? I think it's a very nice looking graft. Okay.

Ladies and gentlemen, thank you for joining us here in OR-26 at the University of Maryland Medical Center. We showed you a completely endoscopic coronary artery grafting bypass procedure. The case went very well, with a perfect angiographic result. And we hope to see you soon here in our OR. Thank you.

Thank you for watching this “OR-Live” webcast presentation from the University of Maryland Medical Center in Baltimore, Maryland. “OR-Live” makes it easy for you to learn more. Just click on the “Request information” button on your webcast screen and open the door to informed medical care. “OR-Live,” the vision of improving health.