**Aortic Aneurysm Repair**
**May 7, 2009**

Good afternoon. Welcome to the Baptist Cardiac and Vascular Institute here in Miami. My name is Dr. James Benenati. I'm an interventional radiologist here at the Institute, and I want to become you to our live webcast. Today we're going to repair an abdominal aortic aneurysm using a technology called an "endograft," which is sometimes called the "stent graft." I want to introduce to you two of my partners who are in the room working on the patient, Dr. Barry Katsen, who is a medical director of the Baptist Cardiac and Vascular Institute, and Dr. Ignacio Rua, who is a medical director of vascular surgery. Good afternoon, guys.

Good afternoon. Thank you, Jim. Good afternoon everyone or evening wherever you might be or morning. I'm Dr. Barry Katsen, and this is Dr. Rua, and together as a team of multidisciplinary physicians, we're going to repair an abdominal aortic aneurysm today and hopefully be able to teach you a little bit about what aneurysms are and why they occur and why they're important. So to do that, I think, let's perhaps show the first slide and we'll talk a little bit about what an aneurysm is.

On the top portion of this slide, you can see a smooth red tube that represents an artery. The arteries carry blood in your body. They carry oxygen and blood to various organs. These arteries have muscular walls, and when they get weak, as you see in the image just below that, when the artery wall gets weak, they can balloon out and expand. And over time, this is a little bit like a blister on a tire where over time with repetitive pressure they continue to expand, and they can rupture. And these aneurysms can occur in a lot of different parts of the body.

What we're going to do today in concept and what was really pioneered here at the Institute and in other places around the world is the less invasive treatment of this type of problem with something called "stent grafts." The next slide shows how this works.

Here you can see the artery that's diseased and become ballooned out with the weakened wall. And inside of that artery we placed a combination of graft fabric and metal. It's called a "stent graft" because there are two different components, and essentially we place a new tube inside the patient's diseased tubing. And this concept is what we're going to demonstrate today in treatment of this patient. So why don't we go back to Jim who is going to tell you a little bit specifically about aortic aneurysms. Jim!

Okay, Barry, thank you. If we look at these pictures we have in the back, we actually have a picture of a normal aorta here. On the left side you can see this tube-like structure. This is a main blood vessel that runs through abdomen. At about the belly button, it divides into a vessel that goes down to the right leg and one that goes down to the left leg. These vessels coming out to have the side up here are very important. These are the arteries too the kidney. And these are very important landmarks that we're going to see later on that help guide how we place the device.

On the right side you can see a picture of the abdominal aortic aneurysm, and you notice how this is now blown up like a balloon. And as this blows up, as Dr. Katsen mentioned, this wall will actually thin out. And the big risk here is that if this gets too big it's going to rupture. Generally when these rupture they're almost always fatal events. So the reason that we're treating this is to prevent rupture and to prevent death from rupture.

This area just underneath the renal arteries that looks normal is another very important landing zone that we're going to refer back to later as an important landmark in this procedure. So let's go back now and learn a little bit about abdominal aortic aneurysms.

Great. Thank you, Jim. Dr. Rua, can you tell us a little bit about aneurysms and why they're significant in the aorta, if we could have the first slide, please.

The first slide. Okay. Abdominal aortic aneurysms cause approximately 15,000 deaths in the United States each year. It affects eight percent of the population over the age of 65. It's most common in males. There is an increasing number, due to the aging baby boomers. Next slide. The risk factors for abdominal aortic aneurysms are males over 60, hardening of the arteries, which is known as atherosclerosis, high blood pressure, smokers, or a family history of abdominal aortic aneurysms. Today's patient is a gentleman who is 76 years old. He's somebody we have been following in the institute for the past three years, and his aneurysm has now grown to 5.4 centimeters.

And this is actually an important factor. Most aneurysms we treat conservatively and we'll just watch them. But the two most important factors in terms of risk of rupture are the absolute size of the aneurysm, how big it is. And the second thing is the rate of growth, how fast the aneurysm is growing. And we know that in this particular patient that the aneurysm has reached the size where risk of rupture when you are is starting to exceed the risk of treatment, and he has also had fairly rapid growth. So at this point, I think we're going to proceed and show you a little bit more about this patient and this procedure we're going to do by showing a little bit of graphic information about the device and the procedure. Jim, would you like to perhaps share that with everyone.

Sure. So if you look at this animation, this is actually a CT, the same type of CT you may get for other reasons, but we use three-dimensional reconstruction and we can reconstruct all the blood vessels. So as we look through this you'll start and see as we work through the skin into the abdomen, you can see the belly button there. We'll play this video again, and as we work through this, you will see the blood vessel here just like in the diagram we showed as we rotate, that dilated portion is actually the aneurysm and this is actually the patient that's on the table. This is a CT scan that we performed several days ago. So having this type of information is critical for us in terms of planning and guiding the procedure we're going to perform. And as we look at this one last time, you can see the normal -- the dilatation and how much bigger it is than a normal vessel.

I think you can all see the pretty big bubble that's there as a result of this patient's aneurysm getting quite bit compared to the normal aneurysm above. And so what we're going to do now is begin to do the process of putting an endograft in, and I'm going to show you the graft right now if we can bring the overhead camera back. Okay.

This is actually the graft that we're going to deploy. And you will see some diagrams and pictures of this. But this is actually delivered on a catheter, and we're going to put it right through this tube that we placed right here over this guide wire. And what I'm going to do first is orient this device so I know right and left, and we're going to do that by using some X-ray. And so if you show camera number one please, you'll be able to see a number of black marks on the screen.

And I'm positioning the graft on the patient's tummy here to orient things, and you can see if you look at the very top here, there's a long black marker and a short one. Perhaps you can see that a little bit better here. I want to show everyone exactly what we're doing, which is being monitored mostly by sort of X-ray vision where we're using this X-ray equipment here in the endovascular suite to see inside the body. So Dr. Rua, as you can see, side by side. We position the device, now, close to the right position. And what I'm going to do now is do an angiographic run or an injection of contrast, and you'll see that.

If we show monitor number one, please. Good. Here we go. Keep it on number one. I'm just going to inject a little dye that you're going to see. And you can see, I'll show you these pictures as they play back. This is like a little bit of a movie that we're doing to show the aneurysm and our various devices. You can see an artery going off to your right side. That's the artery to the patient's left kidney, and there's a similar artery going to the right kidney. And the goal is to place this device just below the kidneys so that we get a seal.

The catheter that you see that looks like kind of railroad tracks going up and down, that's the catheter that we're using to inject dye and also to do measurements using our computer techniques that are going on here.

So what I'm going to do now is using the fluoroscopy, using the X-ray fluoro, I'm going to unsheathe this a little bit. You can see that large sheathe come down. I'm just going to orient this a little bit like that. Are you okay with that? Okay. And we're going to look down here going down. You can see how this coursing down, and you see the patient's bones in the background, so we can see everything for orientation. And now we've released everything, and I'm going to go back up. Back up, please.

We're going to do one more run. You can see these various black dots that may be difficult for you to be oriented to, but for us they're very visible, and they give us very, very important information about where everything is. Even though we're working inside the patient's abdomen here, but there's no incision actually in the abdomen, only these little small incisions where we can kind of get access. Okay. Apnea, please. Apnea.

We're just going to inject some die, and you will be able to see a little movie here. Okay? And one of the things that I'm learning from this movie as we looking at these images is that the device is actually a little bit low. And so what I'm going to do -- you can breathe, yeah. What we're going to do is just use this image where we can see everything superimposed together, and I'm going to advance the device up and you'll be able to see it move. One, two, three, right about right there. You can see it move up.

And if that was a little hard to see, I'm going to do anther injection of dye material so everyone can see better, and we're using that to confirm our position. Sorry. Apnea, please. Okay, now what's happening is that diagnostic catheter is coming down. I don't want it to drop in the sack. Let me have a real wire quick. There you go. I'm just going to -- try not the lean on the controls. Okay.

What you're going to see now is I'm actually going to advance that catheter that has all the black dots on it, and I'm going to put a guide wire up, and we're just going to very gently slide that catheter up like a little snake type of thing right inside the artery. There's no pain or anything associated with these types of manipulations by the way, even if the patient were awake. And as Dr. Rua said, in many patients now we can actually do this without incisions if they have appropriate anatomy for that. Just going to keep this up. So I'm going to do one more reason before we're ready to employee. Okay. Apnea, please.

What I'm doing is these multiple X-ray images to allow us to confirm. And let's come back a little bit more I think, no. Okay you can breathe. You're okay with it? Yeah, I think that thing needs to go a little bit higher. So what I'm going to do advance this just a little bit higher. Okay. Let's un-mag. And now if we can get a camera -- I don't know. Can you come in here on this camera?

So, again, Barry, as you're doing this and everyone is watching this, you're looking on a TV screen inside the patient's body, but your right and left hands are actually down, working in a completely separate area, and it's because of this small technology that allows you to do this.

Exactly. So what's going to happen now is Dr. Shovin, who is assisting us, is going to come over. He's going to stand to the side. And what we're going to do is actually deploy this. Let's go ahead and record it while we're working, please. All right. So you get here, a finger. All right. So he's going to unscrew this. We can show the -- you ready? Okay. Now what I'm going to is I'm going to do fluoroscopy.

I'll tell you what, let's go ahead and show this image while he's doing it. You see the image? You've got to kind of give it a little pull back. Can you see this at all from that camera? Can I see it from the camera across, because it's not going to be -- can I see yours.

While Barry is getting that set up, for all of you listening, you can ask online. Just click the "Ask a question" button, and it will get the questions to us, and we'll try to answer them for you throughout the webcast.

Widen out a little bit. Come off of that a little bit. Come out a little bit. Okay. So Dr. Shovin is going to that I can this, which is attached to a string, and then we'll show you what that does, and I'll count to three. I'll count it down and you go. Ready? Three, two, one, go. Okay, good.

Now what he did it actually just deploy this endograft. The endograft is now in the patient's body fixed. And I'm going to ask Jim to show you exactly what that looks like.

Okay.

Jim, why don't you go ahead and we'll show, Dr. Benenati and I will show you exactly what that looks like. So, again, to show you, how does this something that big -- how does something as big as this get into the patient's body through a tiny little hole? Well this device, as you saw, is actually wrapped down on a catheter, a catheter being a tube, and this is the tube on a catheter right next to it. So because of the technology that we have, we can make this big device small and we can introduce it through this small hole.

Now the device is actually made of -- this particular device is made out of Gor-Tex, the same thing a jacket might be made out of, and the metal framework that Dr. Katsen alluding to is a metal called nitinol, which is nickel titanium, and it actually has the ability to be shaped differently at different temperatures, so we can make it very, very small.

So here is what he did. He put this up through the leg, up through this artery. It came up. He placed it right underneath the kidney artery like we have right here. Okay. And all that positioning he was doing was just to make sure it was perfect right at the kidney. And then I'll ask -- if you'll just hold the end of this and then simply by pulling this string very slowly we can come to the end. You'll watch the device open over here as I pull this string, and that is exactly what we just did inside that patient. And now look, we have this very large device inside the patient, and it went in on this very small tube that we call a "catheter."

So Barry, where are you right now?

Okay, thank you, Jim. You can come back to me. We're actually making very good progress, and I'm going to show a very important part of the procedure where we actually use a balloon to help seat everything. And you're going to see this again on the graphics in just a moment. We're going to show you this balloon inflation. I don't have the wire. Okay? And as you see here, you'll see two large markers, two lark markers, and then a number of little small markers.

If you remember that long marker that we were using for orientation, you can see that long marker came out exactly where we wanted it, which is on the patient's left side. We're going to occlude the aorta for just a moment now. I'm bringing that balloon up. You can see that balloon expanded, and we're very gently applying some pressure there. This is in the neck of the aneurysm that Dr. Benenati discussed earlier, and we're trying to make sure those barbs and everything else are very well seated. Okay. Somebody needs to be grabbing images.

Now for those of you just joining us, again, this is the Baptist Cardiac and Vascular Institute in Miami, Florida, and we're repairing an abdominal aortic aneurysm. Please feel free to ask any questions online. Just click "Ask a question," and they'll get to us.

So Barry you're putting that balloon up. You're seating that device in place.

Right. And here you can see that balloon's going up, and the balloon's a little bit narrow. You can see that it's a little bit deformed, because there is just a little bit of hardening of arteries in this area where the sealing is. But what we're trying to do is by using this balloon is it's not the kind of balloon where we dilate blocked arteries with this. This balloon is trying to iron out the attachment.

So right now we have the first half of the limb deployed. And, Jim, do you want to perhaps now show them the rest of that procedure and what we're going to be trying next.

Okay. So what we're going to do now -- and I should mention, Barry, that because we're doing this with such holes in the groin, this really offers the patient a tremendous advantage over having his bellow open. The recovery time for what we're doing here is going to be much, much shorter than what you would see if you had a conventional repair the old fashioned way with your belly being open.

But now if we come back to my diagram or this picture here, we have this part of the device is in, but we have to connect, now, the left leg. So what they're going to do is they're going to take a tube and try to insert it up through this hole using the X-rays and then ultimately bring this other leg up like this and dock it into place. Okay? And in doing this, this has to be done -- this takes a lot of real skill with your hands and your hand/eye coordination. I just wanted to mention that the people doing this -- Dr. Rua is a vascular surgeon, very well trained, and it takes very special training. It's not just any type of surgeon. So Dr. Rua has done special type of training in vascular surgery, and Dr.. Katsen is an interventional radiologist. That's a specialty many people haven't heard of, but that's a specialty that does minimally invasive procedures using these types of X-ray guidance so that we're trained to use our hands, working with our hands but looking with X-rays on a screen, and it takes a special type of training.

Both the doctors in the room are board certified and highly trained to do just this type of work. One of the advantages we have at the Baptist Cardiac and Vascular Institute is that we have a very level of expertise. We've done almost a thousand aneurysms with this. So we can offer patients a very, very good integrated care with surgery and radiology together. Okay.

Okay. Jim.

Yes, Barry.

Okay. So we're going to come back over here, and I think if we show monitor number one, what we're going to try and do is show you. You can probably see that there's a little gold ring there that shows up on the X-ray, and we're trying to get a wire directly into that gold ring, which can be a little tricky. Watch your legs here. Here you can see that gold ring separating, and what we're trying to do is sort of find our way in there.

So it's like putting a puzzle together, except they're doing it three-dimensionally inside patient's body. And they're searching with that wire to get it right through the open end of that loop. Now one of the questions that was just asked is "What type of endograft is this?" This particular type of endograft is called the "Gore excluder." It's made by Gore Corporation.

And, again, someone else had just asked us, Barry, in terms of how big the aneurysm has to be, and we generally don't treat aneurysms until they get to be 5 to 5.5 centimeters.

Jim, I'm sorry to interrupt here for one second here.

Okay. I'm just going to show monitor number one. Very good. As we pass the catheter through this gate, you can see I'm actually trying to push it up here, and it's actually pushing that little short leg that you showed. So there's some tricks that we can go through to try and make sure that we don't hook on that. The first one is I'm going to try and pull the sheathe down a little bit because it's exerting a little pressure and it's getting caught right on the lip there. And we always have little challenges during these cases obviously.

And now you can see we're passing that catheter right up through that short leg of the graft. What we can do now is just confirm that we're in the body of the graft by rotating this catheter because of the shape of it. And you can see it's spinning nicely. And so with that spin we know that we've actually gone right through the center of the hole. And it is a little bit like Nintendo or probably older -- we're a little old for those kinds of things, but it's very much an eye/hand coordination. And what we're doing here -- if you come to me on camera number three, I guess.

What we're doing is actually working here with our hands here, but actually looking at a very large television screen and using this remote to eye/hand coordination. So we can go back to the fluoro monitor now, and you'll see a large stiff wire there that's going to come up. It's very dark, and it's going to straighten that catheter up just like that. Okay?

Now once this is in, I talked to you about an EndoSensor, and we're going to take a couple minutes just to talk about this small microchip we're going to put in this patient's aneurysm that's going to be very helpful to me in following the patient up in the office. So you can come back to me, if you will, or the table top. You have the wire?

Yeah, this is really very exciting, Barry, because this is a new technology that really makes follow up for the patients very easy.

So people frequently ask after you treat a patient like this what, you know, what's his follow up? And generally we'll see the patient in the officer and we follow the patient with CAT scan. Is that right, Ignacio?

Yeah. Usually we do serial surveillance every three to six months, depending on the type of aneurysm and how large. Usually in the first year we do a lot more frequent studies, and by about the second year, it's usually an annual CAT scan just to check position of the endograft.

Okay. So I'm going to show you, if we can get the overhead camera over here -- if I'm in the right place. Good. If you come in tight on here, you can see that there's a little bit of a device right here. It has some wires on it that's intended to protect it. And inside of there is a very small microchip that acts a little bit like a cell phone technology. We'll show you how that works.

But this is the device that we're going to put in that space between the endograft and the patient to the wall of the aneurysm. So in that space where the aneurysm sack was, we're going to put this in, and it's going to be a pressure monitor, and we'll show you how that works. So we can put this on the wire now. And we can get ready with the paddle. Okay.

Barry, go ahead.

What I was going to say, the way we're going to measure the pressure is a with a device that's right here. You can probably see from the overhead camera perhaps. Hang on one second. Okay. Going in with this.

So, again, Barry, as you're doing this, I just want the mention a question that keeps coming in is, "How long is this device going to last?" And the answer to that is, this device is going to last a lifetime. These devices are approved for use by the FDA. There are many types available, and we expect when we put these devices in that these devices will last the patient's life. They will be free of risk of rupture for the rest of their life, and that's our goal. So even though we still have to follow the patients closely, this device should last this patient through the remainder of his life.

Okay. Jim, if we can show monitor number four here.

Okay. You can see, to the audience that there's a paper clip. If we can show monitor camera number four, you can see all the wires curled around. But just to your left when you're looking at the screen is something that looks like a little paperclip that is sitting next to a lot of wires and actually the endograft implant. And that little paperclip is actually housing the EndoSensor that we're putting in. And what we're going to do now is if you can get -- you have this camera up? We need to -- on the patient's abdomen, patient's abdomen. Okay. Can I have a shot of this, please, the patient's abdomen. Step back.

So what we're doing right now is -- let's use the over head. Yeah. You can see that I've got this kind of tennis racquet device here that's sitting on the patient's abdomen. You can see there's no needle, no contact or anything. And from this tennis racquet, you can now come over to the monitor. We're actually measuring the pressure in that patient's abdominal sack.

Now remember we haven't treated his aneurysm. We're sort of halfway through. So this pressure is actually the same as the pressure in his artery. His aneurysm is still under high pressure at this point because it hasn't excluded. So I want you to remember this, because after we put the endograft in, we can look at the pressure and you will be able to see the difference.
So we're just entering the patient's pressure into the device as you can see here.

And as you're doing that, Barry, I just want to mention that this device basically -- people do not have allergic reactions to this device. These devices -- your body does not reject them. They actually become incorporated into the wall of the vessel, and they become part of the vessel, so that there's no risk that your body can reject these.

So I'm going to go ahead and deploy this.

As you're getting ready to deploy, I also want to mention that not every single patient that we see is actually a candidate for this procedure. They have to have the right anatomy, as this patient does, and that turns out to be about probably 80 or 90 percent of the patients that we see we can actually treat like this. But a small percentage of patients we're unable to treat in this manner. Let's go back into the room, Barry.

Okay.

You can explain to us exactly what you're doing.

Okay. Thank you, Jim. What we're doing is we're actually just detaching that device, and just trying to -- is that wire all the way in? Yeah, all the way down, right, the wire I pulled? Did you take the rest of the wire? Huh? It's totally gone.

Again, remember, if you want to ask questions, you can log onto ask a question. We're here at the Baptist Cardiac and Vascular Institute in Miami, repairing an abdominal aortic aneurysm. Normally this procedure takes us about 45 minutes to an hour of doctor work time, which is, I think, a fairly quick procedure to replace a major life-threatening problem in the patient's abdomen.

So you can see Dr. Katsen working here with his hands, and as he's doing this, again, they're using X-ray guidance to look inside the patient, so this is kind of a remote procedure that he's doing as he's guiding everything inside the patient using X-ray guidance. There's nothing left here? Okay. We're just rotating things around Jim, so I'm just trying to make sure that we're totally deployed here. I think I'm going to move this up here for just one second.

All right. As he's actually doing that, if we come out to the schematic, I can show you exactly where they are. So here's the renal. This is the aneurysm for those that joined late. The aneurysm is a saccular swelling in the aorta. This is at risk for rupture, so we need to treat this.

The device we have is made out of metal and graft material, and in this case Gor-Tex. The first half of the device is in place. And where my pen is here, he's placing that paperclip-shaped sensor, which is really nano or micro technology that will stay in the patient forever. There's no reaction, no allergic reaction. It's inert. But sensor will allow us to always come back and detect using that tennis racquet-like device whether or not there is flow in this sack after we replace in aneurysm.

So right now they're going through the particulars of just trying to get that sensor placed in the exact location. And then after that, they'll take the second limb and they'll come up, and at that point, they'll be able to take the second limb and dock it to the first limb, as we discussed earlier.

Zero, ten, okay. Twelve, okay. Let me have the super stiff. Okay. Jim, what we're doing is you can see this picture that has a lot of those white dots on it again.

We see it, yes.

And again, since we don't have the patient's abdomen open and we're just looking, we're trying to measurement. We're actually doing measurements inside of these lengths to make sure that the various components that we do are exactly the right length, and that's kind of what's going on here. So I think I'll show you with a special type of X-ray here where some of the components are. And the graft is almost completely in. We're going to put that short leg that you were showing in next. Ready? Okay.

So, Barry, as risky as these are to patients and as much as they can be life threatening, we should mention that most aneurysms are actually found accidentally. They're found because patients have other types of workups. Aneurysms are known

to be silent killers. Most patients don't even know they have these. So we do believe patients should be screened. In fact, patients who have a family history of aneurysm, men who are smoking over the age of 55 should be screened for aneurysms. And the way to screen is with a simple ultrasound. But sometimes a CT scan can show that, which is how most of these are found in the emergency room when we do other things. And it's very important to understand that you may not have any symptoms at all with this aneurysm. So, again, as we're watching and we're looking at the work here, they're working with their hands on the outside of the body, and you can see the catheters moving inside in the aneurysm sack with the spine projected in the background. So how long have we been doing these intentions? Well, we actually, here at the Institute, started doing this as early as 1994. But the majority of devices available weren't available to the general public until about between 1999 and 2001. We actually participated in a lot of the original research that was done to get these devices approved. So we have a very big experience here. We have been part of a number of the clinical trials that have been run through the FDA to get these devices approved.

Yeah, I do that. Let me have the dilator first. Dilator first. Jim?

Yes, Barry.

So what we're doing now is we've successfully catheterized the limb, the short leg, and you can come to me if you want to and I'll talk to the audience then. What we're doing is using several different techniques to facilitate getting the device up.

Okay.

And so sometimes this can be challenging, and from a technical point of view, that's what we're doing now. And if we go through -- this will make it a lot easier. And what we've just seen, if you look at camera number four, is we've we engaged the short leg with a sheathe, which is a tube that allows us to facilitate things. Now I know you were talking about this when we started this. And interestingly enough, the first patient was treated this way in 1990 in an experimental and a research way. And we started this Cardiac and Vascular Institute in 1993, doing this kind of research. Can we come here?

That research was led ultimately to approval of a couple of devices in 1999, and then other devices, next-generation devices such as this subsequently. So we're still doing research here to improve devices, improve outcomes, and to get the best possible results for our patients with the least level of invasiveness. So here you can see the device going up, and I'm going to pull the sheathe down so you can see here. You can see the sheathe moving. And those little black dots basically allow us, really, to identify where everything is and they get us oriented.

Now Dr. Rua is going to deploy this device, and you will be able to show -- I think what we're do is we'll show you the fluoroscopy this time, just so you can see. And you can see, we're lining up two dots. So this is a little bit like -- we're lining up two dots. There's a short dot and a long dot, and now Dr. Rua is going to deploy. Three, two, one, okay. And there you can see the device opening up very nicely. Okay. And now we can take this device out and we'll take the balloon out.

You guys, just to remind everyone that joined late, we're repairing an abdominal aortic aneurysm with a less-invasive technique called an "endograft" with a Vascular

and Cardiac Institute in Miami. Feel free to ask a question. You can just click the tab “Ask a question.” The other thing I wanted to mention is if you have friends or anyone that you think that may want to see this, they can watch this delayed by going to the same website, BAPTISTHEALTH.NET, and you should be able to watch it this evening or anytime in a few hours, so we’re very excited about that.

What we’re doing now is we’re just putting a balloon up, and this balloon, again, helps us provide sealing, so you’ll see the balloon go up. This is inside the graft, so we have junctions of graft material where the graft overlies -- two pieces overlie each other a little bit kind of like an erector set. Yeah, keep it right there. Okay. And we’re basically constructing this device inside the patient to protect him from rupture by replacing his diseased pipeline with this totally new synthetic pipeline to protect rupture.

One of the amazing things is although this looks highly technical, and it certainly is, because of the less invasive nature of it -- let’s have the straight flush, please -- the less invasive nature of it, this patient will go home likely in two days time. Come back to me. The patient will go home in two days time and likely will have a much more rapid recovery than open surgery. What do you think about that, Ignacio, compared to open surgery?

Yeah, typically, you know, the patient will be here 24 to 48 hours. In a typical surgical stay, if we have to open the abdomen, it will be about five to seven days.

And, Ignacio, the other thing I think we have to mention isn’t just the hospital stay, but when this patient goes home, this patient will be back to complete normal activities within a week to ten days, whereas sometimes with an open surgery when you cut through the abdominal muscles, it can take several months before the patient’s actually walking and doing everything completely normal.

Okay, Jim, we’re going to come back to the overhead camera, and I just want to show everybody. Dr. Rua is advancing, putting the catheter in. Go ahead, Ignacio. And he is looking under fluoro. We’re got three things going at once here. I’ve got this sensor that’s a little bit like a space age. That’s fine. Don’t go too high. Pull it down a little bit. Pull that first side hole just above. Keep coming now. Keep coming now. Keep coming now. Okay. About right there. All right. Let’s flush this.

And you can also see that we put the tennis racquet, so to speak -- it’s obviously not a tennis racquet, but I’m just going to move the light here so you can get a better view. And, again, this is just a little bit of a microwave device, and what it does it is kind of pings a little radio transmitter signal just like a cell phone might. And what we’re doing is we’re actually reading that signal. And you can see our monitor over here, as soon as we’re ready to go. And remember what we looked at before, we’re going to show you here.

You can see, remember that the pressure here was very high. Remember, before we treated, and that was the sack before. And now, without doing X-rays or anything else, I know that, in fact, I’ve been able to drop the pressure in this gentleman’s sack to an area where he should be protected. Now there are a lot of other things we have to look at, but this patient can come back into my office in a month or so and just very simply, using this device, I can actually measure the pressure in the sack and identify exactly what’s going on if there’s any particular problem. So this is

a very, very good demonstration of how we can use these microchips and the sort of next generation nanotechnology, so to speak.

So I think what we're going to do now is go back to monitor four and show you a little bit of where we are now. And I think all of you remember what the sack looked like before. And what we're going to do now is just do a very minimum injection of contrast just to test injection if we can get apnea for a moment, and if you watch just one second here. Oh, it looks beautiful.

Very nice.

So you can breathe.

Yeah.

So this is just the first look. And I think what I'm going to do is I'm going to take the balloon back just on the right side and just sort of touch this up a little bit, and for those of you that came in late, so to speak, what I want to do is go back and show you this patient's aneurysm. Remember, this is what it looked like before we started. You could see that big bubble in aneurysm. That is the aneurysm, the big bubble in the patient's abdominal aorta that Dr. Benenati showed you the diagram of. And I want you to remember this because in just a moment we're going to take a look at what it looks like now.

And what we're doing now is -- mag up, please. Mag up to the upper. What we're doing now is just putting a balloon up, because what I'd like to do is just make sure that we have the best possible seal. Now watch your lights for just a minute. Step this way for a minute.

Got you.

I just want to make sure -- I'm using these markers again even we haven't operated and we haven't opened the patient's abdomen, I can kind of see it. It's not exactly X-ray vision, but it's something similar to X-ray vision because we're using the X-rays to see inside the patient's body without having to do an incision, and we're just dilating this to just get very good attachment of the device to the wall, and now we're deflating the balloon.

Barry, as you do that, one thing I think we failed to mention, it's very important to each of these devices is basically sized for the individual, so we don't just take any old device. We spend a lot of time with those sophisticated CAT scans we showed you earlier measuring so we have the exact size. So when Dr. Katsen puts this balloon up we're, not going to damage the vessels or hurt any of the vessels because everything is sized in advance to fit this particular patient. And once we're done with this, the patient doesn't need any special type of anticoagulation or blood thinners. This device will basically be anchored in place and stay there forever.

Now I want to go back. What I'm going to now is I want to just show everyone the picture again just to remind everybody. Okay. And there you can see the aneurysm before. And no what I'm going to do, if you just kind of remember this image in your mind, what I'm going to do is do a similar type of x-ray with a little bit of injection of dye material. And I don't have a way to really to put them side-by-side

for you electronically, so we have to rely on your memory to remember this picture. And now we can have apnea, please.

That's really beautiful, Barry. Now we don't see that sack at all, and that means that aneurysm is really excluded.

Yeah, so what we're going to do -- exactly, the patient can breathe. So that was forward on the injector. What we're going to do now, that was just a little injection of dye by hand. We're going to do something very similar with the regular X-ray like we did to start with. You've got to be very careful of this. This thing keeps sliding down.

We should mention, Barry, once these devices are in, it's very rare that we need any type of intervention or another procedure after this.

Very rare. In fact, it's very interesting when we look at the outcome, if we look at outcomes of this procedure, really what we're trying to do, as you said earlier, is trying to protect the patient from rupture in the safest possible way. And one of the things that's unique here at this Cardiac and Vascular Institute is we have a highly-integrated multidisciplinary team; Dr. Rua and I being an example. There are also a lot of other people in the room here, including our anesthesia teams, all of our nurses and our technologists and a lot of people to make something like this look some seamless and so effortless, relatively speaking.

And I think if you look at what the alternative was several years ago, where our patient might have been in ICU for five to seven days, and now we have a patient who is, more or less, going home in a couple of days, it's a pretty dramatic difference.

What we're going to do is take one picture, and you will be able to see this a little bit more detail. Okay. Are we armed? 15 for 25. We're just setting up the injection here, and we'll let you see this X-ray here coming up. Okay? Ready? Just one second. Just wait one minute here. Okay. We'll have apnea now. Everyone will be able to see this. Here it comes. Okay.

So it's clear that that big sack is no longer filling, and all the blood has been devoted through this conduit, through this endograft, and therefore, that aneurysm now has been basically totally excluded.

Okay. Yeah, gentlemen, I think we can see that this is an absolutely textbook result. We're really pleased with this outcome. It couldn't be any better. I think everyone can see that the aneurysm is totally excluded. And there are some minor issues we look for when we look to finish this procedure. One is that we want to make sure that the aneurysm is not filling in some way from other branches that come off the aneurysm, and we certainly could see on this X-ray that that's not the case. It looks like an absolutely perfect result.

And so at this point, in terms of where we go from here, we know several factors. One is that from the picture point of view we can see the aneurysm is gone. We also know that from the pressure point of view everything is well. And now if we go over here and actually feel his tummy, which we can do -- why don't you examine him just seeing what you think about the pulsatility.

Barry, that's a good shot, just to show how small those incisions are that you have.

Right. These are very small. They're about two inches. Dr. Rua did an incredible job with those. And he has hardly anything we can feel at this point.

No, can't even feel it.

So in terms of pulsatility in the normal -- generally the way these aneurysms are detected, as Jim mentioned, most of them are detected by accident. But many times when you go to your doctor and he does a physical examination and examines your abdomen, what he's doing is frequently feeling for these types of things, and you can feel them because they grow big and they also produce pulsatility where you can actually feel them bounding in the abdomen,. Is that right, Ignacio?

Definitely, definitely. What we mentioned before, many times they have no symptoms, so you have to rely on a good physician doing a good examination and also accessing for risk factors.

So we have a very integrated team here, again, and we are, in addition to this type of device, we are part of a number of clinical trials looking at more difficult types of anatomy. If you would like a referral to any of our physicians you can call (786) 596-2700. Or if you're outside of Dade County, (800) 273-2700, and we'd be happy to get you a referral for one of our physicians.

Again, a very integrated, highly-skilled team involving interventional radiologists and vascular surgeons. We combine the expertise of using the image guidance, all the new technology, with some standard surgical techniques, and we can offer this patient a much less invasive therapy. This gentleman is going to be out of bed walking in the hallway tomorrow and will be home the day after tomorrow. And that's how the vast majority of patients end up. So we're very happy.

I can't put the sheathe in.

Okay.

No, just keep your hand there. Let me have a wire real quick.

Now to go back to what you're working on, Barry. Well, I was just going to show you something. We have a little bit of a control issue here. What we're doing right now is our sheathe, our access, our tube has sort of come back a little bit. So what we're doing to do is we're going to put -- we just have to re-secure our access here. Let me have the dilator back. This should have been a super stiff by the way.

If you come to me for a second, I wan to just explain to you what Dr. Katsen is talking about here. When we're inside a blood vessel, we use the term "sheathe." This is what a sheathe is. It's a tube that goes into the blood vessel. This is smaller than a drinking straw. And through a valve that you see here where my finger is, we can pass the wires and catheters up through the sheathe.

So if we look up at the end, this is now in the blood vessel all the way, and we can pass these devices in and out, and we can exchange and put different ones in and out. And that's how we're able to change our catheters and our wires and do everything. We leave the sheathe in the artery, and that's what he's working right

now to secure. And that's what the device went through a sheathe like this. The balloons go through a sheathe like this, so we're constantly taking things in and out. But we leave this one conduit, this one small tubing in place, and it has a valve, so when everything comes out there's no bleeding.

Okay. Good. So, Jim, I'm just going to show you one more time where we are, and we'll talk a little bit about how this procedure is going to be completed. You can see I've got the tennis racquet here on the patient's tummy. And we're going to take a look, again, at the pressure, and we don't really have a camera that I can show you, but that pressure has definitely continued to drop even more. And one of the reasons that occurs is because after the device is in the, all that big sack that we saw, that big bubble that we saw, actually thrombosis. So in the process of thrombosing or clotting off the aneurysm sack, actually the pressure continues to drop.

And so what we're going to do here is show you a couple of things. That the green one, right? So once we get that squared away -- okay. What you can see here is the blue diagram, the blue wave form is what we started with. The red one, just below it, is what happened after we put the graft in, and we got a very good result and we reduced the sack pressure. And now after about ten minutes, you can see the green pressure is even lower. So this is a little bit of an example of sort of space-age technology to follow our patients long-term, and by doing this, hopefully, we can reduce the need for CAT scans moving forward, because this is the way we use to examine these patients.

So I think, Jim, we'll go back to you for a minute, and then I'll come back and tell you how we're going to finish up here.

Okay. Barry, thank you this is really an incredible effort, and the thing that we're really demonstrating here is this collaborative effort using the best medical specialists we have. We have interventional radiology, vascular surgeons, board certified and highly trained. And one of the great things that we have here at the Institute is this wealth of experience for having done this for the past 15 years.

Again, if you would like a referral to see any of our doctors, it's (800) 273-2700, and we'd be happy, again, to answer questions that you have online. I also want to remind you that you can watch in later on on this website without any problem. Now if you think you may be a candidate for this, if you have been told you have an aneurysm, it's important that you ask your doctor about your options. As I said, about 80 percent of the patients we treat end up -- 80 or 90 percent these days, end up being good candidates for this type of therapy.

We would encourage you to seek the least invasive therapy for your own care as long as you're an appropriate patient. So, Barry, do you want to come back and say anything else?

Yeah, I do. I do, Jim. Thank you. I want to talk a little bit about what's going to happen to our patient today, and we talked about the integrated team and these incisions. And what's happening right now is for all practical purposes, the procedure itself, the treatment of this aneurysm is pretty much over, and it's been done in a fairly short period of time, obviously. But it's not completely over, because we still have these incisions that need to be repaired, and Dr. Rua is in the process of doing

that. I'd like to ask Dr. Rua briefly just to describe how he's going to close these arteries as he comes around.

One moment, Barry.

I think he's coming around on the other side of the table here, and he will talk to you in just a moment. I think in some of these views, however, you can see, Jim, as you mentioned, we have a team of incredible folks here that come to bear for each patient that we treat. It takes a lot of resources to use this technology and to make sure it's used effectively. At the institute, one of our main goals is advancing research in endovascular therapy. And to do this we're, you know, clinical trials and next-generation devices are real important. But this is technology that's available to every patient today.

And, Ignacio, are you able to just describe?

Yeah. Okay. We had a little problem with the vessel loop. The vessel loop snapped. It's a silastic vessel that controls the blood vessel, but now we have it under control. We have about a three to four-millimeter size opening in the artery, and we're going to close it with a small fine suture, a 6.0 and an RB-2. Do the wrap. And pick up.

And Ignacio, these patients, you do this in a way that they don't have to return for any suture removal; is that right?

Right. We use absorbable suture, and then they don't have to follow up. You know, they don't have to be removed. Just the body absorbs it. I know you can't see in here but this gentleman's vessels are quite healthy at this point, at this level, which make it nice to repair.

While he's doing that, one final comment I mike make about the whole process here. You can see Dr. Rua is directly looking into the sack and looking into this incision. But, again, the rest of the procedure we did without having to do that. And one of the ways we can do that -- I don't know if you get a shot of this screen over here -- is that those of us that do image-guided therapy depend on all these sophisticated ways of imaging, and so we're looking at the images here that include all kinds of different sources from the patient that we can integrate.

We can integrate CAT scan imaging. We can integrate ultrasound imaging, the patient's blood pressure, and so it's a little bit like being at a cockpit of a fighter plane, because when we're doing these procedures, we have a huge amount of information that's coming in. Again, most of it's coming from indirect source through X-ray or ultrasound or other things that allow us to see inside the patient's body without having to make an incision. So I just wanted to show you a little of the resources that we have when we do these image-guided therapies and treatment of stent graft.

So I think we're coming near the end of our presentation today. Dr. Rua, as you can see, is putting some stitches in. I'd like to thank my partner, Dr. Jim Benenati, who shared so much incredible information with you, and we certainly hope that all of you have been able to learn something from this experience. Certainly our principle focus is for our patient and making sure that the patient care that he receives and the outcome is superior, and we're extremely pleased with that.

We also know, as Jim mentioned, aneurysms are the silent killer, and it's very important that we detect these aneurysms and treat them before they rupture. And so it's very important that if there's any concern that you consider early detection, aneurysm screening, and other issues because most of these are detected by accident. So if you happen to have a family member or someone who has an aneurysm or is in any way concerned, these things can be very simply detected by simple non-invasive imaging techniques.

And so I don't know if there are any questions for me or for any of the operators that may have come in, but I think we're getting pretty close to closing this out, and I would like to thank everyone here from here at Baptist Cardiac and Vascular Institute.

Okay, Barry, I think I agree. I think we're very, very pleased with the way things have come out, and again, just to thank everyone for joining our webcast, and to remind you that you can watch this. You can have a friend watch it later on this evening or any time in the future at BAPTISTHEALTH.NET, and you can log onto the webcast.