

**OFF-PUMP BEATING HEART BYPASS  
MEMORIAL HERMANN HEART & VASCULAR INSTITUTE – MEMORIAL CITY  
HOUSTON, TEXAS  
March 8, 2007**

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ANNOUNCER: Today from Memorial Hermann Heart and Vascular Institute - Memorial City in Houston, Texas, cardiovascular and thoracic surgeons Miguel Gomez, MD and Donald Gibson, MD will demonstrate live an off-pump beating heart bypass procedure. Studies have shown off-pump techniques can reduce common complications and side effects associated with heart-lung machines. In addition to spending less time in the hospital and recovering faster, patients also benefit from lowering the incidence of kidney failure, chest incision infections, and minimizing the need for blood transfusions. Today's program is part of Memorial Hermann's ongoing educational efforts to bring the latest information in health care to physicians and patients. During the program you may send your questions to the OR surgeons at any time. Just click the MDirectAccess button the screen.

00:01:04

DAVID F. MOBLEY, MD: Good afternoon, and welcome to our live webcast from Memorial Hermann Heart and Vascular Institute here at Memorial City Medical Center in Houston, Texas. In just a few moments, you're going to see an innovative off-pump surgical procedure on a beating heart. I'm Dr. David Mobley, I'm a urologic surgeon here at Memorial Hermann – Memorial City Medical Center. I'll be your co-moderator along with my colleague, Dr. Scott Duncan, anesthesiologist. Scott?

00:01:30

SCOTT DUNCAN, MD: Thank you, Dave.

00:01:32

DAVID F. MOBLEY, MD: Performing the surgery this afternoon will be Drs. Miguel Gomez and Dr. Donald Gibson. During the webcast, you will have an opportunity to email us your questions by clicking on MD DirectAccess button on your computer screen. You may have heard that this webcast is going on today and may be struggling a little bit to find it on your computer. If you've tuned up memorialhermann.org, or mhhs.org, go to Surgical Webcasts on the right side of the page, and then this broadcast will come up. You need to click "View the Webcast," and you will be on with us at that point. And if you would like to send us emails, you can do so by clicking on the MD DirectAccess button. It's up toward the right side of the screen. We will answer as many of your emails as we can during the program today and you will be able to send emails for about another four weeks after the program is over. You will also – you or your friends, colleagues, and family – will have the opportunity to watch this broadcast in the future, as it will be available at this website for an indefinite period of time.

00:02:42

SCOTT DUNCAN, MD: Well, David, innovation and quality are at the heart of everything that we do at Memorial Hermann, and today what we'll be seeing is the latest advancement in open-heart surgery. So we're going to go into the operating room now and join Dr. Gomez and Dr. Gibson. How are you, gentlemen?

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MIGUEL GOMEZ, MD: Hello, Scott and David.

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DONALD GIBSON, MD: Hi, Scott.

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SCOTT DUNCAN, MD: Hey, how are you two?

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DAVID F. MOBLEY, MD: Can you give us a little – why don't you introduce our audience to who you've got in the operating room and sort of what they're doing, and then we'll move on to the patient issues at hand.

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MIGUEL A. GOMEZ, MD: Hey, David. Of course, my partner, Don Gibson, is the primary surgeon on this case, which I'm across from. And our anesthesiologist is Dr. Doug Hersh. And our scrub nurse is Rachel. And our surgical assistant is David. And our circulator is Chelsea. And our perfusionist, who's always on standby, is Bill Jackson.

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DAVID F. MOBLEY, MD: That's the crew. That's a big crew. And of course in this operating room, it's a little different today, as we're loaded with cameras and activity so that our watchers out there can view what you're doing today. How about giving us a little background on the patient you're operating on today?

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MIGUEL A. GOMEZ, MD: Well, this patient is a 65-year-old gentleman who has a history of hypertension, and he's overweight, and he has a prior history of tobacco abuse, who came in with some classical signs of angina, of coronary artery disease. He came in with chest pain in the mid-sternum that radiated. It felt like a vise at first, like pressure, and it radiated to his arms and up his neck. Luckily, he came in early enough that he hadn't had a heart attack, but our cardiologist, Dr. Jacobson, promptly got him to the catheterization lab and found that he has blockages in all three vessels, main vessels, that go to his heart.

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DAVID F. MOBLEY, MD: We are now – on our screen, at any rate, Mike, we're looking at the beating heart. Can you tell our viewers what we're looking at here?

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MIGUEL A. GOMEZ, MD: Yes, well, up to this point, what we did – we – Dr. Gibson – we did a sternotomy, we divided his breastbone in half, and we took mammary arteries from each side of his chest.

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DAVID F. MOBLEY, MD: Can you point? There's a vessel –

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MIGUEL A. GOMEZ, MD: I'm holding the right mammary right now. And endoscopically, our surgical assistant, David, took the saphenous vein, which is a vein that runs in his leg that we use for bypasses at times, and now we have all the grafts that we need to do the bypasses. And now we have lifted up the heart, and we have it exposed with a device – that's a suction device called the octopus. And you can see the vessel, the coronary artery, there right in the middle. We have it dissected out. And we're getting ready to make a little hole in the artery, which is – of course, this is beyond the blockage he has in this artery, and so we're going to connect one of our bypass grafts to this artery that's blocked more proximally.

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DAVID F. MOBLEY, MD: Now, can you explain to our listeners how you determine what vessels needed to be bypassed?

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MIGUEL A. GOMEZ, MD: Well, as I mentioned a little bit earlier, Dr. Jacobson, our cardiologist, had done a heart catheterization which demonstrated that he had blockages in

his coronary arteries, in all three main vessels of his coronary arteries. And when it reaches that point, the best option is surgery, and so he referred him for bypass surgery.

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SCOTT DUNCAN, MD: I see, Mike, you've made an incision in the artery now, which of course is bleeding. It's actually a very little bit amount of blood, it just looks impressive on the screen. And you're going to prepare the artery...your bypass vessel into it.

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MIGUEL A. GOMEZ, MD: Correct. Now we've made a hole, and now we're going to put a little hollow tube, which we call a shunt, and this will allow blood flow to go through the shunt into the distal portion of the artery while we're working on the artery to do the bypass.

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SCOTT DUNCAN, MD: Which is really amazing. So the heart continues to get blood through that coronary while you're working.

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MIGUEL A. GOMEZ, MD: Correct. The heart's not ischemic at all while we're working on it.

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SCOTT DUNCAN, MD: Mike, what you've said – one other thing you said, you harvested the vein endoscopically, and that's a bit different, isn't it, from the way it used to be done?

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MIGUEL A. GOMEZ, MD: Yes. It used to be done that we would make incisions, long incisions, down the length of the leg to harvest the vein, but now with all the endoscopic and minimally-invasive techniques available, we're able to make one incision that's about 2 inches long. And with a camera and a scope, we're able to dissect the artery out of the leg, the whole length of the leg.

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SCOTT DUNCAN, MD: That's fantastic because patients always complained about leg pain after cardiac surgery, so that's probably reduced that quite a bit, hasn't it?

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MIGUEL A. GOMEZ, MD: Yes, yes. They – the patients really appreciate the endoscopic approach. The amount of pain they have is minimal and they're able to get up and walk immediately.

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SCOTT DUNCAN, MD: That's fantastic. I see your stent's in and the blood flow is now continuing to the coronary and it's not leaking anymore. It's fantastic.

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MIGUEL A. GOMEZ, MD: Yes. So we're – we got the artery open, but the heart is still getting blood flow beyond the – where we have it open because we have the shunt. That shunt allows us not only to prevent ischemia during the operation, but it allows us also to have kind of a bloodless field where we're working, and also allows us to manipulate the artery by grabbing the shunt. And lastly, it lets us know once we've completed this anastomosis that the anastomosis is open because we've had a shunt in it the whole time.

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DAVID F. MOBLEY, MD: Mike, one of the reasons, of course, we're doing this broadcast is because of the innovation of off-pump bypass surgery that you and Dr. Gibson are doing. Would you tell our listeners a little about some of the advantages of that? You know, what's – and there's an obvious disadvantage as I can see. Sewing on a moving target is more difficult than on a non-moving target, which is what you have with a – when you use the bypass – the heart-lung machine, so we say.

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MIGUEL A. GOMEZ, MD: Well, yeah. Let's talk a little bit about – Traditionally, and how a lot of the heart bypasses are still done is that the patient is connected to a heart-lung machine, and that circulates the blood and oxygenates it while the patient's connected to the heart-lung machine. And the heart is stopped with some medicines and the surgeon works while

the patient is being kept alive by the heart-lung machine. Since the off-pump technique allows us to operate on the heart while it's still beating, and the patient's circulation is maintained by his own heart, so it's physiologically a more normal state for the patient to be in.

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DAVID F. MOBLEY, MD: Af—go ahead.

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SCOTT DUNCAN, MD: No, I'm sorry. I was going to say, Mike, you've just said that he's in a physiologically more normal state, and that just leads to the question, has that shown any sort of improvements, then, in physiological changes that might normally be associated with going on the bypass machine? Things like renal function, I know for example, acute renal failure is diminished, especially in high-risk patients, with staying off-pump, and there are some other advantages as well.

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MIGUEL A. GOMEZ, MD: Yes, I mean, there's – our literature in heart surgery has – abounds with confirmation that the off-pump technique is helpful to patients and that it decreases their early mortality, it decreases their – their cognitive dysfunction, or stroke rate. There are studies that show that the renal failure rate is less, and there are studies that show that the patients recover quicker and go home more quickly.

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SCOTT DUNCAN, MD: I certainly know from the anesthetic perspective that they often require fewer inotropes in the operating room than our folks post-pump do, and that they often require less blood for transfusion.

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MIGUEL A. GOMEZ, MD: Yes, yes. This is true.

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DAVID F. MOBLEY, MD: Now, how popular is this off-pump technique becoming around the country compared to using the heart-lung bypass machine?

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MIGUEL A. GOMEZ, MD: The off-pump technique really began in the United States in the late '90s and it's been adopted by many surgeons across the country. Right now the national average is about 20 to 25% of the cases are done off-pump.

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DAVID F. MOBLEY, MD: Here at Memorial City, what – what is your percentage?

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MIGUEL A. GOMEZ, MD: At our institution, Dr. Gibson and I have really found off-pump technique very – very beneficial to our patients, and thus we've adopted aggressive technique of we try to do most of our patients off-pump. And we're able to do 97%, 98% of our cases off-pump.

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SCOTT DUNCAN, MD: That's amazing. Ninety-seven percent. So basically, with a percentage like that it means that even high-risk patients might be candidates for this sort of procedure.

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MIGUEL A. GOMEZ, MD: Yes. We've found in our experience the sicker the patient, the better they do if we're able to accomplish the case off-pump.

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SCOTT DUNCAN, MD: Well actually, there is literature that shows that people who are at high risk for a neuro problem, say, a patient had previously had a stroke or a high risk for renal failure, people who are sort of on the edge of renal failure, people who are obese tend to do better with off-pump procedures, so that's true.

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DAVID F. MOBLEY, MD: Dr. Gomez, we have an email, and I want to mention to our – the folks out there watching this on the webcast that if you would like to send us emails during

the hour -- we've probably got about 45 more minutes today live -- you may click on the MD Access button on your screen. It'll bring up a little -- it'll bring up a little screen there that allows you to send us an email. Send that to us, hit the submit button. We will receive that. We will do our best to answer as many of those emails as we can during the procedure today. We have a question for you, Drs. Gomez and Gibson. How many of these procedures have you performed up to this point, the off-pump bypass operations?

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MIGUEL A. GOMEZ, MD: We're approaching pretty close to 2,000 cases. Isn't that correct, Don?

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DONALD GIBSON, MD: Yeah, that's correct. Just about 2,000. We've been doing this procedure for seven or eight years now.

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DAVID F. MOBLEY, MD: Are there certain patients in whom this would not -- going in you know this is not the way you need to go or can go?

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MIGUEL A. GOMEZ, MD: Well, sometimes if the patient ha—is in cardiogenic shock and hemodynamically unstable -- their blood pressure's low -- they're not going to be able to tolerate all this manipulation and we have to go on pump. But the majority of cases, the great majority as you can tell that we're able to accomplish off-pump.

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DAVID F. MOBLEY, MD: Obviously.

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MIGUEL A. GOMEZ, MD: So it's the rare patient that we can't do off-pump.

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SCOTT DUNCAN, MD: So even with vessels behind the heart, you can still do these with an off-pump procedure.

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MIGUEL A. GOMEZ, MD: Yes. We can definitely do this with an off-pump procedure. We can reach the vessels behind the heart. Now, there's other techniques, minimally-invasive techniques, that we try -- which I think you all are going to get into, where we do robotic-assisted CADs where we do a small incision between the ribs. We can't reach the vessels to the heart, and so the indicat—can't reach the vessels behind the heart, and so we can't do those cases robotically, but.

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SCOTT DUNCAN, MD: Well, tell us about -- a little bit about robotic heart surgery, Mike, since you're one of the innovators here at Memorial City with that particular style of heart surgery.

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MIGUEL A. GOMEZ, MD: Well, the robotic-assisted bypasses that we do here, and we've done probably 40 or 50 cases about now, we try -- it allows us to do the surgery without dividing the patient's breastbone. Of course, the patients that we can do that on have more limited heart disease. It's only on the vessels on the anterior surface and lateral surface of the heart that we can reach that way, and so a patient like this, who has blockages on all his major arteries and arteries behind his heart, we can't approach that way, but those that we can, it allows us to do the surgery without dividing the breastbone with a small incision between the ribs, and those patients really recover even more quickly because they don't --

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SCOTT DUNCAN, MD: More quickly than the off-pump.

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MIGUEL A. GOMEZ, MD: Than just the off-pumps that we do with the median sternotomy.

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DAVID F. MOBLEY, MD: You know, we hear a lot nowadays about stents and drug-eluting stents, and so forth, Mike. What – what makes the surgeon and the cardiologist make a decision for surgery versus stenting, or vice versa?

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MIGUEL A. GOMEZ, MD: Well, st—That's a good question, and you know, that's an evolving question, which patients – Usually, the patients that can be stented and just done a balloon angioplasty or stent are patients with more limited disease affecting less vessels and that their blockages are discrete lesions, not long, ratty lesions, and not lesions that involve bifurcations of vessels, because then you can't really do a stent on those type of vessels very well. And so that's when they send it to surgery. Usually patients that have the three major arteries blocked are candidates to have bypass surgery without a doubt.

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DAVID F. MOBLEY, MD: We're got a couple of emails I'd like to send in to you guys there in the operating room. One is kind of nice, this is kind of cute, came before the show started from a pre-med student at Orange Coast College. "Our club, Doctors of Tomorrow, is planning to watch the live cast." This is from California. "Watch the broadcast of the off-pump coronary bypass and wondering if you could tell us about how long you expect the webcast will be." About an hour. "And I'm curious as to what the starting point of the program will be." Well, we've already done that. "And will you show the harvesting of the vessel." Let's talk a minute about that because that was done before we got going. Would you explain to the folks out there watching, how do you get the vessels that you need?

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MIGUEL A. GOMEZ, MD: Sure. The vessel that we're using right now is a right internal mammary artery. There's two different –

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DAVID F. MOBLEY, MD: Now, where does that – for-for people that don't know the anatomy, where does that artery run?

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MIGUEL A. GOMEZ, MD: That comes from the chest wall.

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DAVID F. MOBLEY, MD: Inside the chest wall.

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MIGUEL A. GOMEZ, MD: Inside the chest wall there's two mammary arteries: one right – one's on the right side of the chest wall and the other one runs on the left. And that is one of the bypass grafts that we use.

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SCOTT DUNCAN, MD: Mike, aside from convenience, being right there, is there any advantage to using that artery versus the vein grafts we talked about earlier?

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MIGUEL A. GOMEZ, MD: Yes, and the other graft, as I was going to mention, is the vein grafts from the legs. Now, the arteries from the chest, they have a tendency to last much longer. Their patency rate as the patient grows older are much more likely to be still open 10, 15, 20 years down the road, unlike veins, which when we use them as grafts, they have a tendency to last -- only about 50% of vein grafts are open at 10 years down the road.

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DAVID F. MOBLEY, MD: We've got a couple of emails asking more or less the same question. I think people are watching this and they're seeing that heart beating in the background and they're wondering how difficult is this? I guess that's a somewhat subjective answer, but you know, in comparison, shall we say, to a patient on bypass pump, where the heart is pretty still, is it not?

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MIGUEL A. GOMEZ, MD: Yes.

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DAVID F. MOBLEY, MD: How much more difficult is this?

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MIGUEL A. GOMEZ, MD: Well, you know, it's a different approach. Of course, with the heart moving some, it makes it a little bit more technically challenge, but of course when they do it –

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DAVID F. MOBLEY, MD: Now, you had some little tools that kind of settle things down, though, don't you?

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MIGUEL A. GOMEZ, MD: Excuse me?

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DAVID F. MOBLEY, MD: You've got some little tools that kind of settle the bouncing around.

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MIGUEL A. GOMEZ, MD: Right. We have this device here. It's a suction-based device that sucks up a portion of the heart on each side of the blood vessel and –

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SCOTT DUNCAN, MD: And they call it the octopus. It has the little suction cups on the bottom, doesn't it, Michael?

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MIGUEL A. GOMEZ, MD: Correct.

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SCOTT DUNCAN, MD: And actually sort of stretch a little piece of the heart between its two limbs and pulls back on it, which allows the heart to continue beating while isolating that little sort of rectangular piece of the heart so you can work on it a little bit easier. And by the way, I think both you and Dr. Gibson are going to be very humble, and so it's just very technically interesting. But obviously, having watched heart surgery for a good part of my career, this is clearly technically much more difficult, and I think you guys do a beautiful job. And it's nice that you can be humble, but I think it's difficult and you do a beautiful job doing it.

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DAVID F. MOBLEY, MD: Now, what are we watching, exactly? We see you tying some knots. What stage are we in the operation?

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MIGUEL A. GOMEZ, MD: We've completed our anastomosis to the LAD vessel. We completed the right internal mammary artery to the LAD vessel, which runs on the anterior surface of the heart.

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SCOTT DUNCAN, MD: And Michael, along the same lines of an earlier question, we've established that the mammary arteries are more patent; they last longer as a graft, as a bypass graft, than the veins do. Does that mean that you put them in different places? Do you usually use them for certain grafts, then, or more important grafts?

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MIGUEL A. GOMEZ, MD: Yes, we try to do that. We – The LAD is a very important vessel on the heart, and that's a big, long vessel that runs on the anterior surface of the heart, and we almost always try to put a mammary artery on that.

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DAVID F. MOBLEY, MD: If you harvest a vein, and you did harvest a vein from this gentleman's leg, did you not?

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MIGUEL A. GOMEZ, MD: We did.

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DAVID F. MOBLEY, MD: If you don't use all of that do you try to bank it? Do you save that in case they need something, some surgical procedure later on – of this type?

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MIGUEL A. GOMEZ, MD: No, you can't really save these veins.

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DAVID F. MOBLEY, MD: It's a one-time use deal.

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MIGUEL A. GOMEZ, MD: So it's one-time use.

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DAVID F. MOBLEY, MD: I got an email here, Mike. It says, "What is the graft patency in on-pump versus off-pump?" Is there a difference in ultimate outcome as far as patency goes?

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MIGUEL A. GOMEZ, MD: No, though there are studies that show that the patency rate is the same. That's been studied, because that was one of the fears of a lot of heart surgeons, that the patency rate of the off-pump grafts would be less because it's a little bit more technically challenging. But the thing is, is when you do the surgery on-pump with the heart stopped, you are under time constraints because you cannot – you cannot do the grafts – you cannot keep the patient, I'm sorry, forever indefinitely on the heart-lung machine or with the patient's heart stopped. So, but now with the off-pump technique, the heart is live, it is not ischemic, and we can take as – pretty much as long as we want on any one graft to make it as perfect as an anastomosis as we can.

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DAVID F. MOBLEY, MD: Dr. Gibson, or I know you're working like crazy in there, I see you working, but could you answer a question or two for us?

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DONALD M. GIBSON, MD: Sure, you bet.

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DAVID F. MOBLEY, MD: We've got a question from a concerned female listener, and that is, "Is this different in females and are the size of the arteries and the vessels you had to deal with more difficult in the female?" Any gender differences there?

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DONALD M. GIBSON, MD: Typically what we see, David, is the vessels tend to be somewhat smaller in females. And that had been an issue of concern in the past, but that really doesn't enter into our decision-making process whether or not the patient gets bypass surgery or – or has some other treatment. If the location of the blockages and the number of blockages are such that bypass is indicated, then we're going to do the surgery whether it's a male or a female.

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SCOTT DUNCAN, MD: Don, just to update the audience, what you were just doing now is checking the flow in the vessel you've just sewn on, haven't you?

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DONALD M. GIBSON, MD: Right.

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SCOTT DUNCAN, MD: You took those white probes and put it around – it's a magnetic flow probe – and showed that the flow through the artery you've put on there is very good.

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DONALD M. GIBSON, MD: Yes. Obviously, one of the things that we want to do during this procedure at the end of each bypass is we check it to make sure that our quality is as good as we can make it, so we use a device that measures the flow in the graft after everything is completed, once the stabilizing device has been removed, and we look at the amount of flow and we look at the characteristics of the flow and that tells us the quality of the anastomosis that we just made. And this one – this first one looks real good.

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SCOTT DUNCAN, MD: Fantastic. And I see you've got the second mammary artery out and ready to go.

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DONALD M. GIBSON, MD: Right. Now, one of the things that we're going to do now is we're going to reposition the heart so we can get to the back and do our second anastomosis. So we're going to move these slings around. I'm going to rotate the patient toward me.

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SCOTT DUNCAN, MD: So you're going to actually move the beating heart with your hand and actually pull it...

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DAVID F. MOBLEY, MD: Since our audience, Don, didn't get to see the very first part of the procedure that you guys were working on for an hour beforehand, can you kind of orient us: what have you done there, what kind of incision have you made, and what – exactly what are we looking at?

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DONALD M. GIBSON, MD: Sure. Patient's head is one my left, his feet down to my right. We've made an incision in the midline of the chest through the sternum. The internal mammary arteries run on either side up under the sternum, and those have been taken down. We harvested the vein, as we talked about, and we did that endoscopically, I wanted to point out, as opposed to the way we used to do those 10 or 15 years ago, where some patients who had this surgery had a very long incision in their leg, now they end up with a 1 or 2-inch incision, and we can take out the entire vein through that one incision. And so now that we've – this is the artery down the front wall. It's very difficult to see sometimes on camera. But this is the anastomosis area. This is the internal mammary artery that we took from the right side. We anastomosed it to this very important artery down the front wall. And we're going to take this artery, which is the left internal mammary artery, and there's an artery on the back wall that we're going to find and dissect free and do the same type of anastomosis. We're going to do that right now.

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SCOTT DUNCAN, MD: You'll get a chance to see now how the octopus actually works, too, when you're repositioning it.

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DAVID F. MOBLEY, MD: From the position you are, we have an email from a teenager who wants to – is curious about the various parts of the heart. Can you kind of point to the – from the top to the bottom, the atria, the ventricle? Can we see that from where you are?

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DONALD M. GIBSON, MD: Right now all you can really see very well is the right and left ventricle. This is the left ventricle, which is the main pumping chamber of the heart. The right ventricle, which pumps blood to the lung, is in this area. The atria are sort of behind where we are right now and they're not in the field.

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DAVID F. MOBLEY, MD: Now, if you had to get all the way behind the heart, that is physically possible to do, then?

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DONALD M. GIBSON, MD: We're doing that right now.

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DAVID F. MOBLEY, MD: This is the octopus you're applying?

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DONALD M. GIBSON, MD: Mm-hmm.

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DAVID F. MOBLEY, MD: While we watch them apply this instrument, I have to share with our audience out there something that just came to my attention and your attention today, right, Scott?

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SCOTT DUNCAN, MD: Yes.

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DAVID F. MOBLEY, MD: This is from the *New York Times* yesterday. And they actually rated the hospitals in the United States. They went to ten cities -- Chicago, Boston, Los Angeles, Phoenix, San Francisco, Houston, New York, and Washington, D.C. -- and rated the best hospitals in the city with regards to the percentage of patients who are having a heart attack whose blocked arteries were treated within two hours of arrival at the hospital. Two hours the magical time, Scott?

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SCOTT DUNCAN, MD: It is. It's a very important window for saving heart muscle.

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DAVID F. MOBLEY, MD: Well, with that introduction, you might think Memorial Hermann -- Memorial City was ranked number one in Houston, and indeed it was. We've gotten a lot of honors at our hospital for the cardiac care here at the Heart and Vascular Institute, but now recognized by the *New York Times* as number one in the city of Houston for patients having a heart attack and getting the care they need.

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SCOTT DUNCAN, MD: It's amazing, David. Eighty percent of patients who arrived with chest pain were treated within two hours. That's a phenomenal rate. And when looking nationwide, that really is quite impressive.

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DAVID F. MOBLEY, MD: You know -- yeah, go ahead.

00:28:13

DONALD M. GIBSON, MD: What we've done now, just in an effort to show how the heart can be manipulated if you have -- sorry -- to show how the heart can be manipulated if you have the right instruments and the right anesthesiologists, we've got the heart basically tipped up where the apex of the heart, which normally lies in this direction, is now pointing out toward me. And so you can see that we have a very good view of this vessel. And that area of the heart, that one square-inch of the heart, is not moving very much at all while the rest of the heart is beating vigorously and blood pressure is 99/110 systolic, so we are in really good shape right now, so we're going to be able to do what we need to do. And this is just demonstrates that this procedure is tolerated very well by most of the patients as long as you're patient -- as long as the doctor and the surgeons and the anesthesiologists are all patient and --

00:29:20

DAVID F. MOBLEY, MD: So now right then you are opening one of the coronary arteries you're going to sew your graft into, correct?

00:29:26

DONALD M. GIBSON, MD: This is an obtuse marginal coronary artery. It's an artery on the back wall of the heart. It's a very good-quality artery. This is relatively big.

00:29:40

DAVID F. MOBLEY, MD: While we're watching that, let me -- I'm going to ask Dr. Duncan because we talked about this a little bit earlier on the program, but I'd like him to make a comment. This is something you're very familiar with. We had an email asking us, "Is there a reduction in perioperative strokes among patients with off-pump versus on-pump?" And we might also mention some of the other reductions in morbidity for our listening audience.

00:30:03

SCOTT DUNCAN, MD: Yeah, we briefly touched upon that earlier when Michael and I were chatting. And one of the -- the answer to that question is yes, there are. Especially people who have had previous strokes or previous cerebral vascular disease in their histories, their risk of additional mortality and morbidity is diminished, especially involving stroke, by doing their cases off-pump. And it's a clear advantage over an on-pump case. There are other morbidity and mortalities that are diminished. People who are obese certainly have higher risk for all sorts of surgeries and do for coronary artery bypass surgery, and often patients

who are obese tend to do a bit better as well than being on-pump. There are decreased dysrhythmias. Dysrhythmias are funny heart rhythms that occur after surgery frequently. And the number of instances of those dysrhythmias is decreased after doing this off-pump versus on-pump. And as we mentioned earlier, kidney disease and acute failure of kidney resulting in folks having to go on dialysis, and that's diminished quite impressively by doing this off-pump.

00:31:03

DAVID F. MOBLEY, MD: Now, Scott, there are some things that we as people can do to – obviously our genetics play into this, but there are things – and you deal with this as an anesthesiologist, you see this every day, I know. But why don't you talk to our listeners about preventing heart disease. What can they do to stay out of this operating room?

00:31:22

SCOTT DUNCAN, MD: Yeah, every day when we go and pre-op our patients before we come back to the operating room, we go through all their medical history and we look at all of their associated disease problems, and we also look at their personal habits and habitus and get a very good idea of why this sort of is happening. And we certainly counsel them, as I'm sure their cardiologist and their family doctors do. And of course a healthy lifestyle is very important and will diminish the risk of coronary artery disease. The most controllable of those is weight. We want to avoid obesity, of course. A very simple thing to do that would really improve the chance of avoiding heart surgery and coronary disease is to quit smoking. An active lifestyle that is important as well, and a balanced diet. But of course that goes to weight as well. If you have high blood pressure, it's very, very important that you take your medication every day and stay on it. We find a tremendous number of people who know they have high blood pressure but simply don't take their medications or don't renew them, and it's very important that you stay on those medications. Diabetes is another huge risk factor. And if you have diabetes, you have to, again, treat it and be very, very vigilant about your blood sugars and to control them closely and will decrease your risk of having coronary disease that winds up bringing you to the operating room.

00:32:28

DAVID F. MOBLEY, MD: But aside from our genetics, which we have no control over, there are a lot of things we can do proactively to try to reduce our risks. Drs. Gibson and Gomez, I've got a question for you on an email, if one of you can answer this. And this is, "What is the average number of grafts per patient performed at our institution with off-pump coronary bypass?"

00:32:53

MIGUEL A. GOMEZ, MD: It's around three, or a little bit above three.

00:32:56

DAVID F. MOBLEY, MD: And the same email wanted to know about how long do you ordinarily maintain a patient in intensive care unit after the surgery?

00:33:05

MIGUEL A. GOMEZ, MD: Usually it's 24, 48 hours max.

00:33:09

SCOTT DUNCAN, MD: Mike, is that better than it was with an on-pump patient? Is there –

00:33:13

MIGUEL A. GOMEZ, MD: Historically at our institution, yes, that's better than it was.

00:33:18

SCOTT DUNCAN, MD: And that's great. That, of course, improves – decreases cost, certainly, for the patient and for the hospital to have them out of the ICU within 24 to 48 hours. And I – probably also helps the patient a bit since ICUs tend to be places where patients are at risk for disease. I know that from other studies at Hopkins where I did my residency. So it's nice to get them in and out of there as soon as possible.

00:33:44

DAVID F. MOBLEY, MD: Cost of medical care is something that we all have to deal with also, and this tends to be a less costly hospital stay, does it not?

00:33:53

MIGUEL A. GOMEZ, MD: Yes, it does. Usually their ICU stay is less, their complication rates are less, and their entire hospital stay is less, and their time to – before they go back to work is also less.

00:34:10

DAVID F. MOBLEY, MD: We got an email, and we've talked a little bit about this, but the recovery process – let's say the first week, pump versus off-pump surgery.

00:34:25

MIGUEL A. GOMEZ, MD: Excuse me?

00:34:25

DAVID F. MOBLEY, MD: The recovery process. What is the first week or two?

00:34:28

MIGUEL A. GOMEZ, MD: Versus off-pump?

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SCOTT DUNCAN, MD: Right. Is it different between the two of them?

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MIGUEL A. GOMEZ, MD: Yes. I mean, when you do the patient on-pump, of course that's not a natural state for the patient, and there's an inflammatory response that occurs when you have your blood circulated outside of your body pumped back into your body by a machine. It sets off all kinds of hormones and an inflammatory – a very big inflammatory response, so the patient swells, has a lot of swelling and edema throughout his body that occurs. And of course it takes some time to have that swelling and edema and inflammation to come back to normal. So – and when you do it off-pump, you don't have that.

00:35:16

SCOTT DUNCAN, MD: That's certainly true from my perspective as an anesthesiologist. There was a tremendous emphasis placed in the '80s and early '90s on being on the pump as short a time as possible to diminish all of those things. And of course one of the best ways to diminish all of those things is to simply not go on pump.

00:35:30

DAVID F. MOBLEY, MD: We're going to try and answer a couple of emails here, and also I want to remind you, those of you watching this on the Internet, that if you would like to send us an email, if you'll click on the MDAccess button, it'll bring up a little box that you can put your email in, send it to us, submit it. It says "submit." We'll get that email, we'll try to get that on before the program is over. We will also be receiving your emails about this procedure for about another four weeks. And as a reminder also, this – this production will be archived at the Memorial Hermann website for an indefinite length of time, probably several years, if you want to go back and review it again. We've got some emails to you gentlemen that are concerned about how are you going to stop bleeding. When you get through with this, how are you going to keep the heart from bleeding?

00:36:22

DONALD M. GIBSON, MD: Well, what we're going to do, David, is we're given a blood thinner, and it's a relatively short-acting blood thinner, and it's used while we're doing the anastomoses, while we're using the shunts. But during the time period where we're finishing the operation, we're closing the chest, putting the dressings on, that blood thinner wears off. And so typically what we find after we have spent a few minutes at the end of the procedure drying up the obvious bleeding points, by the time we're ready to leave the room, the patient is clotting as they should. And we've been very fortunate that our problems with bleeding have been not excessive.

00:37:15

MIGUEL A. GOMEZ, MD: Minimal. We have a device called a thrombo-elastograph that measures the patient's bleeding profile. And at the end of the case, we always – we get one

throughout the case, and at the end of the case we get one, and almost always it shows that the patient is back to normal clotting.

00:37:40

DAVID F. MOBLEY, MD: What about medications after? For example, Aspirin? What's your thoughts on that? I know that once your surgery is completed and a week postoperative has gone by, to a large extent these patients are back in the hands of their cardiologist, but what about medical therapy to maintain what you've accomplished?

00:37:59

MIGUEL A. GOMEZ, MD: Well, anybody who's had heart surgery, it's critical for them to take their Aspirin for the rest of their life and to also to be put on a cholesterol-lowering medicine.

00:38:12

DAVID F. MOBLEY, MD: And Michael, after a surgery like this, what sort of activities can the patient resume? Are they able to go back and take care of their normal activities of daily life or do they have to basically be careful for the rest of their lives?

00:38:22

MIGUEL A. GOMEZ, MD: Well, they have to wait until the breastbone heals, and that usually takes two months for the breastbone to heal. But once the breastbone is healed, they can go back to pretty much any normal activity they were doing before.

00:38:35

SCOTT DUNCAN, MD: That's fantastic.

00:38:37

DAVID F. MOBLEY, MD: Now, when you do the robotic surgery, or the mini-chest openings, the small openings, does the recovery – is the recovery then a little shorter and quicker – shorter?

00:38:48

MIGUEL A. GOMEZ, MD: Well, it is. There's not as much disruption of the chest wall mechanics and you don't have to wait until bone heals because you're not dividing any bone, and so the patient's recovery time to normal activities is much quicker. Usually within two or three weeks they're back to their normal activities.

00:39:11

SCOTT DUNCAN, MD: Michael, do you ever have to convert these surgeries from an off-pump to an on-pump surgery?

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MIGUEL A. GOMEZ, MD: Yes, that happens occasionally. Again, you know, rarely.

00:39:20

SCOTT DUNCAN, MD: What are the primary reasons?

00:39:22

MIGUEL A. GOMEZ, MD: The primary reason is that if the patient was to become hemodynamically unstable.

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DAVID F. MOBLEY, MD: To somebody who maybe doesn't understand that term, can you describe that?

00:39:30

MIGUEL A. GOMEZ, MD: Yes, that's when we can't maintain their blood pressure normally. We're having problems maintaining their blood pressure with their heart in a different position, and so that's one reason why we have to put the patient on the heart-lung machine.

00:39:48

DAVID F. MOBLEY, MD: Now, can you explain to the folks watching what is entailed with putting a patient on the heart-lung machine?

00:39:56

MIGUEL A. GOMEZ, MD: What that entails is that we would put a cannula in the aorta, which is a big blood vessel that comes out of the heart. And we'd put a cannula in the right

atrium of the heart, and so the cannula in the right atrium of the heart would drain the blood from the patient and it would go to the heart-lung machine. And the heart-lung machine has roller pumps, and it has an oxygenating device, and it'll oxygenate the blood and return it to the patient through the cannula in the aorta.

00:40:29

SCOTT DUNCAN, MD: And one of the nice parts about doing these off-pump, of course, is that you avoid having to cannulate the aorta, which – which you certainly do if you have to, but there have been some studies that show right when you cannulate the aorta that when you squeeze that blood vessel that there can be some microembolic events that occur. And there have been some studies that have looked at inside the brain with something called a Doppler probe that looks at objects inside blood vessels – it looks inside the brain – and when you cannulate the aorta, there's a huge response that you see there, meaning that they're small emboli, whether they're air or plaque or something, right, Mike?

00:41:01

MIGUEL A. GOMEZ, MD: Same plaques that cause the blockages in the arteries to the heart will cause blockages in plaquing of the aorta. And so when you cannulate the aorta, you have a possibility of dislodging some of those plaques, and those can go to the brain, they can go to other organs to the body and disrupt their blood flow and cause you to have a stroke or cause you to have renal failure, and so that's one of the problems.

00:41:33

DAVID F. MOBLEY, MD: Now, can you kind of – you're getting close to closing up this vessel. As you do that, would you kind of just point out a couple of things, orient the folks that are watching this as to what is going on? What is that little vessel you're sewing, where's that coming from, and –

00:41:47

MIGUEL A. GOMEZ, MD: This vessel – the graft is the left internal mammary artery we took down from the left chest. And this artery is the obtuse marginal artery, which is an artery that runs in the back surface of the heart. And we are sewing this graft to that artery. And of course where we open the artery is beyond the blockage that the patient has in that artery. And so we're going to bypass that blockage and bring blood flow to this artery and to the heart muscle.

00:42:20

DAVID F. MOBLEY, MD: You talked a little bit earlier and we kind of just breezed over that a bit, and that is the duration of patency of these vessels. In other words, how long do they stay open? Can you descr—talk a little bit about that?

00:42:35

MIGUEL A. GOMEZ, MD: Sure. One of the reasons we're using this mammary artery is because using an artery as a bypass graft, they have a tendency to stay open for longer. Usually at 10 years, most mammary arteries, 90% of them are open, whereas the veins that we take from the leg to use a bypass, only about 50% of them are open at 10 years down the road.

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DAVID F. MOBLEY, MD: And the reason for that is what?

00:43:03

MIGUEL A. GOMEZ, MD: Well, there's a lot of speculation on that. One is that it's a vein and not an artery that we're using, and so the vein is not used to the – those pressure, and so it's not used to carrying blood to an organ. The veins carry blood away from organs and back to the heart.

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DAVID F. MOBLEY, MD: Now, the internal mammary artery seems to be a pretty popular way to bypass these days. Is – does that artery just not develop hardening of the arteries, atherosclerosis?

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MIGUEL A. GOMEZ, MD: Usually -- That is correct, but the mammary arteries usually don't have a tendency to develop blockages in it. But occasionally we will find case of patients that have a mammary artery that does have blockages and we can't use it. That does happen. But --

00:43:57

DONALD M. GIBSON, MD: Dave, did you see we have a small leak here? And we're just going to put -- we're going to put a stitch here to close this small leak. It's a little bit proximal to that, isn't it?

00:44:19

DAVID F. MOBLEY, MD: We have some -- you know, I've noticed we have some emails from people who are really up on the -- we're getting a lot of medical jargon in these emails, so I think we've got some medical people out there that are watching us today. It says, "Do you see any difference in the internal mammary artery to LAD patency rate between off-pump and on-pump?"

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MIGUEL A. GOMEZ, MD: No. No, and there's been a number of studies that have looked at that.

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DAVID F. MOBLEY, MD: Antibiotics? Are they necessary?

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MIGUEL A. GOMEZ, MD: Yes, yes. We always give perioperative antibiotics.

00:44:54

SCOTT DUNCAN, MD: And one -- oh, sorry, Mike, go ahead.

00:44:55

MIGUEL A. GOMEZ, MD: The one complication you want to avoid in this is an infection of the breastbone because that is devastating to a patient.

00:45:04

SCOTT DUNCAN, MD: I was going to ask if you've seen -- if you think off-pump bypass has a reduction in that because that is really a bad complication often involving lots of debridement surgeries to clear it up.

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MIGUEL A. GOMEZ, MD: You know, I believe there is, in our 2,000 patients our sternal infection rate has definitely decreased since we've gone to the off-pump technique.

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SCOTT DUNCAN, MD: Again, from the anesthetic perspective of working here, I see very few patients come into the operating room to have those debridements done. It used to be quite common 10 years ago. Now, there was one more question, and I think it's a good one. It says, "What happens after 15 years and the lifespan of the internal mammary is over?" What happens when that artery starts to -- starts to close down?

00:45:42

DONALD M. GIBSON, MD: Well, I wouldn't look at it exactly that way, Scott. I don't know if you can say the lifespan is over. Some of these will go 30 or 40 years. I think that what you're looking at is a percentage of them start to block off. And in that situation, there are ways to treat these patients medically. Or with the new advances that are being made in the cath lab, we can certainly harvest the situation.

00:46:14

MIGUEL A. GOMEZ, MD: Now we're going to look at our flow there, and you all can see --

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SCOTT DUNCAN, MD: That's a flow diagram showing -- the magnetic flow probe is showing the flow through the new coronary bypass graft they have put on there.

00:46:22

MIGUEL A. GOMEZ, MD: To the obtuse marginal branch.

00:46:26

DONALD M. GIBSON, MD: And this flow is excellent. This is one of the better ones we've had. It's good flow. That's a very good bypass. His heart's going to be very happy now.  
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MIGUEL A. GOMEZ, MD: Did you save that, Chelse?  
00:46:42

DONALD M. GIBSON, MD: We're - all right. The next one we're going to do here, Scott, we're going to do the right coronary. We have - as we talked about earlier, we harvested the veins - have some irrigation, please? And we - while we were waiting, we went ahead and attached these to the aorta. As soon as I get this cleared off I want to show you that. How we doing?

00:47:09

ASSISTANT: Good. Pressure's fine.

00:47:15

SCOTT DUNCAN, MD: So when you attach the - the vein graft that you harvested endoscopically from the leg to the aorta, did you use any special device or did you put a big clamp on it -

00:47:24

DONALD M. GIBSON, MD: No, that's what I wanted to show you. We - this is the aorta at the end of the sucker. Okay. Pardon me. And this is the area of the anastomosis right here at the end of my - at the tip of my finger. What we did was we really try to practice what is called a no-touch technique, or minimal touch technique, on the aorta. As Dr. Gomez was talking earlier, there is - one of the things that we really want to avoid is any type of emboli, which is the breaking up of plaque and having it go downstream to other organs, and especially in this first part of the aorta, where they can go to the brain and cause strokes. So we try to do this with a technique where it doesn't require a clamp on the aorta. And we've done both of those already, so we're ready to go with these vein bypasses now.

00:48:17

SCOTT DUNCAN, MD: I just saw you take the clamp off the end of one of the bypasses and show the blood rapidly flowing there.

00:48:22

DONALD M. GIBSON, MD: That's a good point. I'll do that now. You can see I'm occluding it, it's connected to the aorta proximally at the end of that finger, and you can see that the blood flow is just -

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SCOTT DUNCAN, MD: That's phenomenal.

00:48:32

DAVID F. MOBLEY, MD: Don, the way you connect it to the aorta is really intriguing. Can you describe that to the folks watching?

00:48:37

DONALD M. GIBSON, MD: Well, we make a small hole in the aorta with a punch device, and this is a - this is a device that automatically puts sutures through the wall of the vein and through the wall of the aorta.

00:48:52

DAVID F. MOBLEY, MD: Is this the punch device we're looking at?

00:48:53

MIGUEL A. GOMEZ, MD: This is the punch device. It kind of has a harpoon at the end of it, and we put it in the aorta and come back. And this is a cutting edge. And you can see a portion of the aortic wall. And that makes the hole in the aorta.

00:49:05

SCOTT DUNCAN, MD: And Mike, actually you could see a little piece of the aorta there, a donut-like piece, can't you? Yeah, there it is, little...on the end of the device.

00:49:11

DAVID F. MOBLEY, MD: And before that instrument was developed what was it like?

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DONALD M. GIBSON, MD: Well, we sewed everything, and that's still an acceptable way to do this, especially if for technical reasons we can't use the – the anastomotic device that we used today, but the problem that we try to avoid is placing what is called a partial occluding clamp, where the walls of the aorta are squashed between the jaws of the clamp, and that can squeeze that plaque out and cause the strokes that we were talking about earlier. So as we talked about, we really want to avoid any type of emboli going to other organs in the body. All right, so now we're going to expose the right side of the heart. Watch his blood pressure, please.

00:50:08

SCOTT DUNCAN, MD: Yeah, every time you have to reposition the heart, of course, if there's pressures on different chambers, it can change the way the heart fills and the way the heart functions to eject blood, and that can change the blood pressure. That's what you were just asking Dr. Hersh, I assume, to watch the pressure.

00:50:20

DONALD M. GIBSON, MD: So what we have now is we have the right coronary artery, which we dissected out earlier, between the jaws of this stabilizing device. That one square-inch is not moving very much while the rest of the heart is beating, and we're going to let him stabilize. His blood pressure is pretty good right now. We're just going to wait another minute. Round blade. Thank you. Pressure's coming up nicely. And surprisingly, we don't have to use a lot of medical therapy, a lot of pharmacologic support, not as much as you might think.

00:50:55

DAVID F. MOBLEY, MD: We've had a lot of emails commenting and wondering about blood loss either during or after these procedures. Is that a big issue?

00:51:04

DONALD M. GIBSON, MD: Well, blood loss is certainly a concern in any type of heart surgery. And one of the reasons that we use one of the drugs that we use is because it goes away so fast – I'm talking about the blood-thinning medication – it goes away so fast such that the body can return to normal clotting in a short period of time. Let go for a minute.

00:51:31

SCOTT DUNCAN, MD: Hey Don, and do you also use other assist device to minimize transfusion? I think the profusionist is helping you to do that, right?

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DONALD M. GIBSON, MD: Right. We use what is called a cell saver, and that collects the patient's blood, washes it, cleans it up, concentrates it, and gives it – we give it back to the patient.

00:51:56

DAVID F. MOBLEY, MD: We had – Scott, if you wouldn't mind talking about this for just a moment, we've had a couple of emails asking – we did talk about this a little bit earlier but let's mention this again, and that is how does the doctor decide where – find out where the blockages are? How's that done?

00:52:11

SCOTT DUNCAN, MD: Well, that's done in the cath lab, and our cardiology colleagues do that. Essentially, the patient comes in. You know, historically people knew that coronary events existed for years, people died of heart attacks, but they had no idea how to fix them because they had no idea where the blockage actually was in the coronary. They only found them on autopsy. When they developed the cardiac catheterization technique of placing dye in the coronary arteries by going through the femoral artery, now currently in the groin, running a catheter all the way up into the coronaries, and then injecting dye and watching it on x-ray and seeing where it obstructs and where the coronaries narrow. And once they have ascertained which coronaries are narrowed and which ones are open, then they can

decide how to do the surgery. Those films that are show in the cath lab are given to the surgeon, and they consult with the cardiologist to pick out their targets for bypass.

00:52:54

DAVID F. MOBLEY, MD: Are there some of these – we've got pictures on the screen of some of the anatomy of the heart. Are some of these arteries more important for survival than others, as far as these coronary arteries go?

00:53:06

SCOTT DUNCAN, MD: Well, that's certainly true. Dr. Gibson was alluding to they put the mammary artery on the LAD, which is the left anterior descending artery. And in the '60s and '70s, that artery was known as the widow maker.

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DAVID F. MOBLEY, MD: The widow maker. Still is, isn't it?

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SCOTT DUNCAN, MD: Yes, it is. It feeds primarily the left ventricle. And again, Dr. Gibson alluded to the fact that the left ventricle pumps the blood to the rest of the body, so blood comes back into the heart from the inferior and superior vena cava, which deoxygenated blood, and the right side of the heart, which is a low-pressure system, pumps it through the atria and ventricles and out into the pulmonary circulation, where it's oxygenated. And then the left ventricle pumps it through the entire rest of the body. So with that ventricle goes, you go. And so that – you're absolutely right, David, and that's why they make such – they have such an emphasis on making sure those arteries get good blood flow.

00:53:51

DAVID F. MOBLEY, MD: Looked like you gentlemen were pulling up a vessel and getting ready to do something there. What's your status now?

00:53:57

DONALD M. GIBSON, MD: David, this is one of the by—one of the vein grafts. This was the one that we showed you earlier was attached to the aorta. We had – David had – David Flores had harvested this vein from the patient's leg, and it's been prepared and attached to the aorta, and now we're going to attach the other end to the right coronary artery.

00:54:21

DAVID F. MOBLEY, MD: Now, this is a vein graft. Do you ever use a different kind of artery? You mentioned the internal mammary artery. Do you ever use any other arteries for bypass aside from the internal mammary?

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DONALD M. GIBSON, MD: Well, if you – yeah, the radial arteries are used.

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DAVID F. MOBLEY, MD: Radial arteries in the forearm?

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DONALD M. GIBSON, MD: Radial arteries are the arteries from the forearm. And...and also an artery called the gastro-epiploic, which is an artery along one of the walls of the stomach. Those are used much less frequently than the internal mammary arteries and the veins from the leg.

00:55:05

DAVID F. MOBLEY, MD: As we're getting closer to winding down this broadcast today – we've got a little bit more time left – I want to mention a couple of things for folks out there watching. This is being brought to you from Memorial Hermann Heart and Vascular Institute at Memorial City Medical Center in Houston. You can – those of you who are watching have already found our website, of course. And we do have a lot of information about the Heart and Vascular Institute on the website. After this program if you want to make use of that. Especially for folks located here in the Houston area, you may be very curious about some of the processes that take place there and some of the technology that is available at the Heart and Vascular Institute. For those of you that are very familiar with Houston, you know our building on Gessner and you've seen the big Heart and Vascular Institute sign up there.

Well, the top three floors of that building are our Heart and Vascular Institute. We're working in the same building in the operating room here. But if you're curious about some of the services that are provided, certainly go to our website and make use of that. How are we coming along there?

00:56:16

DONALD M. GIBSON, MD: We're doing fine. We are – we're at the beginning of the third of four bypasses. We are going to be doing one more vein graft that we have attached to the aorta already. And after we complete this one, we'll go back to the left side of the heart and attach that last vein graft.

00:56:36

DAVID F. MOBLEY, MD: We're not going to be able to broadcast the entire operation, Drs. Gibson and Gomez. Would you tell our audience as you wind it down, after you finish the last graft then what is the process of finishing the job, shall we say?

00:56:53

MIGUEL A. GOMEZ, MD: Well, we've got one more bypass we're going to do after this with the other vein graft, and then what will be left to do is to close the chest. We will close – reapproximate the breastbone with some wires and that'll be it. And then we'll close the skin, and that's it, and the patient goes to the intensive care unit.

00:57:20

DAVID F. MOBLEY, MD: Again, for the audience out there watching this live webcast, if you want to send us emails – and we've got quite a few nice emails from you so far – if you want to send emails, click on the MD Access button. It will bring up a box, you can write in your little emails, try to make it relatively short, submit it to us, and we will have it on the air here very shortly.

00:57:43

SCOTT DUNCAN, MD: Michael, is there a subset of patients that we're waking up in the operating room? I still think that's fascinating that we've started doing that and we've achieved that here, so I know that in some cases we actually are doing that, letting the patients awoken in the operating room and taking them up awake.

00:57:56

MIGUEL A. GOMEZ, MD: Yeah, patients that are healthy and young, usually patients under the age of 65 and have a normal heart we do wake up and take them off the breathing machine here in the operating room, and so they're never on the respirator up in the ICU.

00:58:13

SCOTT DUNCAN, MD: And that's sure very different from what was done for most cases just five or ten years ago.

00:58:17

MIGUEL A. GOMEZ, MD: Yeah, and I would say that's probably 25% of our cases now.

00:58:22

SCOTT DUNCAN, MD: That's impressive.

00:58:31

DAVID F. MOBLEY, MD: What is the – now, you gentlemen are doing four bypasses on this individual. What's the – is five the most?

00:58:38

MIGUEL A. GOMEZ, MD: No. We've done eight off-pump, we have. It just depends on the patient's anatomy and how many branches of the major – three major arteries he has blocked – the patient has blocked. There's three major arteries supplying the heart, and each of those arteries have branches. And if they have blockages, then we have to bypass them.

00:59:06

DAVID F. MOBLEY, MD: Now, you mentioned – we've talked a little bit – we've used the word patency, and over time, and made comments like that. What is the follow-up on these

individuals over time? What does a cardiologist have to do to determine, do you need any further treatment?

00:59:30

MIGUEL A. GOMEZ, MD: I'm sorry, David. I didn't catch that last question.

00:59:33

DAVID F. MOBLEY, MD: From the cardiology standpoint afterwards, what's the follow-up as far as determining in the fu—let's say, five years down the road if further treatment is necessary, another bypass surgery, for example.

00:59:43

MIGUEL A. GOMEZ, MD: Well, I mean, once a patient has been diagnosed with heart disease, the bypass surgery doesn't cure them of heart disease, okay? They – they will need lifelong treatment to prevent – to try to prevent and hold off further blockages from having.

01:00:00

DAVID F. MOBLEY, MD: Okay, and how do they accomplish that?

01:00:02

MIGUEL A. GOMEZ, MD: From occurring, and the most important things that a patient can do after he's been treated with bypass surgery, again, is what we talked about, an anti-platelet. A platelet is a type of clotting factor you have in the blood, and the most common one that's prescribed is Aspirin, and they'll need to take Aspirin for the rest of their life. And then a cholesterol-lowering agent. That's been shown to also help these patients from developing further disease or slowing down on the heart disease process.

01:00:36

SCOTT DUNCAN, MD: Not to mention all the other things you guys have already mentioned, like treating their diabetes, not smoking, getting reasonable exercise, and having a good diet is just as important after surgery as it was before surgery to try to avoid further complications.

01:00:47

DAVID F. MOBLEY, MD: What about – what about cardiac rehabilitation? Is there a specific approach that is taken here at the Heart and Vascular Institute?

01:00:56

MIGUEL A. GOMEZ, MD: Well, yeah. They have – cardiac rehab – most facilities doing cardiac surgery do have a cardiac rehab program, and it involves dietitians and physical therapists, and so forth, and teaching the patients the proper diet, and also teaching the patients the proper exercise routines.

01:01:18

DAVID F. MOBLEY, MD: You're doing four vessels on this gentleman, and we have an email question, kind of interesting, and that is, "What determines the order in which the vessels are bypassed?"

01:01:31

DONALD M. GIBSON, MD: That's a good question. What determines the order, basically, is what the anatomy looks like. Typically we do the one on the front wall, the LAD, first unless we have a situation where that is the only artery that the patient has that's still open. And in that situation, what we will do is we will bypass some of the other arteries first to increase the blood supply before we start to manipulate that one remaining artery that he has open. So –

01:02:07

SCOTT DUNCAN, MD: So the anatomy really would determine how you would approach the problem. And actually, the one thing again, by doing this off-pump with a beating heart, every time you do an anastomosis, you increase the oxygen supply to the myocardium, so you improve cardiac oxygen delivery, and so in fact the heart gets a bit stronger, perhaps. By doing the LAD first, you improve...

01:02:26

DONALD M. GIBSON, MD: Yeah, that's right. And the blood supply really gets better as the case goes on because we're just putting new bypasses in. And before we start the next bypass, things are already better from the blood supply standpoint.

01:02:44

DAVID F. MOBLEY, MD: Once this operation is completed, as you mentioned, you'll close the chest and that's pretty much it. This individual will go to our intensive care unit. What takes place in that environment?

01:02:56

DONALD M. GIBSON, MD: Well, they – he'll be taken up there and whatever stabilization is required will be performed with the team, including the anesthesiologist and the nurses and the heart surgeon will get the patient settled in. And then if he was not extubated in the operating room, then we start to wake the patient up and get the breathing tube out as quickly as possible. And after that's accomplished, what we have found in our practice is that the quicker we can mobilize these patients, meaning the quicker we can get them out of bed, sitting in a chair, standing up, walking, studies have shown and our experience has confirmed that these people do a whole lot better. So the whole goal once the operation is over is to ensure stabilization, and then get the patient mobilized and out of bed and back as quickly as possible to a normal life.

01:04:08

DAVID F. MOBLEY, MD: So you'd like to get them out of bed the next day...if possible?

01:04:11

DONALD M. GIBSON, MD: Yeah, we get them out of bed the next day.

01:04:15

DAVID F. MOBLEY, MD: We've got an email from Tyler. It says tell my dad I said hi. He did a great job.

01:04:22

DONALD M. GIBSON, MD: Thanks, Tyler.

01:04:26

DAVID F. MOBLEY, MD: So Tyler's happy with the operation.

01:04:27

DONALD M. GIBSON, MD: That's good. He's my – he's my toughest critic. Thank you, Tyler.

01:04:33

SCOTT DUNCAN, MD: Actually, I wanted to ask one more question, gentleman. As the show draws to a conclusion, we wanted to just ask a little bit about valvular surgery because we haven't really touched on that much. I understand, Dr. Gibson and Dr. Gomez, that you're doing minimal invasive approaches now for valve surgery, which usually requires using the bypass machine, of course, since you have to open the heart up itself and replace the valve. But I understand you're starting a new approach, a minimally-invasive approach. Is that true?

01:04:56

DONALD M. GIBSON, MD: That's true, Scott. Around the country, there's been a trend toward smaller incisions, which translates into less pain and less hospital stay, and we've been fortunate to be able to start to develop some techniques, learn some new techniques that involve smaller incisions for aortic valve replacements, and also on board coming are the new approaches to mitral valve replacement, so that's something very exciting that we're going to be doing here.

01:05:32

DAVID F. MOBLEY, MD: As we're winding down, I want to remind the individuals out there watching the program tonight that this will be archived at this same website for the next, about, four weeks. If you have email questions you would like to send to us, our surgeons will take some time and answer those questions for you. So for the next few weeks through the website you'll be able to send emails. Eventually that possibility will go away, but for the

next few weeks that's still good. The surgical procedure itself will be archived for a good, long time at the Memorial Hermann website.

01:06:10

SCOTT DUNCAN, MD: There's one more technical question we received for Dr. Gibson and Dr. Gomez. What's your view on composite arterial grafting versus saphenous vein graft? That was the question. It's obviously a technical one by someone who knows what they're asking.

01:06:23

DONALD M. GIBSON, MD: Composite – I'm assuming that he means a combin—a combination of an artery and vein together?

01:06:33

SCOTT DUNCAN, MD: Yes, that's what I would think.

01:06:35

MIGUEL A. GOMEZ, MD: Or either, you know...regular arteries off your mammary artery.

01:06:39

SCOTT DUNCAN, MD: Exactly. Right.

01:06:40

DONALD M. GIBSON, MD: I tell you. You know, the whole concept of keeping things simple applies to this field, okay? And I think that in each – in the situation where it's required as a last-ditch effort to get a better blood supply, I think it's fine. That certainly would not be my first choice. Keeping everything simple leads to certainly a lot better results. And actually, one of the things that's good about this procedure is you're not on pump and things are simple. Can I have a bulldog, please, Michael?

01:07:26

SCOTT DUNCAN, MD: We also have a listener that – or a viewer that asks whether these surgeries can be done when a pacemaker is in place or the patient is dependent upon a pacemaker.

01:07:34

DONALD M. GIBSON, MD: Yeah, that's not a problem. We just have to use some special care when we're using what we call a bovie, which is an electrocautery device to help us stop the bleeding. But the pacemakers doesn't –

01:07:53

DAVID F. MOBLEY, MD: Now, we've – we – we've completed three vessels, is that right, three of the four?

01:07:57

DONALD M. GIBSON, MD: Three of the four, and I'm just tidying up a little bit here.

01:08:02

DAVID F. MOBLEY, MD: Well, we're coming to the end of the broadcast, and I want to thank the surgeons for doing a marvelous job. And the crew. We had a great crew here putting this whole thing together. And as a reminder to everyone, this will be available for an indefinite period of time at the Memorial Hermann website. Go to the homepage, look at archived surgeries, and you will find this. It may not be there for a few days. We'll probably tidy it up and do a little bit of editing and have it on the web for you. There are a number of other operative procedures that are available webcasts, and if you simply go on archived webcasts at Memorial Hermann's website, you'll see there's about a dozen or more operations like this, not heart operations, but a number of different operations that have been done, and you can watch them. They're very interesting and certainly educational. Scott, any closing comments?

01:08:54

SCOTT DUNCAN, MD: No, actually – well, let's see. Do we have a last question? Oh, this is just a technical question. They were asking, once you remove the vein from the leg, how does the blood flow properly through the leg where the vein was removed? Dr. Gibson, Dr. Gomez, want to comment?

01:09:12

MIGUEL A. GOMEZ, MD: Well, in the vein – in the leg you have two systems of veins, a deep and a superficial venous system. And the superficial system is superfluous. We can take the saphenous vein, which is a superficial venous system, and the blood flow – venous blood flow of the leg will be okay because it goes through the deep. God was kind of like a heart surgeon for us; he was thinking of helping us out that way.

01:09:40

DAVID F. MOBLEY, MD: Dr. Gibson, Dr. Gomez, since we're going to be closing up, do you gentlemen have any parting comments you'd like to make for folks out there watching this program?

01:09:49

DONALD M. GIBSON, MD: David, thank you for being here and helping us with this, and you too, Dr. Duncan.

01:09:55

SCOTT DUNCAN, MD: It's been a lot of fun.

01:09:56

DONALD M. GIBSON, MD: And enjoyed it.

01:09:57

MIGUEL A. GOMEZ, MD: Yes, thank you both.

01:10:00

DAVID F. MOBLEY, MD: You still have a little work to do. It looks like you're doing great. Have a great rest of the evening.

DONALD M. GIBSON, MD and MIGUEL A. GOMEZ, MD: Thank you very much.

01:10:04

SCOTT DUNCAN, MD: Thank you. Thank you, David.

01:10:10

ANNOUNCER: Thank you for watching the live off-pump beating heart bypass procedure from Memorial Hermann Heart and Vascular Institute-Memorial City in Houston, Texas. To make a referral, make an appointment, or request more information, please click the buttons on the screen.

01:10:40

[end of program]