

Announcer: Hello, my name is Paul Friedman. I'm chair of the Department of Cardiovascular Medicine, and I'm delighted to have with me my colleague, Dr. Joe Dearani, professor of surgery, and the President of the American Thoracic Society of Cardiovascular Surgeons. And today we're gonna talk about the Ross procedure from baby to adult. Joe, welcome. Great to see you.

Dr. Joseph Dearani: It's great to be here.

Dr. Paul Friedman: So first, before we jump into what the Ross procedure is, what, at a, at a, in the technical sense, at a high level, who needs it and what are the indications for it?

Dr. Joseph Dearani: Well, the Ross procedure is a form of aortic valve, aortic valve replacement. And it, the, the, the title from, you know, children All the Way to Adults is, is relevant because there really are no good aortic valve replacement choices in children. So the Ross procedure has been sort of the mainstay of aortic valve replacement in children. And simply stated, the Ross procedure is taking the patient's native pulmonary valve, moving it over into the aortic position, and then replacing the pulmonary valve with a pulmonary homograft, typically cryopreserved in the United States from another human. And the results of this procedure have really, have really been superb to the point that the, the upper age limit keeps getting higher and higher and higher and higher. And now it's, it's being performed with some regularity in young to middle aged adults. And so that's sort of the background.

Dr. Paul Friedman: How long does this operation last? I mean, you're putting a valve in a position in which it was not designed, if you will, to be put in, and you do obviously have an, an artificial valve in the pulmonary position. Right. What are the durability findings?

Dr. Joseph Dearani: The durability is actually quite good. Ironically, in children, it works very well. We don't have the ability to do reinforcement procedures with the, what we call the autograph. That's the label that it becomes when it's moved into the aortic position because you don't want to compromise growth potential. And so the autograph can become aneurysmal with time, but typically it's not until the adult years, the pulmonary homograft is actually probably the valve that comes to an intervention first for usually a combination of narrow, you know, stenosis and regurgitation. However, when we get into patients where they've completed growth, we then have reinforcement maneuvers that we can apply to the autograph to keep it from dilating. And, and that's where, you know, the real advantage comes in because then that autograph can last literally for decades and decades. And one important little fact that I think many cardiologists, you know, may not appreciate is that if you look at aortic valve replacement in young adults, bioprosthetic valves, mechanical valves, and the Ross procedure, no matter how you look at the literature, the Ross procedure has superior late survival compared to every other valve on the market. And that's why this discussion is so important because there's this desire to avoid, you know, coumadin therapy and avoid, you know, mechanical valves with this, you know, sort of unbridled enthusiasm for bioprosthetic valves. But actually in a young adult, you know, the Ross procedure

statistically is, is gonna be the valve that's going to provide the best long-term outlook for a patient in their twenties, thirties and forties compared to a bioprosthetic valve.

Dr. Paul Friedman: Now what about the medical management after the Ross procedure, aspirin anticoagulation for any duration of time, how do you typically manage them?

Dr. Joseph Dearani: Just aspirin. There's no anticoagulation at all. Aspirin is, is used, you know, for the first few months, but it's actually not needed in the long term. Some people feel that with the homografts, some low grade anti-inflammatory thing in the background may be helpful, but there's no real hard evidence that that's essential. No. So that's the, that's the advantage. There's no medical therapy, except I should say good blood pressure control for the first year. Very, very good blood pressure control for the first year after which antihypertensive medicines can be, you know, can be stopped.

Dr. Paul Friedman: And then you mentioned the most common mode of failure relates to the pulmonic valve. Is that, can that then be treated percutaneously if there is a problem? What's the most common approach there?

Dr. Joseph Dearani: Yes, it can, that's the most common approach, percutaneous, although it does require a, a proper cardiac catheterization to make sure that the left coronary artery is not gonna be compromised. Because that is one of the potential downsides of the pulmonary homografts following the Ross, is that homografts really hugs the left coronary artery. And so temporary balloon inflation of the homografts with a coronary angiogram to make sure the left coronary is not compromised needs to be done first. And if there's no problem, yes, absolutely it can be treated percutaneously.

Dr. Paul Friedman: So you mentioned the strengths of the procedure. Do all surgeons perform the Ross procedure?

Dr. Joseph Dearani: No, most congenital surgeons will perform it because of course, that's what we do in children. And so many Ross procedures in the adult are performed by congenital surgeons. Although there is a small list of adult cardiac surgeons that have expressed an interest and have developed a level of expertise, you know, with the Ross procedure. So I would say most congenital surgeons and selected adult surgeons.

Dr. Paul Friedman: And then you had mentioned that because of its durability and increasing use in older and older populations, should it be offered for an A BR in adults? And what's the oldest patient that you have done a Roth procedure in?

Dr. Joseph Dearani: Yeah, the oldest I've done it in is in their fifties. When you go to Europe, you know, the, in Europe, they'll, they do it in patients in their, in their sixties, seventies, may be pushing the envelope a little bit. But I think for me right now, you know, I usually use about 50 years of age as a rough cutoff. Although if there's somebody between 50 and 60 who's very athletic, who's in good medical condition, has no other comorbidities, you know, I would, I would offer it to that person because the hemodynamics are nearly normal. So, you know, you don't have gradients across the valve. And so athletic athletes, you know, benefit quite well from this. And that, by the way, is the procedure that's done in athletes.

Dr. Paul Friedman: So is it that not used more commonly? Mainly because many adult cardiac surgeons, so included in the repertoire, is it surgically more complex to do than an A VR? It is,

Dr. Joseph Dearani: Yeah. Yeah. It's, it's, yes, first it's not in the usual adult cardiac surgeon's repertoire. That's true. Secondly, the reinforcement maneuvers have been an evolution with the procedure. There's, you know, you can put it inside a Dacron sleeve, you can reinforce the ascending aorta above it. You can reinforce the annulus below it, you can wrap the native ascending aorta around it. All of these reinforcement procedures prolong the durability of the autograph. It is a more complex operation, it's a root operation. So coronaries are detached reimplanted, of course, that needs to be done, you know, carefully. And then there's the pulmonary homografts insertion, which also, you know, adds some degree of complexity. But I should emphasize in the hands of surgeons that do it all the time, the risk is still 1%. It's very, very low for those that do it all the time.

Dr. Paul Friedman: Now, of course, the big question in today's era is what's its role in the place of tavr, right? Yeah. The, there's such enthusiasm for percutaneous therapies. How do you see the two balancing out? When would you offer a Ross versus a TAVR in the adult population?

Dr. Joseph Dearani: Well, I, I think the first thing to acknowledge is that when you first look at late survival of mechanical valves versus bioprosthetic valves, and there have been many institutions that have published this data, Mayo being one, Cleveland being the other, late survival is better with the mechanical valve than it is with a bioprosthetic valve in adults from 40 to 65 years of age. And that is in the face of Coumadin and the shortcomings with Coumadin. Now, of course, the Ross procedure, their survival is even better than that. So I do think that, you know, while there's a fear of Coumadin, we should remind ourselves that late survival is superior when you don't use a bioprosthetic valve. And, and, and the thinking behind why that is, is likely because with a bioprosthetic valve, you have peaks and valleys of performance of the prosthesis. So when you first put it in, you normalize hemodynamics within reason, you know, low gradient, no regurgitation. But then over time you get a combination of one or the other, maybe one dominates, maybe one is, maybe one is, is really quite dominating. And then the ventricle suffers the consequence. We may drag our feet a little bit before another intervention. And so

then you do another intervention. And maybe that's surgery, maybe that's valve and valve therapy. So I think one of the reasons why late survival with a bioprosthetic valve is lower than a mechanical valve is with a mechanical valve, you stabilize the hemodynamics that then don't change for years and decades, where with a bioprosthetic valve, it oscillates. And, and of course all of that is avoided with the, with the, with the Ross procedure. And, and, and that's probably why that fares even better than a mechanical valve.

Dr. Paul Friedman: No, amazing. One last question, Joe. Yes. For those of us who follow patients who may have had a Ross operation, any pearls tips or tricks, things to watch for frequency of screening?

Dr. Joseph Dearani: So standard echocardiogram, well first, before they leave the hospital, they should, you know, it's been our practice here, they get an echocardiogram and they get a CT angiogram. You wanna make sure that the contour of the aorta looks relatively normal. You wanna make sure that the coronary ostia and buttons are normal, we don't have kinks. And then beyond that, it's standard echocardiography for both the aortic root and the pulmonary homografts. If there are questions about the aorta or about the pulmonary arteries, I think then you followed that up with a CT angiogram. So CT angiography for great vessel anatomy, echocardiography for valve performance.

Dr. Paul Friedman: Perfect. Joe, fascinating topic. Great to see these surgical advances and really more options for our patients. Thanks for your time today.

Dr. Joseph Dearani: Thank you for your time, Paul.