

Surgical Planning for Bioprosthetic Implantation with a View to Future Transcatheter Valve-in-Valve Implantation

Announcer: Welcome to the Mayo Clinic cardiovascular continuing medical education podcast. Join us each week to discuss the most pressing topics in cardiology and gain valuable insights that can be directly applied to your practice.

Dr. Klarich: Good day everybody. This is Kyle Klarich, a member of the Department of Cardiovascular Medicine in Rochester, Minnesota at the Mayo Clinic. And I'm here today with one of our surgeons who happens to be Juan Crestanello. Not only is he one of our stellar surgeons but he is the chair of the Department of Cardiovascular Medicine, cardiovascular surgery, and the Professor of surgery. And today we're gonna take on the topic of surgical planning for bioprosthetic implantation with a view towards future transcatheter valve-in-valve implantations. So, Juan, great to have you here today.

Dr. Crestanello: Thank you, Kyle. Happy to be here.

Dr. Klarich: How often do you think a valve-in-valve is performed now compared with a redo aortic valve replacement? I think a lot of our patients are saying, "Gosh, can't you just put the valve in through my leg, instead of through my chest." And so now we're talking about valve-in-valve. Can you talk a little bit about the relative ratio of what we're seeing in our practice?

Dr. Crestanello: Yeah. So TAVR have really revolutionized the treatment of aortic stenosis, both native aortic valve stenosis as well as a prosthetic aortic valve stenosis. And nowadays for both native aortic valve stenosis and for prosthetic aortic valve stenosis, a TAVR is the most popular treatment. Just to give you an example, in 2019 there were around 2000 redo aortic valve replacements done in the country, and around 4,000 valve-in-valve for aortic prosthesis deterioration. So it's twice as common as a surgical aortic valve replacement.

Dr. Klarich: Wow. I had not known that until you just said it right now. I could feel it in our practice, as we see the pressure from our patients to go that route. So that's a very important data. What do you think the limitation that prevent the performance of a valve-in-valve? So if a patient was asking for one, but we say, no we should do a redo, what are the parameters there?

Dr. Crestanello: Well, we are mostly limited because of anatomic reasons at the level of the root. So when we consider a valve-in-valve, we need to consider number one, the size of the prosthesis, and number two, what is around the prosthesis. So in terms of the size of the prosthesis we doing a valve-in-valve, we place a new, a TAVR valve inside that valve. So if that valve is smaller to start with, then we're gonna have to place a smaller valve, and that will lead to elevated gradient. So that's one of the limitations that can be to a certain degree alleviated by fracturing the stent of the aortic prosthesis, but that's not possible for everybody. That's one consideration. The other consideration is what is around the valve. And as you know, around the aortic root there are the coronary arteries, sinuses of Valsalva and the displacement of the leaflets of the old bio prosthesis can lead to occlusion of the coronary arteries either by directly obstructing the ostium of the coronary arteries or by compromising the inflow of blood into the sinuses of Valsalva. So therefore is very important to before doing these procedures, evaluate the location of

the coronary artery, the distances from the leaflets and the virtual analysts to the coronary ostium, the height and size of the sinus of valsalva and the size of the sinotubular junction and plan the procedure appropriately in order to prevent this catastrophic complication that frequently is very uncommon, because we have learned on whom to avoid these procedures, in order to avoid this type of catastrophic complication.

Dr. Klarich: And it's, and those measurements are made primarily off of a cat scan. That's directed a cardiac cat scan that's directed at TAVR valves or valve-in-valve in these situations?

Dr. Crestanello: Yeah, you're correct. So we, every patient who is being considered for a valve-in-valve get a, what we call a TVR CT which is a cardiac CT angiogram, which is gated. And we do very sophisticated measurements of the size of valve, the simulation of the deployment of the TAVR prosthesis and the distances between the virtual annulus and the ocean of the coronary arteries as well as the sizes of the sinus of valsava, the sinotubular junction size, the height of the coronary arteries, and the height of the sinotubular junction. So all these measures help us to determine the risk of coronary obstruction.

Dr. Klarich: And, what is the average risk of that? Or do we just completely avoid it because we know that we don't even try it in patients that would be at risk?

Dr. Crestanello: Well, patients who are at risk of coronary obstruction, it depends what the overall situation of the patient is. If the patient is a relatively acceptable surgical risk can be considered for surgery, otherwise the other measures like a Basilica procedure which is a laceration of the leaflets of the aortic valve prosthesis that allows for the placement of a valve-in-valve and decrease the risk of a coronary obstruction.

Dr. Klarich: Okay, well, that's good to know. Those are very sophisticated measurements and sophisticated risk benefit discussions that we have to have with our patients each time. Is it, you know, I think you already touched on this slightly, but is what is the risk of the patient prosthesis mismatch when you do place you know, a valve inside another valve?

Dr. Crestanello: Well, as you probably know, the majority about 75% of the patients who have aortic valve replacement, surgical aortic valve replacement get valve that is 23 millimeter or smaller. As a consequence of that just to start with about the 70% or so, the patients already have some degree of patient prosthesis mismatched. That means that the gradient across the aortic prosthesis is already elevated. So by placing a valve inside the valve the gradient is gonna be even higher, although we've removed the aortic stenosis, but the baseline gradient, because the baseline sizes is already small it is gonna be a higher. So it is not uncommon to have some degree of patient prosthesis mismatch in a the valve-in-valve procedures. And in general, the mean gradients in the aortic prosthesis, after doing the valve-in-valve of around 20 millimeter of mercury, or so, compared to the single digit on a TVR or surgical prosthesis.

Dr. Klarich: So, pretty much everyone will have a little bit of patient of increased gradient and maybe some patient prosthesis mismatch, but it wouldn't be necessarily limiting their overall ability to get the procedure.

Dr. Crestanello: No, and that's why it's important when we see a young patient on whom we are, we promise that we're gonna do valve-in-valve in the future, or, we suggest that to choose a tissue valve because of the possibility of valve-in-valve in the future to place a large valve to avoid this problem in the future.

Dr. Klarich: And are there certain things at the time of the original AVR in a younger patient that would be getting a prosthesis in their fifth or fourth decade that would you would do to allow the valve-in-valve in the future?

Dr. Crestanello: Yeah, certainly number one is to place the largest valve that we can place. And if we cannot place at least a 23 millimeter valve we need, we normally perform a root enlargement, and also taking consideration the location of the coronary artery and the size of the sinotubular junction as we close aorta which are also an important considerations to prevent a compromise of the coronary arteries in the future when a valve-in-valve is performed. So doing a root enlargement on those patients, or closing the aorta with a pericardial patch with enlarged vinosalva and sinotubular junction and increase the distances between the leaflets and the coronary ostium and therefore will increase the likelihood of doing valve-in-valve in the future.

Dr. Klarich: Well, that's great. And it's interesting now that we're actually planning, you know, couple decades down the road for some of these patients, as we as we do their first aortic valve replacement. Well, that was a very nice discussion. Is there any closing comments that you'd like to make about this planning for the valve-in-valve in the future when doing the first bio-prosthetic implantation?

Dr. Crestanello: No, just to summarize number one is to place the largest valve that we can place. And number two, be conscious about the position of the coronary arteries and the sizes of the sinus of valsalva once we close the aortotomy just to make sure that there's no compromise of the coronary arteries when we do our valve-in-valve in the future. So paying attention to those key factors is really important to be able to fulfill the promise of valve-in-valve in the future.

Dr. Klarich: Great. Well, thank you very much. This has been a very nice conversation and I appreciate your expertise.

Dr. Crestanello: Thank you.

Announcer: Thank you, and thank you for your time, and thank you to our audience for taking their time to listen to Interviews with the Experts, Rochester, Minnesota.

Announcer: Thank you for joining us today. Feel free to share your thoughts and suggestions about the podcast by emailing cvsselfstudy@mayo.edu. Be sure to subscribe to the Mayo Clinic cardiovascular CME podcast on your favorite platform and tune in each week to explore today's most pressing cardiology topics with your colleagues at Mayo Clinic.