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Improving Outcomes by Overcoming Challenges in Complex Cardiac Reoperations

Announcer:

You're listening to ReachMD, and this is *Advanced Treatments and Innovations from Mayo Clinic*.

Here's your host, Dr. Matt Birnholz.

Dr. Birnholz:

Cardiac surgeries are complicated procedures that call for a sophisticated skillset, but cardiac reoperations are even more complex and require a highly advanced set of surgical techniques. And with more patients than ever before going back for reoperations, what techniques can we apply to help improve outcomes for these surgeries?

Welcome to *Advanced Treatments & Innovations from Mayo Clinic*. I'm Dr. Matt Birnholz, and joining me is Dr. Juan Crestanello, Chair of the Department of Cardiovascular Surgery at Mayo Clinic in Rochester, Minnesota. Dr. Crestanello, welcome to you.

Dr. Crestanello:

Thank you.

Dr. Birnholz:

So let's dive right into this subject of complex cardiac reoperations. Now, what are the risks associated with repairing the heart a second or even a third time? And in that vein, can you just tell us about the mortality rates and outcomes associated with these operations?

Dr. Crestanello:

In general, patients who require reoperations are older and they have more comorbidities. In addition, the anatomy around the heart changes after the first operation, and there is the development of more scar tissue that leaves an increased risk for re-entering the chest. For example, the heart or the great vessels that leave the heart can be behind the sternum, and that increases the risk of re-entering the chest, as well as the risk of bleeding.

Dr. Birnholz:

And I take it that increases the mortality rates and outcomes associated with these operations. Is that true?

Dr. Crestanello:

Yes, that's correct. Here at Mayo we do more than 300 reoperations per year. The majority of them, about 70%, are first-time reoperations, and about 30% are second, third, fourth or more time reoperations. Many of the reoperations that we perform, we can do it with morbidity and mortality that are similar to the first-time surgery, but overall, if you take all reoperations, the raise in mortality is about 6%.

Dr. Birnholz:

So let's dive into that a little bit further. What from your experience makes a reoperation surgery so challenging? You talked about scar tissue. But how do you determine whether or not a patient is even going to be a good candidate for this procedure?

Dr. Crestanello:

When we evaluate the patient's candidacy for surgery, the 2 things that we evaluate are the overall physiological condition of the patient, and that involves the age and comorbidities and, particularly for the reoperation, the anatomic factors that could potentially make the reoperation and the re-entry in the chest more challenging. That includes, for example, having the aorta or other vessels immediately behind the sternum, the right ventricle or previous bypass grafts immediately behind the sternum, the previous history of mediastinal

radiation. Other factors is the number of reoperations. It's not the same doing a first-time reoperation versus a second, a third or a fourth or subsequent numbers. The higher the number, it increases the risk. And also, there are some particular lesions like aortic insufficiency or patients who had poor ventricular function that makes the risk of reoperation higher.

Dr. Birnholz:

So that brings up one of the natural questions that I'm sure some of our listeners are wondering, Dr. Crestanello, and that's whether reoperations should be perceived as necessary at all. What factors are at play here in terms of making the decision to do a reoperation?

Dr. Crestanello:

Like every decision that we make in cardiac surgery, the 3 factors that are in play are #1, the type of lesion, either a valvular lesion, a coronary artery disease or an aortic aneurysm that demands the operation; #2, the repercussions that a lesion had in the heart, in the function of the heart as well as in the symptoms that the patient has, what is the natural history of that lesion if we don't do anything versus we operate. And then, once we have that information, the second step is to analyze what are the comorbidities of the patient and whether the patient will be able to tolerate the surgery. Number 3 is to analyze the technical aspects of the operation, and here is where reoperations are particularly challenging, and we use a multi-imaging modality to assess the safety of the reoperation before the surgery. We do CT angiograms of the chest and the abdomen, and that allows us to identify the location of the different cardiac structures in relation with the sternum and assess the safety of re-entry in the chest and plan the surgery accordingly. Based on those findings, we can decide that going through the sternum is not the ideal approach. We may decide to do the operation going through a thoracotomy, through the side, either through the right or through the left side, and also, we may decide to place the patient on cardiopulmonary bypass before opening the chest, and that is accomplished normally through the femoral artery and vein.

Dr. Birnholz:

That's excellent. So these more precise diagnostic workup procedures and tools and techniques are enabling you to have a better cost-to-benefit ratio analysis for whether to proceed with these procedures.

Dr. Crestanello:

Yes.

Dr. Birnholz:

For those just joining us, this is *Advanced Treatments & Innovations from Mayo Clinic*. I'm Dr. Matt Birnholz, and today I'm speaking with Dr. Juan Crestanello about the key considerations underlying complex cardiac reoperations.

So, Dr. Crestanello, I want to switch gears and explore some of the techniques that have been developed in response to these challenges you talked about around cardiac reoperations. What kinds of techniques or approaches have come on to the scene for you?

Dr. Crestanello:

Well, as we discussed before, #1 is the planning of the reoperation, and that's the main step to assure a safe re-entry in the chest, and as we just discussed, we accomplish that by performing a CAT scan of the chest that allows us to precisely determine the relationship between the sternum and the cardiac structures and plan the operation accordingly. In addition, the placement of patients on cardiopulmonary bypass through the groin vessels before the opening of the chest adds safety to that surgery.

Dr. Birnholz:

And, Dr. Crestanello, I'm particularly curious given the high-volume center that you're at performing over 300 operations for cardiac reoperations, as you put it. At what point would other clinicians in this therapeutic category consider making the call to refer a patient to a high-volume center such as yours for reoperative repair of the heart?

Dr. Crestanello:

Well, I think that the reoperations are challenging reoperations, and we are experts in the field. Really, any reoperation should be conducted, from my point of view, in a center that has expertise to deal with the reoperation as well as the complications of the reoperation, but particularly, a second, third and higher number of reoperations should be done in centers of excellence where the whole team is trained to deal with these type of cases.

Dr. Birnholz:

And I'm sure this is somewhat intuitive, perhaps obvious to some of our listeners, but it almost goes without saying but needs to be said that high-volume centers in other therapeutic categories for surgical procedures, the outcomes are far better than places that are not as steeped in performing these procedures. I assume the same holds true for cardiac reoperations. Is that true?

Dr. Crestanello:

Yes, our outcomes are far superior than what the other centers report.

Dr. Birnholz:

So then, Dr. Crestanello, I want to try looking ahead at any developments that are on the horizon with the potential to really improve cardiac reoperations. What do you think we should keep an eye out for, and what's going on over at Mayo?

Dr. Crestanello:

Well, the first step is to try to avoid reoperations, and clearly, there are several reasons for reoperations. One of them is deterioration of a previous valve that had been placed, development of new diseases in other valves or other structures of the heart. So it is important that once one is diagnosed with a cardiac problem that requires a cardiac surgery, after that initial surgery the adequate secondary prevention is performed, so a strategy to prevent infection or thrombosis of the valve and also monitoring for an early deterioration of the heart function or development of new lesions in the heart is very important because it is not the same to operate at that stage and at an early stage of certain cardiac lesions that doing a reoperation when that lesion has had significant repercussions on the heart function or in other parts of the body. The prevention is one important consideration.

Number 2 is the consideration for other types of procedures, like minimally invasive procedures or robotic procedures, that can in selective cases for reoperations that allow us to make those procedures less invasive and less risky. And now on the horizon is the transcatheter procedures for treatment of deterioration of a prosthetic valve, and the transcatheter procedures allow for the replacement of some type of a valve percutaneously rather than having to open the chest.

Dr. Birnholz:

And do most of the minimally invasive procedures for cardiac reoperations center on valvular operations, or do they also extend to other aspects of cardiac function?

Dr. Crestanello:

No, in addition to reoperation for valvular heart disease, there are reoperations for coronary artery disease, reoperations for aortic aneurysms, reoperations for new lesions. I mean, somebody can have an initial operation either for coronary artery disease or aortic valve disease and now has developed mitral valve disease or tricuspid valve disease or an ascending aortic aneurysm that requires a reoperation.

Dr. Birnholz:

So, Dr. Crestanello, before we close, let me just open the floor to you for any parting thoughts that you want to convey to our audience regarding cardiac reoperations and the evolution of these procedures and techniques over time coming from your vantage point over at Mayo Clinic.

Dr. Crestanello:

Well, I want to reassure the patients who require reoperation that here at Mayo we have the expertise to provide care for complex heart problems. We have a multidisciplinary team that consists of surgeons, cardiologists, anesthesiologists, critical care nurses, nurse practitioners, who help us put your anxiety associated with the problems that require a reoperation at ease and give you the best outcomes available in the world.

Dr. Birnholz:

With those thoughts in mind, I very much want to thank my guest, Dr. Juan Crestanello, for joining me to share new thoughts on complex cardiac reoperations and the pathways to improve care. Dr. Crestanello, it was great having you on the program.

Dr. Crestanello:

Thank you again.

Announcer:

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