

[MUSIC PLAYING]

**RAJIV GULATI:** Greetings. I'm Dr. Rajiv Gulati, associate professor of medicine at Mayo Clinic. During today's commentary we will be discussing re-operative cardiac surgery when one operation is just not enough. I'm joined today by Dr. Joe Dearani from cardiac surgery, Dr. Naser Ammash my colleague in cardiology, and Dr. Sam Sameh from cardiac surgery also. Gentlemen welcome. Joe if I can turn to you, why should patients and referring physicians be more informed about redo cardiac surgery?

**JOSEPH DEARANI:** Well it turns out that there are very few things in cardiac surgery that we do where one operation is the end of the story. Recurrent lesions develop, sometimes there's valves that we put in wear out, they need additional attention. And then as patients get older they develop other co-morbidities. And there comes a time when another operation, or another operation beyond that, and sometimes even beyond that become necessary. And I think assimilating all the information and trying to determine what the role is so that you can plan an operation that will be the lowest possible risk and provide the greatest possible benefit for the patient is becoming an increasing part of our practice now in the current era.

**RAJIV GULATI:** Naser do you want to help us with that? So when you see congenital patients frequently having multiple operations, tell us about the infrastructure and the issues that are involved from your standpoint.

**NASER AMMASH:** So in the congenital population I cannot agree more with Joe because many, many of those patients when they come back to see us with a problem, most of them are related to the heart surgery that has been done before and many, many examples. So some of this has been anticipated because it's not the thought to fix, there's no total fix for congenital heart disease even for a smaller defect. So when they come to us we do a very comprehensive evaluation to look at issues related to congenital heart diseases, what is the acquired problem, and deal with the specific of what needs to be done at that time and what's the best way to do it, because sometimes it's this surgery, sometimes it's not surgery, it could be more like an intervention plus surgery. So it's really a mixture of things and the interaction between us, and Joe, and Sam, and the rest of the cardiovascular surgical team will be very important to determine what would be best for the patient.

**RAJIV GULATI:** Yeah that's very helpful so on that note, how important is a surgeon experience, operative volumes, institutional experience, I mean is this something that should be considered by all practices, maybe you can help us with that.

**SAMEH SAID:** It's very important to consider the infrastructure of the institution experience and inside the same institution the surgeon experience as well. It's very important how many re operation the surgeon is comfortable with, and how many sternotomies. And that's important for the outcomes in safety for the patients.

**JOSEPH DEARANI:** If I could just maybe just add a little bit there. I mean, there are pitfalls with many of these re operating procedures. And I know that when we're training our residents, we get in the habit of at least I create a checklist, a checklist of things that would potentially cause mortality, and a checklist of things that would potentially cause morbidity. And then we planned and we designed the operation which begins in the pre-operative phase with imaging and things like that so that we eliminate the things that are going to be potentially hazardous. And so as I think as Sameh was saying that some surgeons have a lot more experience with this. And then as the institution gains more experience then it becomes habit for all of the people involved, which consists of Allied health and nurses. And it requires really a well-informed team that's used to sort of working through the things that one might encounter with a difficult re-operation.

**RAJIV GULATI:** And maybe on that note we can talk about some of the pre procedural planning that goes into this imaging, changes in collaborative care. Naser?

**NASER AMMASH:** This is huge. This is very important because one of the determinative outcome is actually not only the congenital heart disease itself but also the co-morbidities. So you have to have a really great comprehensive review of all of the medical issues that the patient the to review of all the outside records, the imaging studies that have been performed so that we don't repeat those, and determine what would be the best thing for that patient that, again, might not be and might be something completely different, or a hybrid approach. So this is a very important.

**SAMEH SAID:** I agree it with Naser. I think there of re-operative work up now more deliberate also including cross-sectional images, 3-D reconstruction, even 3-D printing we've done for some of these complex congenital heart re-operation, and also planning what type of access the technology improved regarding the percutaneous cannulation. The operation may not be only of a re-sternotomy. It can also also through a thoracotomy or groin cannulation, neck cannulation, there is a lot of things that need to be evaluated prior to the re-operation.

**RAJIV GULATI:** So an awful lot of stuff going on behind the scenes, not just face to face with the patients.

**JOSEPH DEARANI:** And then one other comment just to expand on what Sam is saying. You know to me, the first 30 years of cardiac surgery involve the development of operations and new operations. The next 30 years is really designed to do operations that have been in place for many, many years, but they can be done safer now because the imaging now is so detailed, the roadmap for the surgeon in terms of planning the operation is so impeccably detailed that it really removes a lot of these hazardous variables that were problematic in the past. And then the second thing is the advancements in technology. And we have all these fancy catheters that you can approach from the periphery. And so the combination of detailed imaging and advances in technology allow us to do complex re-operative cardiac surgery with mortality levels that actually approach in many situations primary cardiac surgery. So its a huge change for the cardiac surgical community and the cardiology committee.

**NASER AMMASH:** And I want to add one an important point because for the congenital patient that we see, all of them are in my practice all of them are adults. So the imaging should not only be focused on the congenital aspect but also on the acquired heart disease. Like for example, [INAUDIBLE] rejection fraction is a huge factor determining outcome after cardiac surgery. Even in the congenital, patient have right-sided disease.

An example of a hybrid procedure, for example, we see a lot of patients with [INAUDIBLE] who have some pulmonary artery stenosis and have pulmonary [INAUDIBLE]. So in addition to the [INAUDIBLE] replacement that Sam [INAUDIBLE] needs to do, we do inter-operative stand placement because this would be the best hybrid technique to do both instead of them repairing the pulmonary artery.

**RAJIV GULATI:** So again, you're stressing the importance of collaboration here.

**NASER** Yes.

**AMMASH:**

**RAJIV GULATI:** And I can say just as commentary, even in a few years, we are talking to each other all the time now, whether it's the procedural planning.

**JOSEPH** That's right.

**DEARANI:**

**RAJIV GULATI:** Or hybrid procedures in the adult world stenting, if there were no conduits while you guys repair the valves. It seems to be an increasing, really great for patients, part of our care.

**SAMEH SAID:** I agree.

**NASER** An arrhythmia is one of the issues. Right? Because sometimes it's better to do percutaneous radiofrequency

**AMMASH:** ablation of an arrhythmia issue before surgery than to do it surgically and add the time of operation, how long you have to put a patient on bypass.

**JOSEPH** So one of the absolute-- arrhythmia is by itself is the most commonly complication after every single heart defect

**DEARANI:** that we do.

**RAJIV GULATI:** Right.

**JOSEPH** And whether or not it requires an intervention is something that needs to be determined by you and your

**DEARANI:** colleagues.

**RAJIV GULATI:** True.

**JOSEPH** But I think one thing that I was hearing that I think is an important thing to emphasize is that there are medical

**DEARANI:** issues that require medical treatment. The surgeon's, sort of, out of the equation. But I think one point that you alluded to is this collaboration between cardiology and surgery because, to me, I think of when we need to do something to a patient, the something is either a complicated operation, or it is an intervention in the cath lab, or it is a hybrid procedure, sort of, in between.

And there is a role for, sometimes, one or the other. And I think the benefit back to what we talked to in the beginning of having a practice that's very, very integrated with a lot of experience makes it very easy to determine where a given patient should be channeled to.

**RAJIV GULATI:** I couldn't agree more. I'm sure you both agree to. Well Joe and Sam in particular, sometimes you can't do it. Sometimes a patient is too sick. The procedure will be too complex. So maybe we can talk about when redo is not possible. What are the indications or what are the particular factors-- and Naser too-- where you say, no really, redo is not appropriate here. And maybe transplantation is an option.

**SAMEH SAID:** I think when it comes down to the factors that we start thinking about transplantation, as you said, really, re-operation would not be possible, which, actually, in these days, becomes less and less because even in the most difficult situations, there are some options like what we talked about hybrid procedures.

Patients who were thought to be inoperable can have another solution prior to the transplant. In fact, one of these factors, of course, would be related to how severe is a ventricular dysfunction, the ejection fraction. How many sternotomies-- does the patient will require a re-operation for a coronary bypass and there is no conduits or there is no distal targets.

In fact, we have evaluated a patient who was considered for a transplant. However, by the multidisciplinary team prior to surgery, we found that the patient can have a redo coronary bypass, despite he went through the transplant evaluation process. So that's an example of some of the situations where the team approach are really important.

**NASER  
AMMASH:** Right. So this is very important in the congenital practice because, really, not everybody is aware of what could be done surgically or percutaneously to those patients. Or sometimes patients are being told your only chance is a transplant. Whereas, repairative surgery is very important.

The ventricular function is so important for me because, as a cardiologist, if I'm dealing with a congenital heart disease that affect the right ventricle and the right ventricle is not functioning well, but if I have the left ventricle not functioning well, it's a hard sell to the surgeon can you repair the tetralogy of Fallot and Epstein when the LV is not so good. Joe?

**JOSEPH  
DEARANI:** Well I think that, you know, when is transplant the best solution, and when do we get away with getting around it? I think, from my standpoint, it comes down to ventricular function. And then, it comes down to technical issues. I would much rather do a fifth time sternotomy on somebody with normal ventricular function than to do a primary sternotomy on somebody with a very bad ventricle because there are some lesions when you repair the lesion, the ventricular function would be expected to improve.

But there are many where it will not improve. And so I think the ones that end up getting channeled toward transplantation are ones that really have-- the function of the heart is really poor. And then, a complicated, high risk reoperation probably does not make sense. But I think, as you've alluded to, it really requires an integrated approach where you are looking at the big picture because, more often than not, there is a role for surgery as either a delayed to transplant or an alternative to transplant. And I think when we have people like this that are communicating, it becomes very easy to determine where that patients should be directed to.

**SAMEH SAID:** And I agree with Joe. Also, in this era, we have a lot of options to support the patient post-operatively.

**JOSEPH  
DEARANI:** Yes.

**SAMEH SAID:** So it comes also to the other point when I think about this complex reoperation, will I be able to get the patient through the surgery? That will be one of my main questions. Will I be able to get the patient through the surgery with some mechanical circulatory support hoping by improving the outflow obstruction, or relieving the ischemia by adding another bypass with a little support with mechanical devices. Can we take him off that device? I think that's also important to consider.

**JOSEPH** Yeah, agree completely.

**DEARANI:**

**RAJIV GULATI:** Well, wonderful. Thank you, gentlemen, for sharing your insights on this topic. And thanks to our viewers for joining us.