Discussion to: Contemporary surgical techniques for mitral valve replacement in extensive mitral annular calcification

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Dr Y. Joseph Woo (Stanford, Calif): I congratulate the authors on yet another outstanding analysis of their program’s expert work in a very high-risk population. Significant mitral annular calcification (MAC) offers a menu of challenges, including deciding whether to avoid, work around, debride, or resect. Patch reconstruction, difficult mitral valve replacement (MVR) suture placement, paravalvular leak, valve dehiscence, calcific embolization, atrioventricular-groove disruption, left ventricular rupture, exsanguination, death. Difficulties abound. Enthusiasm withers, but creativity and innovation can flourish, as you’ve shown. At your center, the skillful traditional implantation or hybrid operative implantation of Teflon-wrapped SAPIEN 3 or Melody were used to treat 72 consecutive patients with severe mitral disease and MAC, 56 and 16, respectively. Procedural outcomes were excellent. For traditional MVR and MAC, I usually place the valve with the sutures on the pledgets on the ventricular side in a supra-annular way, implant the valve, and then put in basically intra-annular type sutures, pledgets on the atrial side, and grab some atrial tissue on the posterior side. And basically, develop a second suture line. That seems to work pretty nicely. I have three questions in the areas of technical, decision-making, and speculation. So in technical, in the hybrid implant, you use annular sutures intermittently. I think that makes a lot more sense than others who’ve described this technique where they place an entire circle of sutures and then you might as well just do a traditional MVR. Can you give us some more specific technical advice on where you put these sutures typically? How many you put them in? What needle you use? Do you drive through the MAC? Do you try to go underneath the MAC, etc?

Dr Ahmed El-Eshmawi (New York, NY): Thanks, Joseph, for your insightful comments. The answer is all of the above. So basically, you look at the valve and then you decide where to put the sutures. We first try to put the sutures at the commissures because that’s a common site for paravalvular leak and to help circulizing the otherwise kidney-shaped mitral annulus. Also, we use any soft spots that can take the sutures, whether in the leaflet, through, or around the calcium, taking great care not to fracture the calcium bar; otherwise, we would lose the landing zone of the balloon-expandable valve or create a nidus for a paravalvular leak.

I should also say we have done cases without any sutures, especially early in our experience and you rely on the radial tension of the device; however, that would definitely increase the risk of valve migration or embolization. So our recommendation is to put sutures as described, we do so selectively and we try to balance it around the annulus.

Dr Y. Joseph Woo: Great, thank you. Decision-making. So with the poor 1-year survival in the hybrid group of 55%, should these patients just all be approached with transcatheter mitral valve repair (TMVR)?

Dr Ahmed El-Eshmawi: Yeah, but the problem Joe, as you know, that the promise of TMVR for patients with extensive MAC never came through due to several technical limitations that limit the application of this technology in those difficult patients. Joseph, we definitely do not prefer to do those cases, as they are considered the highest-risk patients in mitral surgery, but most of them were already referred after screen failure for transcatheter therapy and clinical trials and remain with very limited quality of life, forcing us to take the challenge.
I also believe the poor 1-year outcomes are primarily related to the general greater cardiovascular mortality in patients with extensive MAC, as shown in several population studies.

Finally, I should say the best way to address that problem is referral to mitral reference centers, and the goal should always be to do standard valve replacement using any of the techniques described over the use of SAPIEN in MAC to minimize the risk of the procedure; however, that takes a painful learning curve, as shown.

Dr Woo. Okay. I’d like for you to preview for us maybe your next innovation in this field and speculate on a crazy idea. What about taking a TEVAR that has hooks, intentionally with hooks, putting that in first into your MAC and then mounting a TAVR valve inside the TEVAR?

Dr El-Eshmawi. Will you bring that valve to me next time Joe, and we’ll do a case together, Joseph. [laughter]

Dr Woo. Thank you very much.

Dr El-Eshmawi. Thank you.

Dr David H. Adams. Okay, we have time for one more question.

Dr Danny Ramsey (Houston, Tex). Danny Ramsey from Houston. Any cases in which you go in, you look at the valve, and you’re like we may not be able to do anything? I have had a few cases in which the atrial wall itself is calcified, which forced the TMVR, and I really applaud all that you’ve done and just curious, where you’re almost at the limit of saying, “This is not doable.” What’s your limit where you say, “We have to abort.”

Dr El-Eshmawi. Yeah, so honestly speaking, the whole idea about this project came up when we opened a multi-redo patient with radiation disease over a decade ago and couldn’t do anything for the valve. Patients with atrial wall calcifications, those are dangerous because you need to know if you’re going to be able to close the atrium. As a matter of fact, so those cases should be more like a prohibitive risk because, again, if everything is calcified and then you might end by not being able even to see the valve or to close the left atrium and have a bleeding disaster. However, after several years doing this and with advanced imaging now, we should go to the operating room with a clear image of the extent of calcium and have a plan A and B to deal with it. So that incident when you will have to close the chest and abort should be almost a never-event in recent era of advanced cardiac imaging, which takes a multidisciplinary team to make that decision.

Dr Adams. Yeah, I think that—Ahmed, that was a master presentation. I loved your answer to Joe especially, we’ll do one together. But we have had patients whom we’ve opened and had to close. That really stimulated this, and one piece of advice I can give is we, again, have Ahmed El-Eshmawi, MD, and Gilbert Tang, MD, do all of the cases together. We don’t have different surgeons each try to. So if you have this problem, we call those two, and they basically make the operative plan. We can all be in the room, but those two are always there to try and do this, and I’ll just reiterate what Ahmed said. We were really flying solo here. We started this back before there were even no SAPIEN valves to put in. We were putting in pulmonary valves in a mitral position. That shows you also we were pretty desperate to try and help some of these patients. They have small ventricles if they have MAC and mitral stenosis, so their risk for left ventricular outflow tract obstruction is great, and we’ve gotten much more thoughtful about depth of implantation. Now, to the point, I think, the one that we saw, the only complications we’ve had the last 3 years in this practice or in this setting was, we had an embolization and we had to go back and put the Sapien valve back in. Because that’s what we’re really trying to do now, is to cheat on the atrial side of implantation. So if you don’t have any valve embolizations, you’re probably putting them in too low sometimes.

Unidentified Speaker 2. Can I ask one quick question? In someone that you’re doing a bioprosthetic replacement, it was going through my mind about the mitral stenosis with a small hypercontractile ventricle—do you have any tips that you try to further atrialize a bioprosthetic? One thing that I’ve done a couple times, actually, made felt skirt to help pull it up. And I think also when you do everting sutures that also helps atrialize it a little bit. Is there anything else—

Dr El-Eshmawi. In our experience, we always put the sutures in the ventricle in a nonverted fashion that would allow you to place the valve more atrially with less tension on the sutures. We also cut the subvalvular apparatus, sometimes you sacrifice the whole papillary muscles, So I wouldn’t be too conservative in papillary muscle preservation because this is not for those the kind of patient to avoid subvalvular obstruction. Also, you better use cinchable, low-profile bioprosthetic valves.

Unidentified Speaker 2. I think that’s important to know.

Dr Adams. Yeah, you’ll see in that setting, too, when you size the valve and you say, a 23 annulus because you’ve got MAC, you can select a size 25 prosthesis, you take a modern prosthesis that really can inflect the posts, the top of the valve will almost always override above the annulus. You may not even be able to bring the cuff into it. But that generally works as you tie the sutures down the valve will ride supra-annular as long as the valve struts are squeezed into the ventricle. We never release the valve unless almost all sutures are tried. Make sure the bottom of the valve is secure.
first and in place, and the top can override the annulus a little bit. Ahmed, thank you very much. We’re going to move on.

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