Mitral Annular Calcification (MAC)

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Dr. Bell: Well, welcome again to all of our listeners and viewers again for another in a series of interviews with the experts. I am delighted again to welcome Dr. Juan Crestanello, our chief of cardiovascular surgery, who has actually been a frequent guest on our program and is here today to to talk about mitral annular calcification. So again, welcome Juan. It's really good to have you back with us.

Dr. Crestanello: Thank you, Malcolm. I'm delighted to be here again.

Dr. Bell: So mitral annular calcification. We're just gonna call that MAC for the purposes of this discussion. How prevalent is that? I know we see this on echocardiograms, chest x-rays- but what, what actually is the prevalence, and what's its associated- what, why does it interest the surgeon?

Dr. Crestanello: So, mitral annular calcification is, as it name says, is the calcification of the, of the mitral valve annulus. And that occurs in about 25% of all echocardiograms that were performed at the Mayo Clinic over the, over the course of a study that involved approximately 24,000 patients. And I think that that's the echocardiograms that just were performed over the course of a year. And what is important to know is that the patients with mitral annular calcification are, number one, a high risk group with a high prevalence of comorbidities. And number two, the prevalence of mitral valve disease in those patients is increased. But also it's important to know that not all patients who have mitral annular calcification have a disease of the mitral valve, in the sense that the function of the mitral valve is preserved. There's no stenosis and there's no regurgitation. So mitral annular calcification by itself is not an indication to perform any procedures in the absence of a dysfunction of the valve.

Dr. Bell: Well, that's an excellent point. So, of no interest to the surgeon for, for the time being. So, we're going to focus then on those patients who have concomitant mitral valve disease. And you already talked about some of the characteristics of these patients. What other risk factors might they have, that they have associated MAC with their mitral valve disease?

Dr. Crestanello: Well, there's two aspects. One is the, in terms of the comorbidities that those patients have, in terms that they're older, more often females, they have risk factors for atherosclerosis and valvular vascular disease. They also have left ventricular hypertrophy, and normally they have very small left ventricles, that can be challenging from the standpoint of the creation of LVOT obstruction during the mitral valve replacement. And in terms of the surgery itself, because of these characteristics, the surgeries are more demanding and are associated with procedure-specific complications such as AV disruption- which is the most dire consequence, a complication of this surgery- risk of coronary compromise, perivalvular leak, AV block, stroke, and renal failure- and obviously an increased rate of operative mortality.

Dr. Bell: So just taking a step back, the patients with MAC with mitral valve disease have a worse prognosis than those patients who have mitral valve disease without MAC. Is that a fair statement?

Dr. Crestanello: Correct.

Dr. Bell: And you, you'd already talked about some of the risks of the surgery in patients with MAC. Could you maybe just describe how you, as a surgeon, then deal with MAC at the time of surgery? And again, we're talking about patients with mitral valve disease, so you're also dealing with that. But what are the surgical techniques that you have at your disposal to deal with MAC?

Dr. Crestanello: Yeah, I just want to go a step backwards and make a point of what you said- that the patients with MAC and mitral valve disease have a, have a worse prognosis that those patients with mitral valve disease without MAC. But it's important to know that, in spite of the increased risk of the treatment, patients with surgical treatment or transcatheter treatment of mitral valve disease in the presence of MAC, they do better than patients who are treated with just medical management. So it's important to recognize that treating of the mitral valve disease in patients with MAC provide benefit of those patients in spite of the increased risk. So, in terms of the specific techniques that we use, we, at our institution, we use a conservative approach for these patients who have mitral annular calcification, which we just debride enough of the annulus in order to be able to place an adequate size prosthesis. And then we place stitches either through the valve leaflet through the calcium or around the calcium. And that in general, in our practice, allows us to seat an adequate size prosthesis, and restore either the competency of the valve, or relieve the mitral stenosis.

Dr. Bell: Well, and in a patient who has MAC, and has maybe not severe mitral valve disease, but you know, some significant disease- let's say moderate mitral valve regurgitation, or particularly stenosis. So there's a gradient there, but it's not terribly severe. Is your threshold then, for timing of surgery, altered by the presence of MAC? Is this a patient that you might want to intervene on that mitral valve sooner rather than later? And, again, you're predominantly related to mitral valve obstruction.

Dr. Crestanello: Well, it is important to confirm that they're really patients with moderate degree of stenosis- , they do have a mitral stenosis. Most of these patients have significant left ventricular diastolic dysfunction, as well as left atrial non-compliance. So the gradients across the mitral valve by echocardiogram can be falsely elevated, and can be the result of the left atrial non-compliance and the LV diastolic dysfunction. And as a consequence of that, and given- is important to do invasive hemodynamic evaluation of the degree of mitral stenosis, in order to confirm that the patients do really have mitral stenosis and they will benefit from a treatment. Because, otherwise, it is not uncommon that the pressures in the left atrial chamber will not decrease after a replacement of the mitral valve. So it's essential that we verify that the echocardiogram findings are accurate by doing invasive hemodynamic assessment.

Dr. Bell: Okay. So this is- that's a good point. What's the operative mortality in these patients?

Dr. Crestanello: Well, the operative mortality is elevated. However, in our practice, the operative mortality is low. It's around 1% with a low rate of AV groove disruption, as well as a low rate of perivalvular leak, as well as pacemaker requirement- which are the most common complications associated with surgery in patients with mitral annular calcification.

Dr. Bell: And when- in a patient that you might consider to be too high risk for surgery, you know, maybe related to other comorbidities, what other options would we have for treating those patients?

Dr. Crestanello: Well, there are other surgical options and there are transcatheter procedures. In terms of the surgical options, there is on those patients who have such a significant amount of calcium in the annulus that prevents the safely placement of these stitches, now we're using modified transcatheter valves, where we place directly on cardiopulmonary bypass through a left atriotomy on the mitral valve annulus. And the advantage of this approach is that it minimizes the number of stitches that needs to be placed through the calcified annulus, and also allows us to resect the anterior leaflet of the mitral valve, decreasing- or even perform a myectomy- decreasing the chances of producing LVOT obstruction during the procedure. So this is one option. The other option, for those patients who are truly inoperable, there are transcatheter procedures where also a transcatheter aortic valve is placed in the mitral annulus through a completely transcatheter approach through a transeptal approach. And, that's a good approach for patients who are truly inoperable and they are at high risk, they are very high risk for surgery. But there are- this procedure is less invasive, it's associated with faster recovery time, which all less invasive procedures have. But, however, they have procedure-specific complications where there are risk of LVOT obstruction and perivalvular leak and the risk of embolization for the prosthesis. But in our institution, thanks to Dr. Guerrero and her team, we had a big experience with this type of procedures. And planning for these procedures is essential by doing a CAT scan and evaluating all these risks- the risk of embolization, the risk of LVOT obstruction- and using measures to mitigate those complications before the procedure.

Dr. Bell: And, obviously, in those procedures, there's no like decalcification, there's no removal of calcium, correct?

Dr. Crestanello: Correct. There's no, there's- the calcium is left in place, and we- it is important to evaluate how much calcium it is, because that's essential to anchor the valve. And, Dr. Guerrero had developed a calcium score based on a quantification of the extension- circumferential extension- of the calcium and involvement of the triangles of the mitral valve, and the thickness of the calcium, that is associated with less risk of embolization of the prosthesis. So the more calcium you have, the more, the higher the calcium score, the lower the risk of embolization of the TAVR prosthesis on the mitral valve. It is also important to evaluate the risk of left ventricular outflow tract obstruction. And that's also done by a CT before the procedure. And in those patients who are at high risk, mitigating maneuvers can be done in preparation for the TMVR, and those include doing a alcohol septal ablation, or laceration of the anterior leaflet of the mitral valve during the procedure.

Dr. Bell: Yeah. So obviously the role of imaging, whether it's echo, but particularly CT, is really critical for these patients, isn't it? And who would've known that there's yet another calcium

score that we're going to learn about. And so maybe in conclusion here- actually, maybe before we conclude, is there any medical treatment for these patients? I mean, is there any way that one can slow down the deposition or the formation of calcium in these patients?

Dr. Crestanello: Well, I think that there's many, many potential candidates to decrease the accumulation of calcium in these patients. However, from the practical standpoint, for a patient who already had mitral annular classification, there's really no effective treatment that can be performed with medicines to remove calcium in a reasonable period of time and improve the function of the valve.

Dr. Bell: And are these patients then, in your practice here, I mean, how many surgical procedures are you and your colleagues doing in a year in patients with MAC and mitral valve disease?

Dr. Crestanello: I would say like 50 to 75 patients a year.

Dr. Bell: Wow. And have you found that number increasing in recent years?

Dr. Crestanello: Yes, because patients are getting older and the prevalence of hypertension, left ventricular hypertrophy- the risk factors that leads to mitral valve calcifications- are also increasing. So we're seeing more patients. And the other particular category is radiation heart disease and those patients have MAC very commonly.

Dr. Bell: Yeah, I was gonna- and I think we've been talking about that in another, you know, session. But I was going to ask you about that. Well, Juan, thank you again, so much. It's really great having you join us. The information that you share, and your experience, and your ability just to summarize these very complicated surgical diseases and how to manage these patients, and talking about the risks and the other treatment options, is really very, very helpful. So thank you so much for taking the time to be with us today.

Dr. Crestanello: Thank you, Malcolm.

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