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Key Words: single ventricle palliation, unbalanced atrioventricular canal defect, biventricular repair

Discussion

Presenter: Dr Nicholas Oh

Dr David Overman *(Minneapolis, Minn)*. That was a very nice presentation, Dr Oh. Congratulations.

Dr Nicholas Oh *(Cleveland, Ohio)*. Thank you, Dr Overman.

Dr Overman. I'll make a couple of comments and then I have a couple of questions for you. Achieving a biventricular end state in any borderline anatomic arrangement can be quite challenging, and any information we can glean regarding early and late outcomes in this group of patients is very welcome. So, thank you. First of all, you chose to group all unbalanced atrioventricular septal defect (AVSD) patients together in your outcomes analysis irrespective of dominance. I would make the observation that right and left dominant unbalanced AVSD are quite different animals, as it were. It's relatively unusual to not achieve a biventricular end state in left-dominant AVSD wherein a one-and-a-half ventricle repair is a surgical strategy option. That's not the case in the right-dominant group wherein competence of the left heart is a more binary phenomenon, viability or not. Second observation I'd make, I would suggest that primary biventricular conversion, as you've defined it, is really a matter of patient selection off the top. That is, it's about properly recognizing an existing anatomic substrate that is consistent with a biventricular end state and properly employing that surgical strategy. In contrast and the third observation I would make is the concept of ventricular growth has been to analyzing the poorly understood and thinly documented clinical phenomenon that aspires to move the needle in borderline situations.

This recruitment strategy, as you've termed it, is the most interesting and impactful data from your cohort. That group numbers 20. They have a very low freedom from reintervention, around 30% at 2 years, and extremely low numbers at risk beyond even 1 year. Thus, I'm afraid we are still left with an uncomfortably small experience regarding such ideas. Those observations made I'd ask you a couple of questions. It appears from your Kaplan-Meier survival group, the early mortality after the primary biventricular conversion—and I think you've said the actual number, but I didn't catch it—is in the neighborhood of 10% or so and survival at one year, roughly 80%. Did you uncover any clues in your research as to what might indicate success or failure in the process of patient selection for primary biventricular conversion?

Dr Oh. So I would say—again, thank you for your comments. They're well received. While I do agree with you in the sense that most of our left-dominant patients may be able to be converted to a biventricular circulation, I do think there is something to be said about some of our patients, at least, in the fact that, at least, they were taken down the single-ventricle palliation route, which I think suggests that maybe they weren't the best biventricular candidates to begin with. I would also say that for our average score for our patients, they are still relatively low. Minus 2 is kind of the average for our primary repair, and minus 3.9 would be for our stage repair. So these are certainly still I would categorize as maybe not the best biventricular repair candidates from the start. In regard to your second question, I believe you asked what characteristics define a good patient for biventricular repair, is that—or conversion, is that correct?

Dr Overman. Yes. Did you uncover in patients that survive versus did not, were there any characteristics or clues as to what, in terms of the patient selection process, might help the surgeons select the proper strategy?

Dr Oh. Well, I think what we found were essentially risk factors or predictors of patients that would not do very well with the biventricular conversion. And in that sense, these are patients with either single papillary muscles or patients who had moderate or greater atrioventricular valve regurgitation. And in these patients, we found that we were having more reoperation rates and is associated with higher mortality.

Dr Overman. Sure. And that makes a lot of sense. My second question is: An important part of the late outcome picture in biventricular repair patients, that is patients in whom a biventricular end state is achieved, is the incidents

and severity of residual disease, and in particular pulmonary hypertension? You did reference analysis of echocardiography and catheterization lab data. Do you have data that you can share with us, echocardiography or catheterization lab, regarding the specific question, that is in the late hemodynamic end state of the biventricular repair group?

Dr Oh. Sure, Dr Overman. So, that's a very good question. So I will say that the average follow-up time for our patients were about 1 year. And in terms of complete follow-up, we had about 55% to 60% in our stage group and about 70% from our primary biventricular conversion group. And I don't have necessarily the catheterization lab data to show whether there was any residual pulmonary hypertensive disease. What I can tell you is that 20% of these patients had moderate to severe atrioventricular valve regurgitation and about 25% from the primary group had atrioventricular valve regurgitation. So, in terms of the qualitative echocardiography findings, I do have those. But the catheterization lab data, because we don't necessarily send these patients to the catheterization lab when we do see them on follow-up, I don't have as clear of picture on that.

Dr Overman. Very good. Thank you for those very clear questions and for a very good presentation, Dr Oh. And thank you to the association for the privilege of discussing your presentation.

Dr Oh. Dr Overman, thank you again. I appreciate your time.