Rationale for Ross Procedure for Congenital A.S.
in Young Adults

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As more patients with congenital heart disease survive into adulthood, there will be more need for adult cardiac surgeons to become familiar with management options for congenital heart disease. This is particularly true of bicuspid aortic valve (BAV) disease which can be tolerated for years before needing interventional management. Initial management can often be a valvotomy—most frequently now performed in a cath lab by an interventional cardiologist. Even after a first valvotomy, older patients with BAV disease who present with significant stenosis can often benefit from a second valvotomy (as long as they have minimal aortic insufficiency). As patients with BAV disease age, they generally develop a mixed picture of aortic stenosis (A.S.) and aortic insufficiency (A.I.) which makes timing and indications for surgery challenging. Patients with BAV disease can also show disturbing enlargement of the ascending aorta and sometimes, it is this aneurismal dilatation of the ascending aorta that creates more pressing need for surgery than aortic valve replacement.

When the combination of A.S. and A.I. are present in a young adult with BAV, the ascending aorta should be evaluated for dilatation. Rate of dilatation from previous exams should be graphed and a rapid rise in the rate of dilatation can be an indication for surgery. Aortic dilatation alone, even if relatively stable, can influence surgical decision making.

A mechanical valve placed into a young adult gives them numerous risks, including risks from thromboembolic stroke, bleeding (including fatal bleeding episodes), endocarditis, perivalvular leak and valve dysfunction. Recent reports of long term follow up of patients with mechanical aortic valve prostheses suggest that the rate of valve related death or significant life altering complications can be as high as 75% over 25 years. For young adults, this is a significant issue. Furthermore, the risk of prosthetic valve mismatch to needed annular size can create continued left ventricular outflow tract obstruction. Patients also complain of the noise generated by mechanical valves and the life style limitations from long anticoagulation.

The tissue valve alternative can remove many of the above complications, but when the tissue valve is stented, it can create significant LV outflow gradients and although it won’t need anticoagulation, it will degenerate at a rate such that young patients might be looking at several redo valve operations. The techniques for placing stentless porcine valves are now well described and safe and can provide patients with a better tissue valve alternative. However, these valves will also degenerate in time and will require replacement.
The Ross procedure (pulmonary autograft) has excellent long term outcomes and is the only aortic valve substitute with 70% survival without significant complications beyond 30 years. Those data are from Donald Ross’ pioneer series and we have reason to expect that modern day outcomes will be even better. For young adults, the Ross procedure is likely the procedure of choice for aortic valve replacement, if the operation is performed by someone experienced in the technique. The problems with its utilization are that patients with BAV disease often have A.I. and aortic root dilatation that to some authorities constitutes a contraindication for pulmonary autograft translocation to the aortic position. The concern, borne out by follow up data from many centers around the world, is the risk of autograft dilation—particularly in patients with BAV disease—with late onset of new autograft A.I. In 2004, we reported a technique of pulmonary autograft placement in adults that encased the autograft in a Dacron tube to prevent it from dilating. Over the next several years, we evolved the technique to make it reproducible, reliable and safe, and reported these technical improvements in 2010. Since that time, we have performed this modified Ross procedure in over 40 patients and our long term (6 year) data show that the autograft continues to function well in the Dacron sleeve and there is no discernible autograft dilatation. This technique also can be accompanied by replacement of the aneurismal ascending aorta in selected patients.

The talk will revisit the techniques of this procedure and its indications for young adults who are healthy and who are expected to live for 30-40 more years. This is the only tissue valve that can provide normal hemodynamics, without the need for anticoagulation, and with the potential for durability of the implant beyond 20 years.