Great controversy surrounds the benefits of stentless aortic valves. There are several reasons for this:

First, each stentless valve introduced is uniquely different. A St. Jude Toronto SPV, Medtronic Freestyle, Edwards Prima, Sheltigh Super Stentless, and Angel O'Brien, just to mention a few, are stentless valves that are all very different and should not be "lumped" together in the same category. Even more important is the technique utilized to implant the stentless valve.

In-vitro, stentless valves have a larger effective orifice area than their stented counterparts. This is best exemplified by the fact that a 25-mm Mosaic valve, which is stented, is manufactured using a 23-mm Freestyle stentless valve. So, in order to end-up with similar effective orifice areas when implanting a stentless valve or a stented valve in the same size left ventricular outflow tract, the size of the stentless valve must be altered. This is a very common event when implanting stentless valves using the subcoronary implant technique. The tendency of the surgeon is to oversize the subcoronary implant, thinking that if he puts in a larger valve he will end up with a larger effective orifice area and at the same time have greater leaflet coaptation and thereby, less postoperative aortic insufficiency. In fact, what over-sizing does, in a subcoronary implant, is eliminate the potential hemodynamic advantage of stentless valves because one implants more tissue in the same size outflow tract, leaving less available room for flow.

The second misconception is the concept that surgeons who use stentless valves use them instead of stented valves. Stentless valves should be used only in the instances where they would clearly be beneficial compared to their stented counterpart. Examples of such indications are the patient with a small aortic root in which the stented replacement option would result in continued moderate or severe left ventricular outflow tract obstruction. Patients who have significant aortic root disease and desire not to take Coumadin make excellent candidates for total root replacement with a
stentless root bioprosthesis. Elderly patients with poor tissues are also very good candidates for a stentless root replacement. The root prosthesis gives the surgeon excess synthetic material to use to replace diseased tissues. As a result, no suture lines are under excess tension. Finally, we use stentless valves often in aortic valve and root endocarditis patients. Like an aortic allograft, after extensive debridement of infected tissues, the stentless root prosthesis can readily be used to reconstruct the aortic root.

Short and intermediate term benefits of stentless valves exist in the literature. Still, the failure of stentless valves to be widely adopted stems from a combination of the difficulty of mastering the implant techniques, a lack of understanding the best indications for their use, and the lack of sufficient long-term studies to demonstrate better survival or greater durability. Also, there is fear of a more difficult redo procedure if the stentless valve is used at the primary operation. The lack of supporting evidence for stentless valves may be due to the paucity of any studies from large centers that do the majority of the aortic valve surgery in the U.S. Applying stentless valves in large numbers when they are particularly advantageous would indeed be most beneficial.

The Medtronic Freestyle stentless valve is now the most commonly implanted stentless valve in the United States. Long-term studies by Bach, et al, show freedom from explant due to structural valve degeneration at 12 years to be 92.4%, plus or minus 8.0%, for patients 60 years or younger at implant. For patients older than 60 years at the time of implant, freedom from explant due to structural valve degeneration was 92.3%, plus or minus 5%. There is very little data utilizing stentless valves in younger patients. These data help to support the use of the Freestyle valve in patients less than or equal to 60 years of age who desire not to take Coumadin. Another specific benefit, the advantages of using the full root technique for optimal hemodynamics in the small aortic root has also been shown by Kunihara et al. Future investigations directed toward utilizing stentless valves when specific benefits are proposed, rather than just considering them as a replacement for using a stented valve, will help elucidate the place for their optimal use in cardiac surgical practices.
1. Freedom from structural valve deterioration among patients aged < or = 60 years undergoing Freestyle stentless aortic valve replacement. Bach DS, Metras J, Doty JR, Dumesnil JG, Kon ND. J Heart Valve Dis. 2007 Nov; 16(6):646-55

