



Ask Us a Question about Valve Disease or Aortic Stenosis

January 30, 2014

Our Valve Clinic is the first and only in Central New England for the complete diagnosis and treatment of cardiac valve disease, including conditions such as aortic and mitral valve stenosis or regurgitation and congenital conditions such as bicuspid aortic valves.

Submit your questions anonymously and they will be answered by Nikolaos Kakouros, MD, PhD, director of Structural Heart Disease Program, and co-director of the Transcatheter Aortic Valve Implantation (TAVI) program. Answers will be posted in the Ask the Expert Q&A forum below within 48 hours of submission.

Valve Disease/Aortic Stenosis Q&A:

Question 1: What is a tri-leaflet valve and how might it affect a person's health?

A: Thank you for posing the first question in our National [Heart Health Month Ask the Expert forum on Aortic Stenosis and Valve Disease](#).

I would first like to take the opportunity to describe what a valve is, for the benefit of the forum. Our medical knowledge on how the body works was very limited for a long period of human history. The work of many ancient Greek physicians, such as Hippocrates, allowed for studies to elucidate the concept of how blood moves around the body but it took until the early 17th century when a British physician, William Harvey, demonstrated that blood circulates around the body with the heart acting as a pump.

Valves, that are present in veins and the heart, are crucial in ensuring this one-way circulation of blood around the body. Valves are made of flaps of thin tissue that open to allow blood to go forward across them but not backwards. This ensures that blood flows in one direction. There are four valves within the heart itself.

Secondly, if I may indulge in semantics, multiple valves in the body are trileaflet, meaning they comprise of three leaflets (i.e. three thin tissue flaps).

These include: the tricuspid valve between the right chambers of the heart, the pulmonary valve that allows blood to flow from the heart to the lungs to restore oxygen in the blood and, most importantly, the aortic valve that allows this oxygen-rich blood to exit the main pumping chamber of the heart to the rest of the body. These valves can develop problems such as becoming too narrow and not allowing easy passage of the blood (valve stenosis) or leaking blood backwards (valve

regurgitation). This can disturb the normal blood circulation and cause extra stress to the pumping of the heart.

Finally, and probably most pertinently to your question, the adjective “trileaflet” or “tricuspid” is often used to describe the usual structure of the aortic valve with three leaflets. A tricuspid aortic valve is a normally structured aortic valve and, therefore, there is no direct implication on a person’s health. Nonetheless, 1-2% of the population, mostly men, are born with an aortic valve that does not have three leaflets but rather two leaflets. This occurs randomly or often due to a genetic predisposition, so it may run in families.

In many patients, having a two-leaflet (bicuspid) aortic valve will cause no problems and they may never even know they have this abnormality. The bicuspid aortic valve arrangement, however, is not as robust as the standard trileaflet aortic valve so these bicuspid valves are more likely to develop problems such as narrowing (stenosis) or leaking (regurgitation) placing extra stress on the heart. They may, therefore, require replacing at some point in life.

Question 2: Would a 93 yo female with dilated LA and newly found afib with EF of 20% with a critical AS-is a candidate for a valvuloplasty if their other med problems are minor. Except short of breath due to heart issues/poor exercise tolerance. What is the risk of stroke/complications from the procedure?

A: Thank you for this interesting question. For our non-medical readers I will start by mentioning that the Aortic Valve is the main valve through which the pumping chamber of the heart has to push blood out to the body (see Question 1). Narrowing of the aortic valve is known as aortic stenosis (AS) and can severely impact not only a patient’s quality of life but also their life expectancy. A patient with critical AS with reduced EF (i.e. weakened pumping ability of the heart) and shortness of breath is likely to die from their AS within a year or so. Possibly to many people’s surprise, the average 93 year-old female is expected to live at least another 4 years and addressing the AS can often help them achieve this improved life expectancy.

Another important point in your patient description, however, is the “EF of 20%”. There are many reasons why this weakening of the heart may happen, but in many cases the heart has simply tired of pushing against the narrow aortic valve. In these cases we may need to do some more tests to determine whether this damage is reversible and the heart will get better when we fix the valve or whether the damage is permanent and we are too late. If these non-invasive tests are inconclusive then valvuloplasty may serve as a helpful “test”.

In the Valvuloplasty procedure we enter the body through a small (3-4mm) hole in the artery of the groin and introduce a fine wire across the narrowed aortic valve. We then inflate a balloon within the valve. This often works well to relieve the narrowing but it is not a permanent fix. The valve works better for a while but 6-8 months later they tend to re-narrow. If the heart improves with the

temporary relief of opening the valve for a few months then we can be more confident that a more permanent fix will be of benefit.

A permanent fix to the narrowing can be achieved by surgical aortic valve replacement (sAVR) or the minimally-invasive Transcatheter Aortic Valve Implantation (TAVI) procedure. Both of these procedures replace the narrowed aortic valve with a new prosthetic valve, often made of cow or pig heart tissue. Just like valvuloplasty, they are both invasive procedures with potential complications including bleeding and stroke. In most cases, however, the risks of the procedure (that are individually assessed for each patient), are far outweighed by the potential benefits in terms of improved life expectancy but also improved quality of life and staying out of hospital.

I believe that careful consideration of treatment goals in elderly patients plays a significant role in medical management decisions and the patient's wishes are extremely important in guiding these goals. In my experience, life expectancy is rarely the primary treatment goal with increasing age when improved quality of life and greater independence become increasingly important. Having said that, many elderly patients with aortic stenosis have told me that they wish to have their valve fixed, not only to feel better, but also to live longer.

Consequently, I suggest that patients discuss their goals of care and likely outcomes with and without intervention with a Heart Team experienced in the management of patients with aortic stenosis. At UMass Memorial we have set up a Heart Team clinic to facilitate this evaluation. The patient can meet a cardiac surgeon to discuss the option of sAVR and myself to discuss the minimally-invasive catheter-based TAVI alternative. We also formally assess how well the patient is doing overall and, if they are interested, we may proceed with further tests on the same day to check their suitability for a new valve.

For more information on TAVI please contact us by phone at: 508-334-VALV (508-334- 8258), or by email at tavi@umassmemorial.org.

Question 3: Who are the surgeons most experienced performing Ross Procedures? Revisions? How many do they do annually? Is their a surgeon more experienced in Boston? Name?

When the aortic valve is diseased (narrowed or leaking) and requires surgical replacement it may be replaced with a metallic valve or a valve made out of animal tissue. The metallic valves have excellent durability but require the patient to remain on blood thinners lifelong to avoid blood clots forming on the valve. On the other hand, traditional "bioprosthetic" valves made of animal tissue tend to fail more rapidly in young patients. Consequently, in patients younger than 40-50 years old the Ross procedure was developed by British surgeon Dr Donald Ross in 1967. In this procedure the diseased aortic valve is removed. The patient's pulmonary valve is used to replace the diseased aortic valve and a cadaver donor tissue valve is placed in the pulmonary position.

Although still an operation of choice for infants and children, enthusiasm in the Ross procedure for adults has waned over the last 20 years particularly as it is a more extensive operation that increases the surgical risk. This, in addition with technological improvements in the way animal tissue is treated to create “bioprosthetic” valves and concerns regarding long term failure rate, has led to a ten-fold reduction in the rates of the Ross procedure in the USA.

Our Cardiac Surgery team has been awarded 3 stars (the highest rating) by the US Society of Thoracic Surgeons (STS) for their excellent outcomes in performing valve surgery. Only 5.2% of the 968 hospitals participating in STS receive this rating. I recommend meeting one of our surgeons to discuss all the options.

Question 4: I was diagnosed with a heart murmur years ago. Now that I am older, am I more at risk for developing valve disease?

The short answer is that the presence of a murmur, by itself, does not indicate you have valve disease or that you are at higher risk for developing valve disease. It may, however, indicate that you have already developed valve disease.

I know this is not a very helpful answer, so let me take the opportunity to explain to you and our readers what a murmur is. I hope this explanation will clarify my answer.

Normally, 5-6 liters (10-12 pints) of blood flow through the heart every minute. If the heart and blood vessels are shaped normally, this large volume of blood flows smoothly and creates very little sound. When doctors listen to your heart with a stethoscope they only hear the sounds of the heart valves slamming shut (see Question 1 regarding what valves are), but do not (or rather should not) hear the blood flowing.

So, what causes an individual to have a murmur? Under certain circumstances, normal blood flow is disrupted and becomes “**turbulent**”. Instead of flowing smoothly, the blood inside the heart starts swirling around, making “whooshing” noises that we call murmurs.

Not all murmurs are a cause for concern. Some murmurs are called “**functional**” or “innocent” murmurs and are caused by factors outside the heart. For example, if the body’s requirement for blood is unusually high, the blood has to travel through the heart so fast that the flow becomes turbulent producing a murmur even if the heart is normal.

Other murmurs are “**pathological**” and are caused by abnormalities in the structure of the heart and vessels. For example, a baby may be born with an abnormal connection between parts of the heart and main vessels that changes the normal, one-way flow of blood (see Question 1). This disruption of normal blood flow through the heart creates areas of turbulent flow that cause murmurs. These murmurs may persist into adult life, although sometimes the abnormal connections heal themselves as the baby grows and the murmur disappears.

Such abnormal, murmur-causing connections may also rarely develop in adults due to damage to the heart and vessels. Far more commonly, however, murmurs in adults are due to valve disease. When a valve is damaged or deteriorates, its shape changes causing the valve to not open or close properly. If the valve becomes too narrow or leaks (see question 1) the blood flow becomes turbulent and creates murmurs.

I hope the above clarifies my initial answer. If the murmur was diagnosed when you were a child or young adult, then this may have been an “innocent” murmur or a murmur due to a connection that has since healed. This does not necessarily cause an increased risk of valve disease. On the other hand, a murmur later in life often suggests some degree of abnormality, likely with a valve.

Valves are mechanical structures and if diseased they are unlikely to heal. On the contrary, as they continue to open and slam shut every time the heart beats they tend to deteriorate further with time. I suggest visiting your Primary Care Provider or Cardiologist for a physical examination to check on the progress of your murmur.

If there are further concerns, your doctor may refer you to our [UMass Memorial Valve Clinic](#) where our team of cardiologists can provide expertise in the diagnosis and management of murmurs and valve disease.