

Minimally Invasive Robotic Assisted Mitral Valve Surgery

The Mitral Valve is the inlet valve for blood to go from the lungs to the left sided pumping chamber of the heart, or left ventricle, and from there to the rest of the circulation; it functions as a one way valve and is made up of a complex apparatus that consists of a number of anatomically identifiable structures.

The mitral annulus is the fibrous ring that contains the attachments of the mitral leaflets; there are two leaflets anterior and posterior, divided into several segments. The leaflets are tethered by fibrous cords to the papillary muscles that are like pillars inside the left ventricle. This whole apparatus functions in a unified, but quite complex manner, with significant movement attached to each one of these components. This movement allows for this valvular apparatus to function as a one way valve; by opening and allowing the left ventricle to fill as the heart relaxes and then closing firmly, thus propelling the blood to the systemic circulation when the heart contracts.

There are multiple disease processes which can affect the function of this apparatus; by affecting one or more of its structures, and therefore, causing this valve to not open completely or fail in its closure, allowing for it to leak backwards into the lungs.



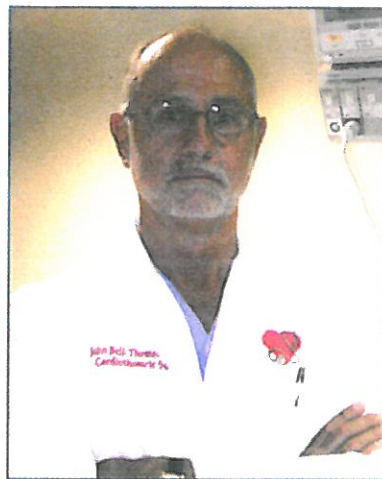
Whenever the mitral valve does not function correctly, the most common sign is a "heart murmur", which can be easily detected by the physician listening to the heart with a stethoscope. A more sophisticated way of determining the function of the mitral valve is with a transthoracic echocardiogram, where a sonar probe is placed on the patients' chest to access the valve structure and function. An even better way of looking at the mitral valve in particular, is a transesophageal echocardiogram, where the sonar probe is inserted down the esophagus right up against the posterior wall of the heart to look carefully at the mitral valve and its structure and function.

Surgical correction of a leaking mitral valve is indicated even if the patient is asymptomatic or minimally symptomatic so long as the possibility of repairing this valve exceeds 90%. Dr. John Bell-Thomson has been repairing mitral valves with the daVinci® Robotic Surgical System for over one year. His technique is the result of over 30 years experience with Mitral Valve Surgery, and consists of a valve sparing dynamic repair that takes into consideration the structure, and in particular, the movement of the components of the mitral valve apparatus.

The daVinci Robotic Surgical System allows for this reparative surgery to be done with extraordinary precision because of the imagery provided by the eyes of the robot inside the heart. "It's as if I have been lowered into the heart and am looking at a stage, where curtains are the anterior leaflet of the mitral valve, and the stage makes up the posterior leaflet of the valve. The three dimensional image allows for an excellent assessment of the function of this whole apparatus, and repair of its failure with extraordinary precision," says Dr. Bell-Thomson.

Evolution of mitral valve reparative surgery has progressed over the years as a better understanding of the anatomy, the function of the different anatomical structures and their variations in the mitral valve apparatus has been understood. The classical thinking was to employ the teachings of the French school that included cutting out pieces of the valve and placing

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rigid rings in various sizes and shapes to achieve a properly functioning one-way valve. More recently, experience at several American cardiac surgery centers has improved upon this by respecting the movement of the mitral valve, and substituting rigid structures for more flexible ones that allow for a better physiologic repair of the mitral valve apparatus. This often includes the reconstruction of the cords, repair of the leaflets and resizing of the annulus.

With the daVinci Robotic System this procedure can be undertaken through a few puncture wounds of the right side of the patient's chest and therefore, makes for a minimally invasive approach that is far more comfortable for the patient and gets rid of all the complications associated with the traditional incision: that cuts right down the middle of the breast bone.

For a results analysis of
Dr. Bell-Thomson's
experience in mitral valve
surgery, please go to
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