

Mechanical Heart Valve

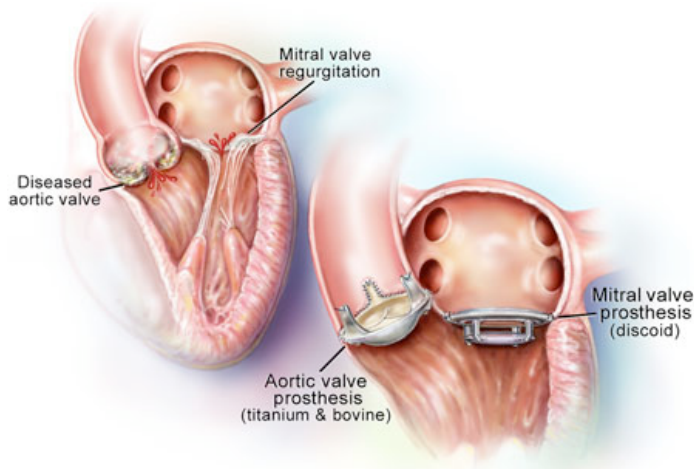
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According to the American Heart Association, around 5 million Americans are diagnosed with heart valve disease each year.

Heart valve disease is a condition that affects the proper function of the hearts valve or valves (2). The heart depends on four valves to control the proper flow of blood out of the heart's four chambers (right/left atria and the right/left ventricle).

The tricuspid, aortic, and pulmonary valves are three of the four valves that have three leaflets or cusps. The mitral valve which is located in between the two left chambers of the heart only has two cusps. The valves work by opening and closing flaps of tissue known as cusps or leaflets. These flaps of tissue help maintain a stable blood supply. They also aid in preventing the back flow of blood(4).



Complications in the function of the heart valve can be from birth (congenital heart defect) or a damaged valve. The cause of a valve being damaged can be from infections (infective endocarditis), rheumatic fever, or changes in the structure of the valve with age (2). An abnormal heart valve does not allow normal blood flow due to the valves failure in fully opening and closing. Valvular stenosis and valvular insufficiency (regurgitation) are the two types of valve diseases. Stenosis occurs when the cusp do not fully open, causing a lack of blood to flow through into the next ventricle. Regurgitation is when the "leaky valve" fails to close properly, causing the back flow of blood(2). Both valvular regurgitation and stenosis cause the heart to work harder.

In many situations, surgery can fix the issue of a malfunctioning cusp(s). When surgery isn't enough, the valve will be replaced.

Two kinds of artificial valves used for valve replacement are mechanical valves and biological valves which come from an animal or deceased human donor (4). Both functions in the same way a natural heart valve will (1).

Ball-and-Cage, Monoleaflet, and Bileaflet are three mechanical valves; the Ball and Cage being the first design. They are made of graphite coated with carbon (pyrolysis). Mechanical valves unlike biological valves last about 20 to 40 years (4).

During surgery, the breastbone is cut open, the heart is stopped, and is connected to a heart-lung machine. This allows oxygen rich blood to continue flowing through the body. A patient will take anticoagulant, to prevent blood from clotting. The surgery can take from 2 to 4 hours and recovery is about a week with 1 to 3 days in the ICU(4). According to the New England Journal of Medicine, about 60,000 heart valves are replaced every year in the United States; the majority being artificial heart valves (1).

A new improved and modified mechanical heart valve is the Trileaflet valve. It is made with three mechanical leaflets and imitates a natural heart valve. This new design allows blood to flow more efficient and reduces thrombosis (3).

Work Cited

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