Difference Between Bicuspid Valve and Tricuspid Valve

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Key Difference - Bicuspid Valve vs Tricuspid Valve

Circulation is an important aspect of living organisms in the transportation of different important elements such as nutrients, oxygen and different metabolites including waste products. The heart acts as a pumping device for the circulation of the circulatory medium; blood. The human heart is composed of mainly four chambers; two upper atria and two lower ventricles. Other than the four chambers of the heart, it consists of nodes and valves which control the rate of heartbeat and the pumping of blood. Bicuspid valve and tricuspid valve are two important valves present in the human heart. **The bicuspid valve is present between the left atrium, and the left ventricle which involves in preventing the backflow of blood from the ventricle into atrium whilst the tricuspid valve is present between the right atrium and the right ventricle and functions to prevent the backflow of ventricular blood to the atrium.** This is the **key difference** between Bicuspid valve and Tricuspid valve.

What is a Bicuspid Valve?

The bicuspid valve is also referred to as mitral valve or left atrioventricular valve. It is present in between the left atrium and the left ventricle. The bicuspid valve consists of two cusps one anteromedial cusp and posterolateral cusp. In a dimensional aspect, the bicuspid valve typically is 4 cm^2 to 6 cm^2. The mitral annulus is a fibrous ring that surrounds the opening of the valve.

The left atrium receives oxygenated blood from the lungs through pulmonary circulation and passes it on to the left ventricle for systemic circulation. Blood is pumped from the left atrium to the left ventricle via the bicuspid valve. The bicuspid valve opens at diastole and closes during systole. This prevents the backflow of blood from the ventricle to the atrium.The opening and closing of the valve depending on the pressure that is exerted by the left atrium and left ventricle.

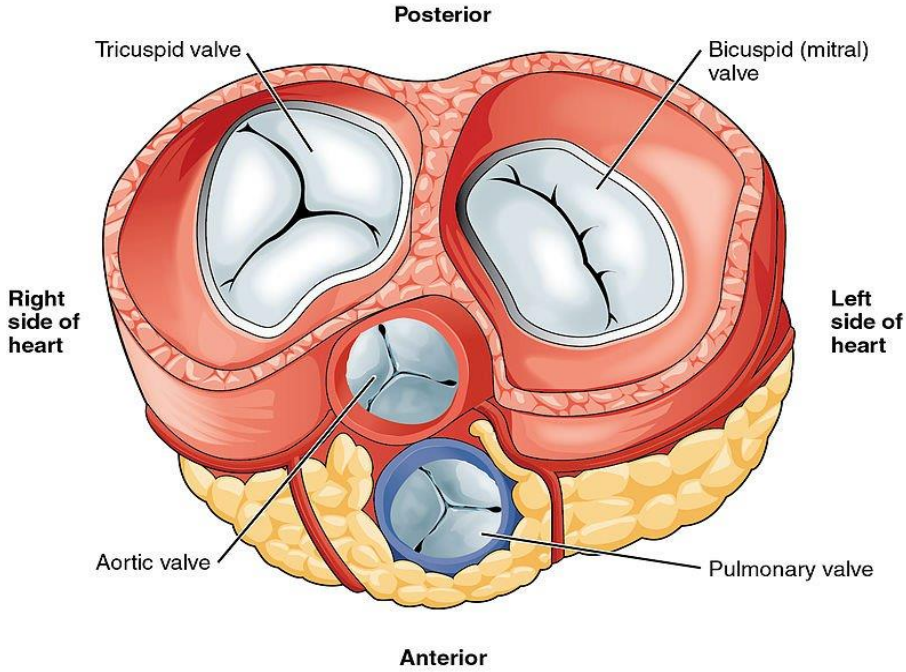

Figure 01: Heart valves

During the exertion of a higher pressure by the atrium than the ventricle, the valve opens up and closes during higher pressure built up in the ventricle than the atrium. Different disease conditions could affect the functioning of the bicuspid valve which results in backflow of blood and causes heart failure. This is known as mitral regurgitation. Narrowing of the bicuspid valve is known as mitral stenosis. Rheumatic heart disease and infective endocarditis affect the proper functioning of the bicuspid valve leading to severe heart failures. Bicuspid valve defects could be corrected through surgery which could repair the damaged regions of the valve or replace it. Mitral valvuloplasty is a less invasive technique that is utilized to open up a narrowed/ stenotic bicuspid valve.

What is Tricuspid Valve?

The tricuspid valve is also referred to as the right atrioventricular valve. In a mammalian heart, it is typically present in between the right atrium and the right ventricle which is on the right dorsal side. Once the right atrium receives deoxygenated blood from the systemic circulation, it directs it to the right ventricle for pulmonary circulation. Blood is pumped from the right atrium via the tricuspid valve. The main function of the tricuspid valve is to prevent the backflow of deoxygenated blood into the right atrium from the right ventricle during ventricular systole.

The tricuspid valve closes during ventricular systole and opens back at ventricular diastole which facilitates the movement of blood from the atrium to the ventricle. A typical mammalian tricuspid valve consists of three flaps of structures (cusps) and three papillary muscles. The cusps are connected to the papillary muscles through a special type of structures known as chordea tendineae. It is present on the surface of the right ventricle. The functioning of the tricuspid valve gets severely affected and

weakened by drug abuse. This causes malfunctioning of the valve which leads to a backflow of blood and finally results in heart failure.

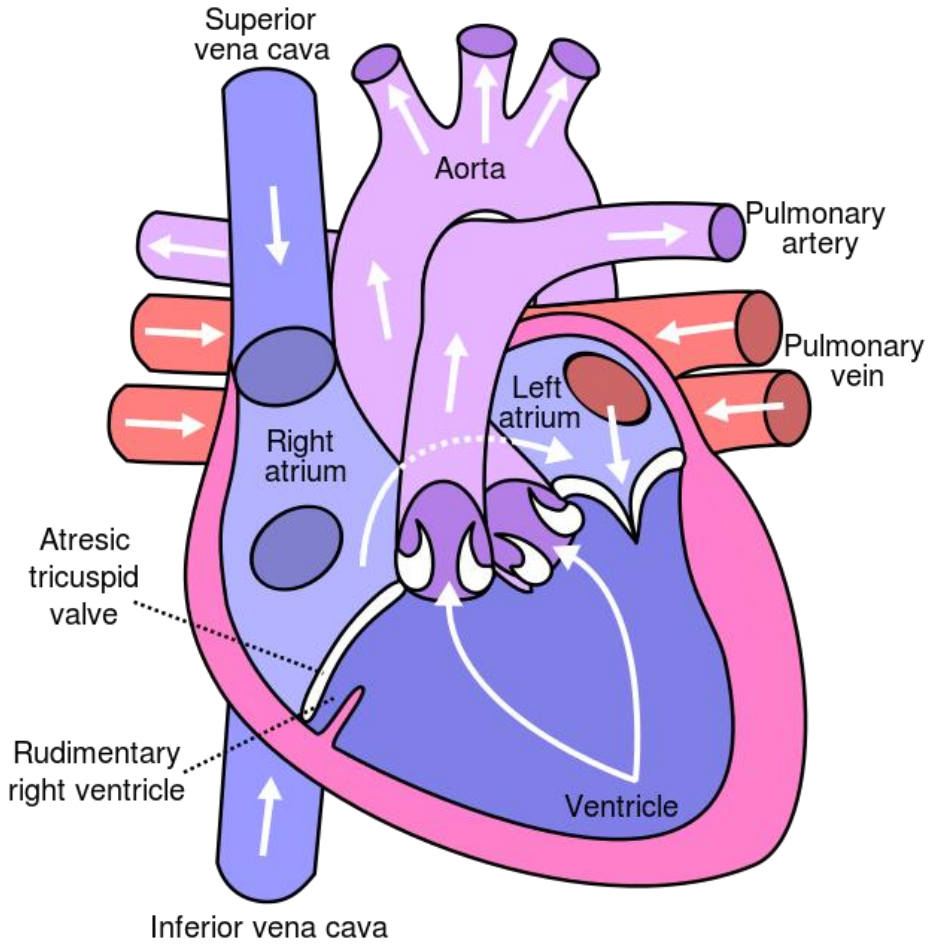

Figure 02: Tricuspid Valve

Rheumatic fever also affects the functioning of the tricuspid valve. This condition is referred to as tricuspid stenosis or tricuspid regurgitation. Tricuspid regurgitation is commonly known as the 'backflow of blood.' Congenital defects in the tricuspid valve lead to tricuspid regurgitation. Certain tumors associated with the heart, cause defects in the tricuspid valve due to the production of fibrosis. Serotonin which is a monoamide neurotransmitter which is produced by tumor cells causes the production of fibrosis.

What is the Similarity Between Bicuspid Valve and Tricuspid Valve?

- Both valves control the pumping of blood from the atria to the ventricles and prevent the backflow of ventricular blood to the atria.

What is the Difference Between Bicuspid Valve and Tricuspid Valve?

Bicuspid Valve vs Tricuspid Valve	
Bicuspid valve is one of the four valves of the heart which is situated between the left atrium and the left ventricle.	Tricuspid valve is one of the four valves of the heart which is situated between the right atrium and the right ventricle.
Location	
Bicuspid valve is present in between the left atrium and the left ventricle.	Tricuspid valve is present in between the right atrium and the right ventricle.
Function	
Bicuspid valve permits blood flow from the left atrium into the left ventricle and prevents backflow.	Tricuspid valve permits blood flow from the right atrium into the right ventricle and prevents backflow.
Structure	
Bicuspid valve possesses two cusps.	Tricuspid valve possesses three cusps.

Summary - Bicuspid Valve vs Tricuspid Valve

Bicuspid valve is one of the four valves of the heart which is situated between the left atrium and the left ventricle. Tricuspid valve is one of the four valves of the heart which is situated between the right atrium and the right ventricle. Bicuspid and tricuspid valves are involved in preventing the backflow of ventricular blood to the atria. Bicuspid valves consist of two cusps whilst the tricuspid valves possess three cusps. The narrowing of the bicuspid and tricuspid valves due to certain defects is known as mitral stenosis and tricuspid stenosis respectively. The backflow of blood is known as regurgitation. This occurs due to the damage of either of the valves. This results in severe heart failure. This can be described as the difference between Bicuspid valve and Tricuspid valve.

Reference:

1.The Editors of Encyclopædia Britannica. “Valve.” Encyclopædia Britannica, Encyclopædia Britannica, inc., 6 Nov. 2016. Available here
2.“Heart.” InnerBody. Available here

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1.'2011 Heart Valves'By OpenStax College - Anatomy & Physiology, Connexions Web site. Jun 19, 2013., (CC BY 3.0) via Commons Wikimedia
2.'Tricuspid atresia' By RupertMillardFontan procedure.svg (CC BY-SA 3.0) via Commons Wikimedia

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APA: Difference Between Bicuspid Valve and Tricuspid Valve.(2017 November 16). Retrieved (date), from http://differencebetween.com/ difference-between-bicuspid-valve-and-vs-tricuspid-valve/

MLA: "Difference Between Bicuspid Valve and Tricuspid Valve" Difference Between.Com. 16 November 2017. Web.

Chicago: “Difference Between Bicuspid Valve and Tricuspid Valve.” Difference Between.Com. http://differencebetween.com/ difference-between-bicuspid-valve-and-vs-tricuspid-valve/ accessed (accessed [date]).