



“बेटी बचाओ, बेटी पढ़ाओ”

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FACULTY OF HOMOEOPATHIC SCIENCE

Faculty Name	: JV'n Dr. M.P. Sharma
	Teaching Methodology of physiology
Program	: BHMS 1 st year
Course	: Physiology
Session	: CVS – Cardiac Cycle

Academic Day starts with –

- Greeting with saying ‘**Namaste**’ by joining Hands together following by 2-3 Minutes Happy session, Celebrating birthday of any student of respective class and **National Anthem**

Lecture Starts with-

- **Review of previous Session-** In previous session as I had discussed about introduction of heart. Now tell me about physiological shunt?
- **Topic to be discussed today-** Today I will discuss about cardiac cycle. I will start this topic from relation with ancient literature.

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Topic to be discussed today- Today I will discuss about cardiac cycle. I will start this topic from ancient literature.

RELATION WITH ANCIENT LITERATURE

The heart has played an important role in understanding the body since antiquity. In the fourth century B. C., the Greek philosopher Aristotle identified the heart as the most important organ of the body, the first to form according to his observations of chick embryos. It was the seat of intelligence, motion, and sensation -- a hot, dry organ. Aristotle described it as a three-chambered organ that was the center of vitality in the body. Other organs surrounding it (e.g. brain and lungs) simply existed to cool the heart.

William Harvey, 1653

"The heart is an essential constituent of the body... that it may lodge the central source of heat. This part must be well protected, seeing that it is, as it were, the citadel of the body."

"The heart is very white, the auricles reddish and filled with blood."

"The heart is situated at the 4th and 5th ribs. Therefore [it is] the principal part because [it is in] the principal place, as in the center of a circle, the middle of the necessary body."

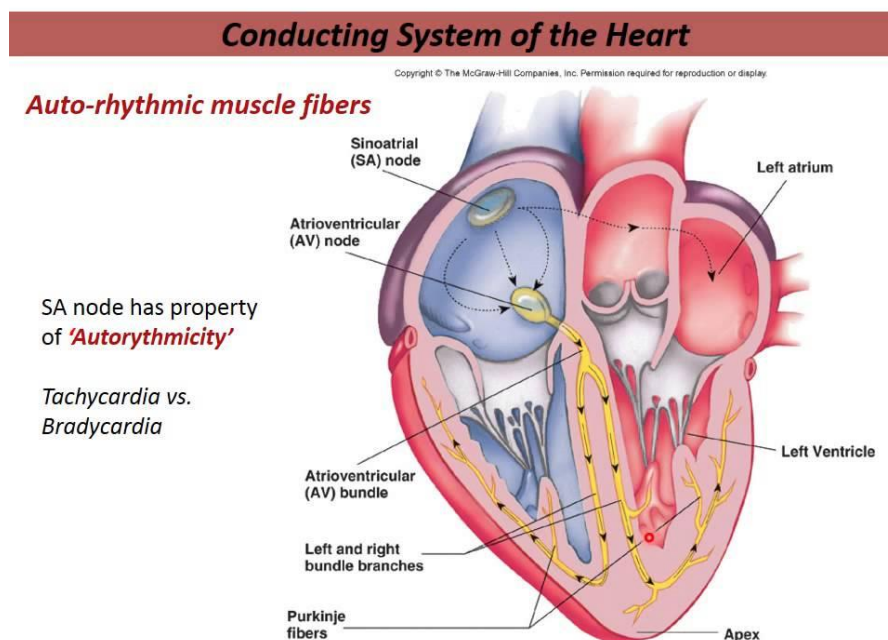
"Vigor results from the heat of blood; therefore [we have] the irascible [person]; on the contrary, [those] slow to fear, do not fear to become angry, for in them the bubbling of the blood [is] as a bubbling lake, but with great repose they

swiftly cool down.. A hard heart [indicates blunt] sensibility, and a softer one, keen sensibility."

HEART INTRODUCTION

The heart functions as a pump and acts as a double pump in the [cardiovascular system](#) to provide a continuous circulation of blood throughout the body. This circulation includes the [systemic circulation](#) and the [pulmonary circulation](#). Both circuits transport blood but they can also be seen in terms of the gases they carry. The pulmonary circulation collects oxygen from the lungs and delivers carbon dioxide for exhalation. The systemic circuit transports oxygen to the body and returns relatively de-oxygenated blood and carbon dioxide to the pulmonary circuit.

Blood flows through the heart in one direction, from the atria to the ventricles, and out through the [pulmonary artery](#) into the pulmonary circulation, and the [aorta](#) into the systemic circulation. The pulmonary artery (also trunk) branches into the left and right [pulmonary arteries](#) to supply each lung. Blood is prevented from flowing backwards ([regurgitation](#)) by the tricuspid, bicuspid, aortic, and pulmonary valves.



CARDIAC CYCLE-

Cardiac cycle is defined as the succession of (sequence of) coordinated events taking place in the heart during each beat. Each heartbeat consists of two major periods called systole and diastole. During systole, heart contracts and pumps the blood through arteries. During diastole, heart relaxes and blood is filled in the heart. All these changes are repeated during every heartbeat, in a cyclic manner.

EVENTS OF CARDIAC CYCLE

- 1. Atrial events**
- 2. Ventricular events.**

Duration of each cardiac cycle is about 0.8 second.

ATRIAL EVENTS Atrial events are divided into two divisions:

1. Atrial systole = 0.11 (0.1) sec
2. Atrial diastole = 0.69 (0.7) sec.

VENTRICULAR EVENTS :

1. Ventricular systole = 0.27 (0.3) sec
2. Ventricular diastole = 0.53 (0.5) sec.

Ventricular Systole Time (second)

1. Isometric contraction = 0.05
2. Ejection period = 0.22

Ventricular Diastole

1. Protodiastole = 0.04

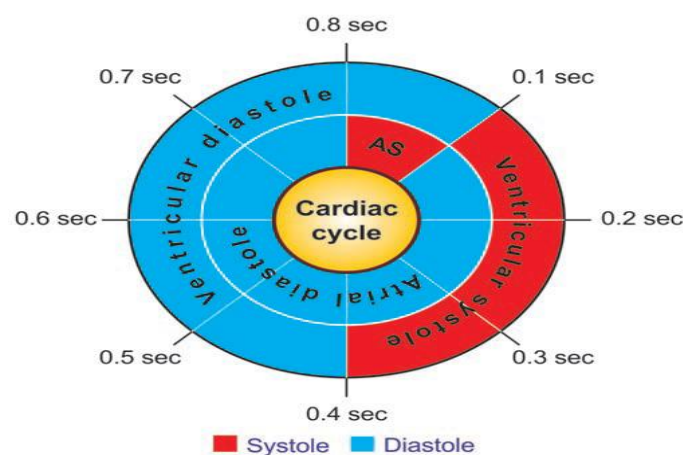
2. Isometric relaxation = 0.08
3. Rapid filling = 0.11
4. Slow filling = 0.19
5. Last rapid filling = 0.11

DESCRIPTION OF ATRIAL EVENTS

ATRIAL SYSTOLE- Atrial systole is also known as last rapid filling phase or presystole. It is usually considered as the last phase of ventricular diastole. Its duration is 0.11 second. During this period, only a small amount, i.e. 10% of blood is forced from atria into ventricles.

Fourth Heart Sound Contraction of atrial musculature causes the production of fourth heart sound.

ATRIAL DIASTOLE - After atrial systole, the atrial diastole starts. Simultaneously, ventricular systole also starts. Atrial diastole lasts for about 0.7 sec (accurate duration is 0.69 sec). This long atrial diastole is necessary because, this is the period during which atrial filling takes place. Right atrium receives deoxygenated blood from all over the body through superior and inferior venae cavae. Left atrium receives oxygenated blood from lungs through pulmonary veins.



DESCRIPTION OF VENTRICULAR EVENTS

Ventricular Systole

- **Isovolumetric contraction**
- **Rapid ejection**
- **Slow ejection**

Ventricular Diastole

- **protodiastole**
- **Isovolumetric relaxation**
- **Rapid filling**
- **Slow filling (Diastasis)**

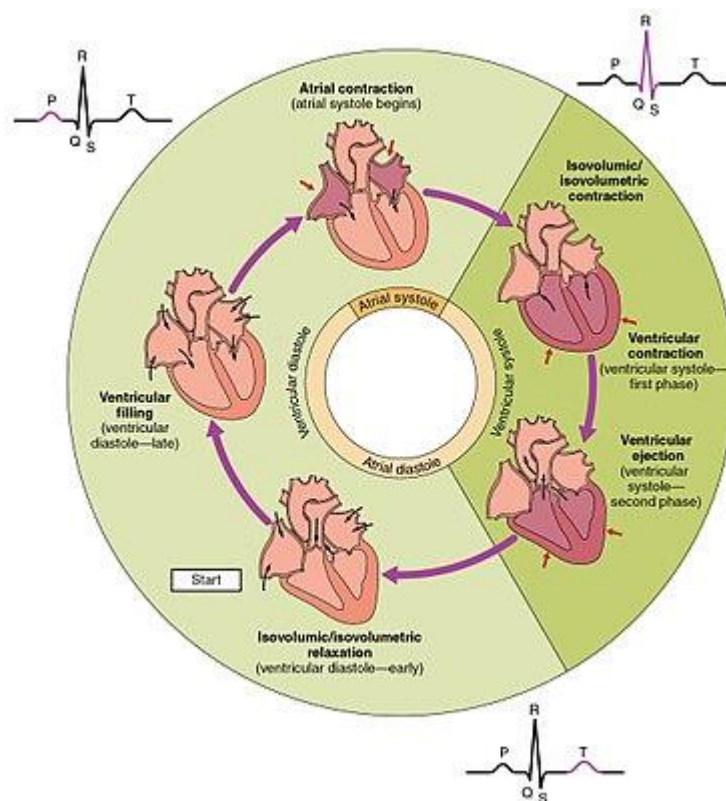
➤ **Protodiastole–**

- ❖ Duration of this period is 0.04 second.
- ❖ Due to the ejection of blood, the pressure in aorta and pulmonary artery increases and pressure in ventricles drops.
- ❖ When intraventricular pressure becomes less than the pressure in aorta and pulmonary artery, the semilunar valves close.
- ❖ Second Heart Sound Closure of semilunar valves during this phase produces second heart sound.

➤ **Isovolumetric contraction-**

- ❖ Rising ventricular pressure results in closing of AV valves (1st heart sound –“lubb”)
- ❖ Ventricles are contracting but no blood is leaving
- ❖ Ventricular pressure not great enough to open semilunar valves

- ❖ Ventricular ejection phase opens semilunar valves
- **Ventricular ejection phase**
 - ❖ Semilunar valves opens
 - ❖ Rapid Ejection (70% blood)
 - ❖ Slow ejection (30% blood)
- **Isovolumetric relaxation**
 - ❖ volume does not change as ventricles relax, pressure drops and AV valves open
- **Ventricular filling**
 - ❖ Rapid ventricular filling : as blood flows from full atria
 - ❖ diastasis: as blood flows from atria in small volume
 - ❖ atrial systole pushes final 20-25 ml blood



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Review of literature- in process

Suggestions to secure good marks to answer in exam-

Give answer with complete labeled diagrams.

Explain answer with key point answers

Questions to check understanding level of students-

1. what is ejection fraction ?
2. what is isometric relaxation?

Next Topic-Disease related to heart sound

Academic Day ends with-

National song 'Vande Mataram'