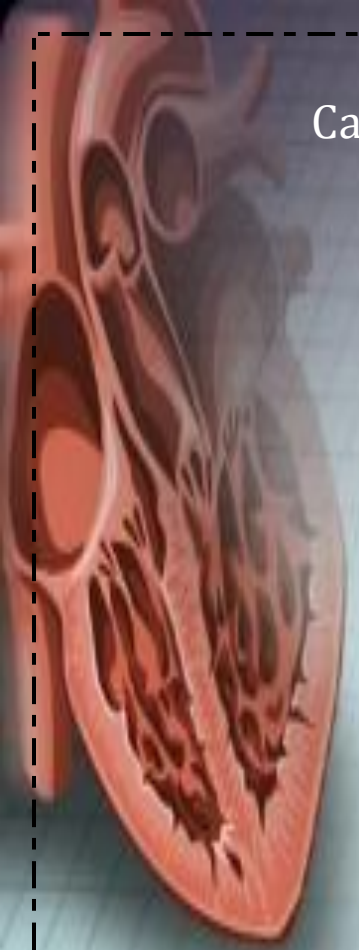
Cardiovascular Block



5th Lecture

CARDIAC CYCLE-1

Notes Dr. Ashraf

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Organized By : *Suliman AL-Shammari*

Cardiac Cycle : Events that occur from the beginning of one heartbeat to the beginning of the next **(one contraction and one relaxation)**

What events ..? This is what we'll talk about in this lecture

Diastole : period of **relaxation (during heart fills with blood)**

Systole : period of **contraction**

Diastole always **longer** than **systole** (in atrial and Ventricular)

Because it receive Blood

AV – valves : Mitral valve **and** Tricuspid valve

Semilunar valves : Aortic valve **and** pulmonary valve

Tachycardia → short cardiac cycle

Bradycardia → Long cardiac cycle

■ Cardiac cycle :

1- Atrial Cycle : 0,8 sec

2- Ventricular Cycle : 0,8 sec

All happening at the **same time**

So, **duration** of the cardiac cycle

0,8 sec

■ Time overlap :

Phase / Structure	Atrial systole	Early ventricular systole ⟷ Late ventricular systole	Early ventricular diastole ⟷ Late ventricular diastole
Atria	Contract	Relax	Relax
Ventricles	Relax	Contract	Relax

Three Phases :

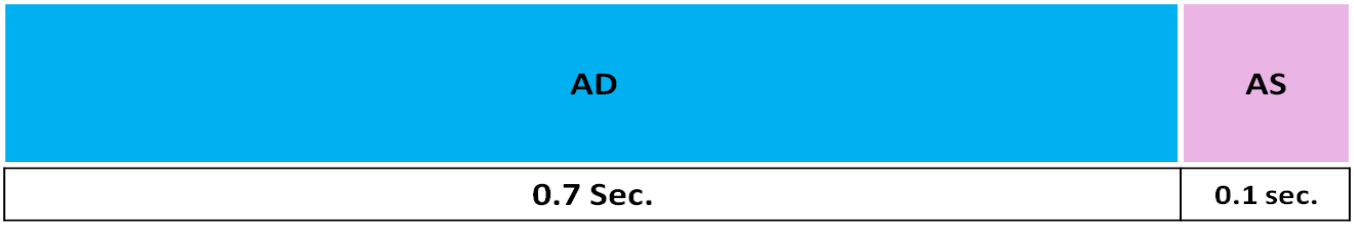
1- Atrial **Contract** , ventricles will be **Relax**

2- Atrial **Relax** , Ventricles will be **Contract**

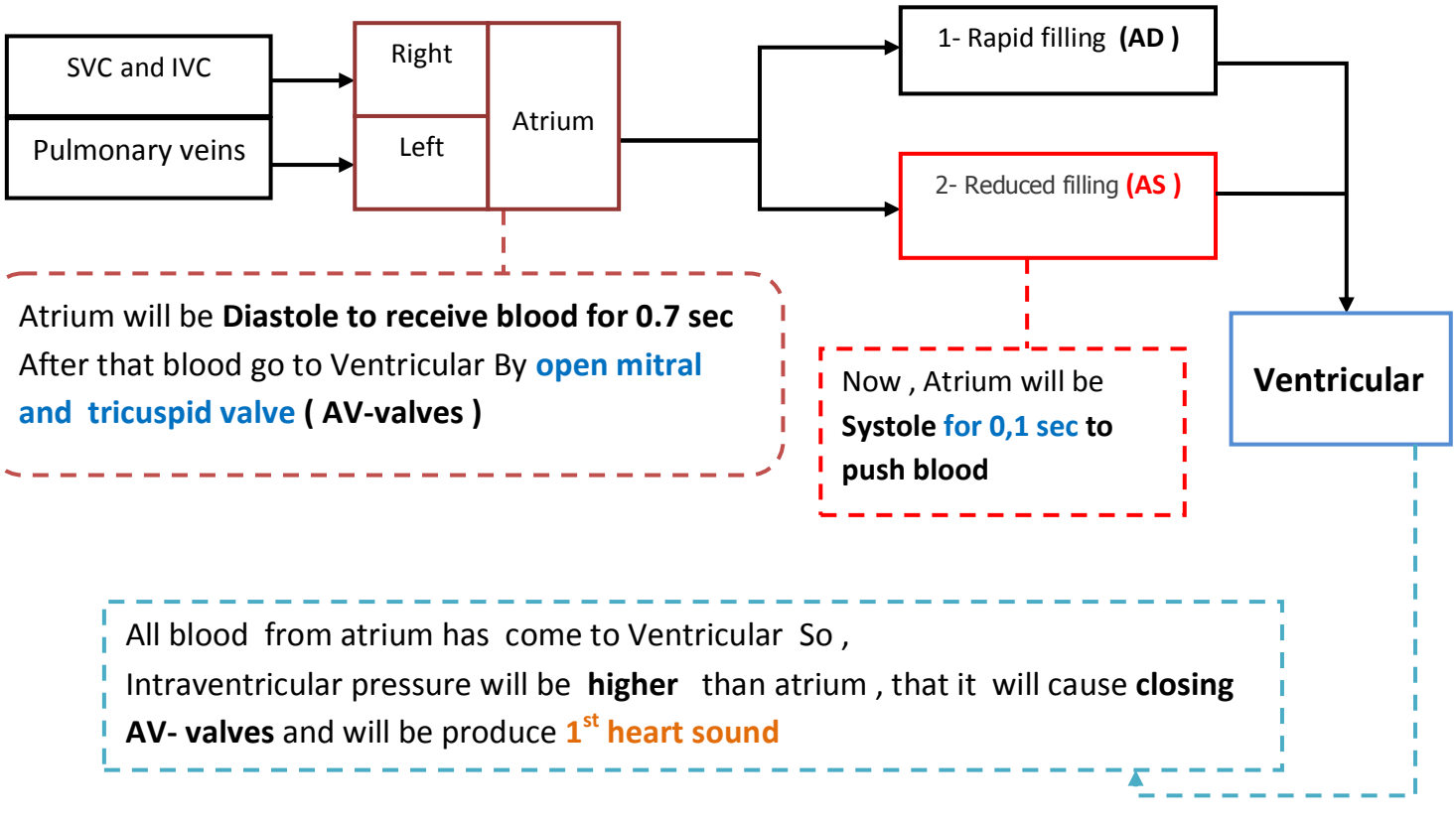
3- Atrial and ventricles **Relax**

■ **Atrial & Ventricular Systole (Contract) NEVER overlap**

Atrial Cycle :



AS – Atrial Systole; AD – Atrial Diastole



The Blood passes through mitral and tricuspid valve from atrium to Ventricular by two ways :

1- **Rapid filling** : By graphite **(70 % of blood)**
2- After that **Reduced filling** : By contract of atrium **(30 % of blood)**

Extra note :

Between two ways : small amount of blood normally **passing through the atrium** from veins **directly** into the ventricular

Ventricular Cycle :

VS – Ventricular systole; VD – Ventricular diastole

Isovolumetric Relaxation Of Ventricle

- Ventricle is empty
- Close AV- valves
- Close Semilunar valves

1- rapid | 2 - Reduced

Filling

- Open AV- valves
- Semilunar valves still close

Blood filled ventricle (Full Blood)

Isovolumetric contraction

- Ventricle is filled
- AV- valves Close
- Semilunar valves Close

1- Maximum Ejection

2- Reduced Ejection

Open Semilunar valves

pulmonary trunk and aorta

Close Semilunar valves Again

Isovolumetric Relaxation Again

Ventricular Diastole which consists of : **(For 0,5 Sec)**

1. Isovolumetric relaxation
2. Rapid filling
3. Reduced filling

Ventricular Systole which consists of : **(For 0.3 Sec)**

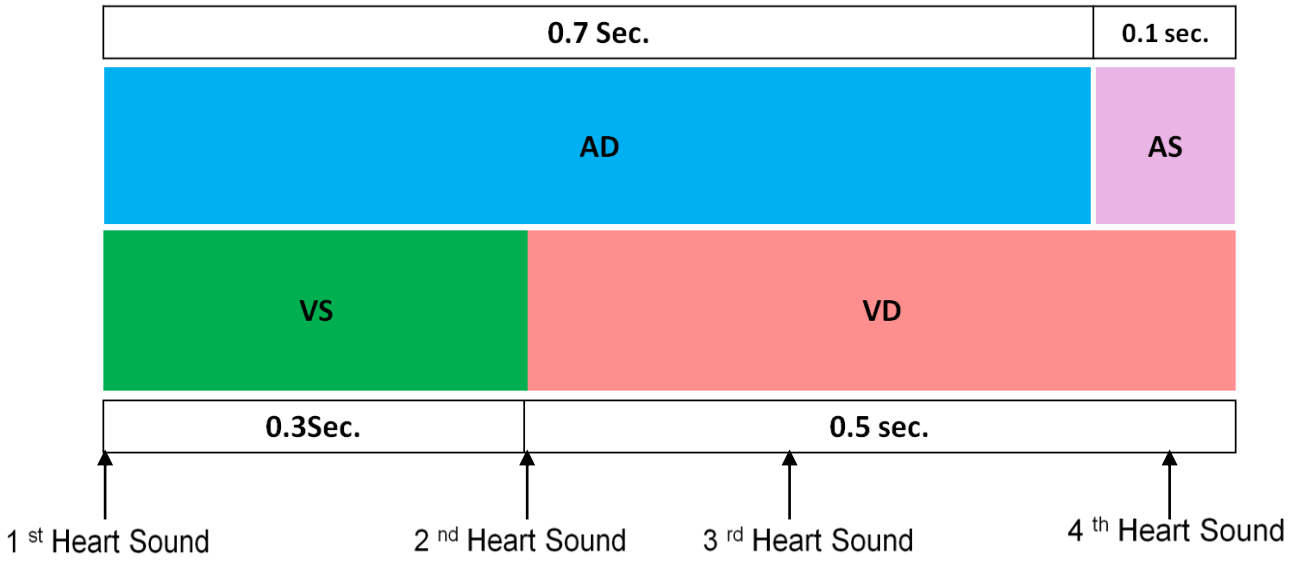
1. Isovolumetric contraction
2. **Maximum (Rapid) ejection** : **(75% of blood)**
   more Blood short time Because Fast
3. **Reduced ejection : (25 % of Blood)**
   few Blood long Time because slow

After ejection , Blood going up to aorta and pulmonary trunk So, Isovolumetric Relaxation will happened (close Semilunar valves again). **Produce 2nd heart sound**

Close cavity : when **All valves Close** in ventricular (That Happen during Isovolumetric Relaxation and contraction)

Isovolumetric = isometric
Isometric : No Change in length
Isotonic : shorten

Heart sound



1st heart sound : start of the VS , Caused By close A-V valves

2nd heart sound : start of the VD , Caused By close Semilunar valves

3rd heart sound : At Rapid filling phase , Caused By passage of blood through the narrow place (A-V valves)

4th heart sound : (Atrial heart sound) At Reduced filling Phase , Caused By contraction of atrium

Volumes :

1- End-diastolic volume (EDV) :

Volume of blood in ventricle at end of diastole

EDV = 120 ml

2- End-systolic volume (ESV) :

Amount of blood left in each ventricle at end of systole

ESV = 50 ml

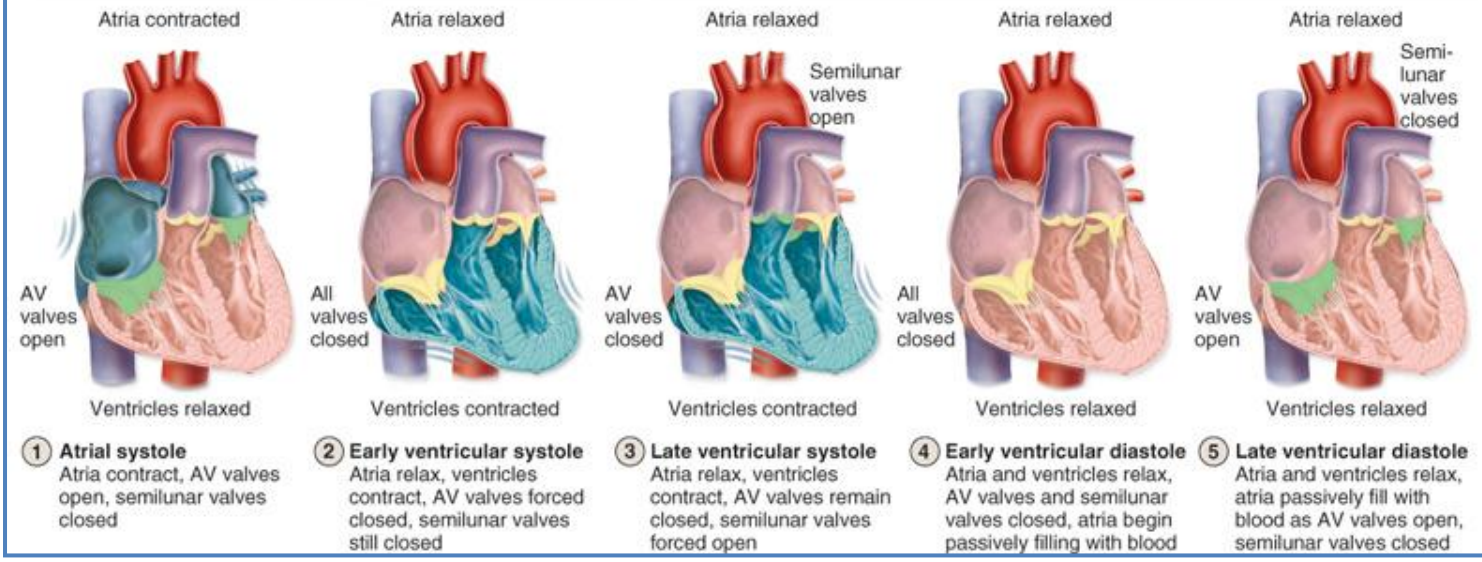
3- Stroke volume (SV) :

Amount of blood ejected from each ventricle during systole

SV = EDV – ESV = 120 – 50 = **70 ml/beat**

For you ^_^

Structure \ Phase	Atrial systole	Early ventricular systole ⟷ Late ventricular systole	Early ventricular diastole ⟷ Late ventricular diastole
Atria	Contract	Relax	Relax
Ventricles	Relax	Contract	Relax
AV valves	Open	Closed	Open
Semilunar valves	Closed	Open	Closed



Good Animation ☺

http://www.argosymedical.com/Circulatory/samples/animations/Heart/index.html