The Recording of Jugular Venous & Carotid Arterial Pulses

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Objectives

To be able to:

- ✓ Identify,
- ✓ Understand the events causing the different waves of the JVP & CP tracings.

Carotid arterial pressure

- The carotid pulse can be taken on the right side of the neck over the carotid artery in order to determine heart rate
- When blood is forced into the aorta during ventricular systole, two things happen:
  - Blood is moved forwards.
  - A pressure wave is set up which travels along the wall of arteries (faster than the flow of blood). Expanding the arterial walls as it travels. The expansion of the arterial wall is palpable as the pulse.

How to examine

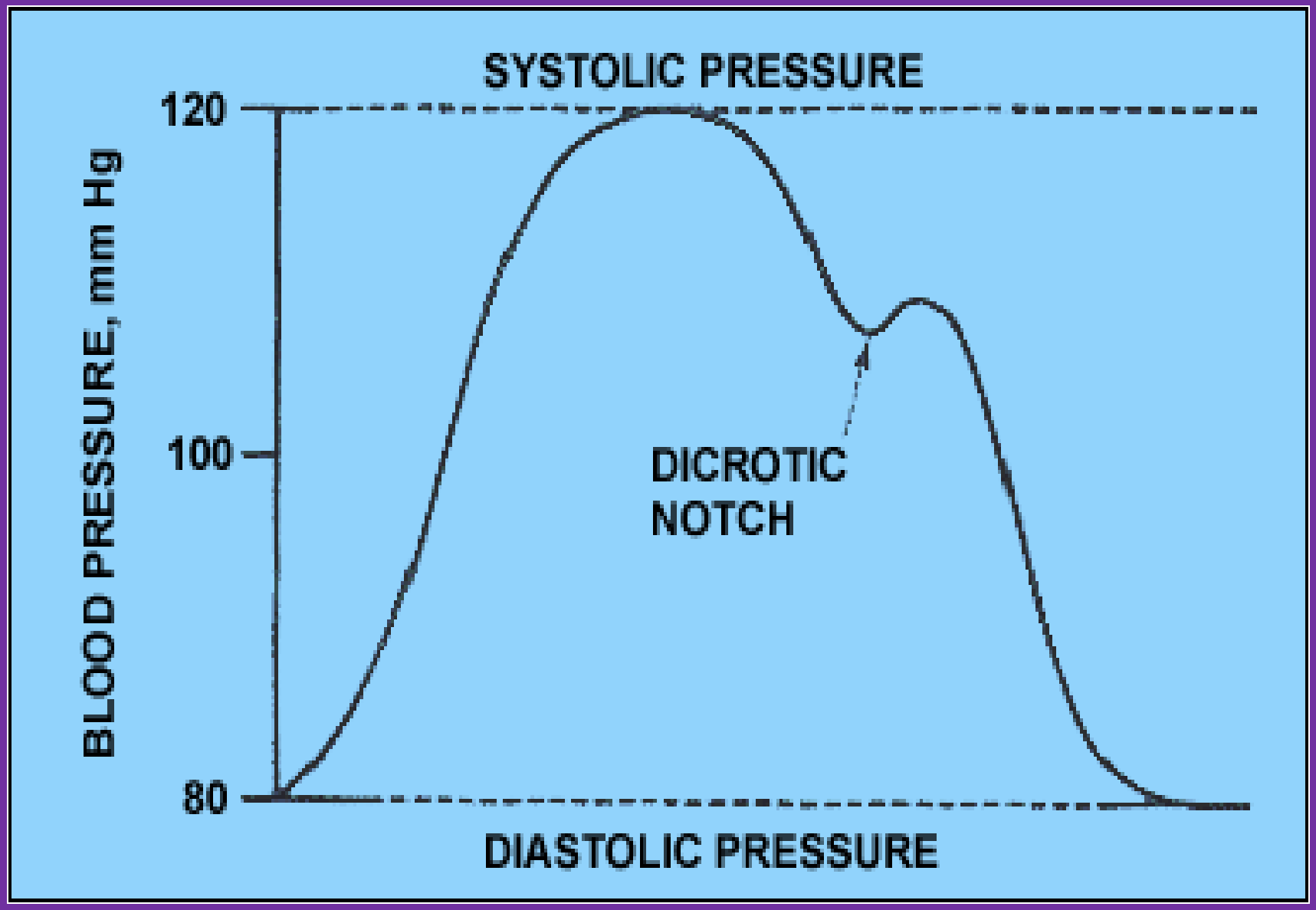
1. Subject lies quietly on a couch head slightly bent to the examined side.

1. Feel CAP between anterior border of SCM and lateral border of thyroid cartilage.

3. Apply transducer over CA using soft rubber band & connect it to recorder.

Recorded CAP graph

- Anacrotic limb:
  - Record during maximum ejection phase of ventricular systole.
- Dicrotic notch (Incisura):
  - Due to closure of aortic valve.
- Dicrotic wave:
  - Due to elastic recoil of arterial wall.
- Dicrotic limb: (descending)

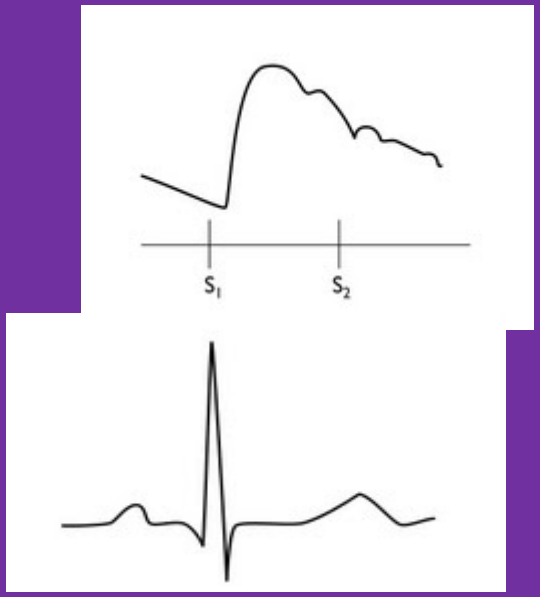

SYSTOLIC PRESSURE
120
100
80
BLOOD PRESSURE, mm Hg
DICROTIC
NOTCH
DIASTOLIC PRESSURE

- Cardiac Cycle duration = 0.8 sec.
- Ventricular systole = 0.3 sec.
- Ventricular diastole = 0.5 sec.

CAP and ECG

Dicrotic Notch (Dn) or Incisura:

it coincides with the second heart sound when we relate it to a phonocardiogram and occurs just after the T-wave when we relate it to an ECGc



Abnormal CAP

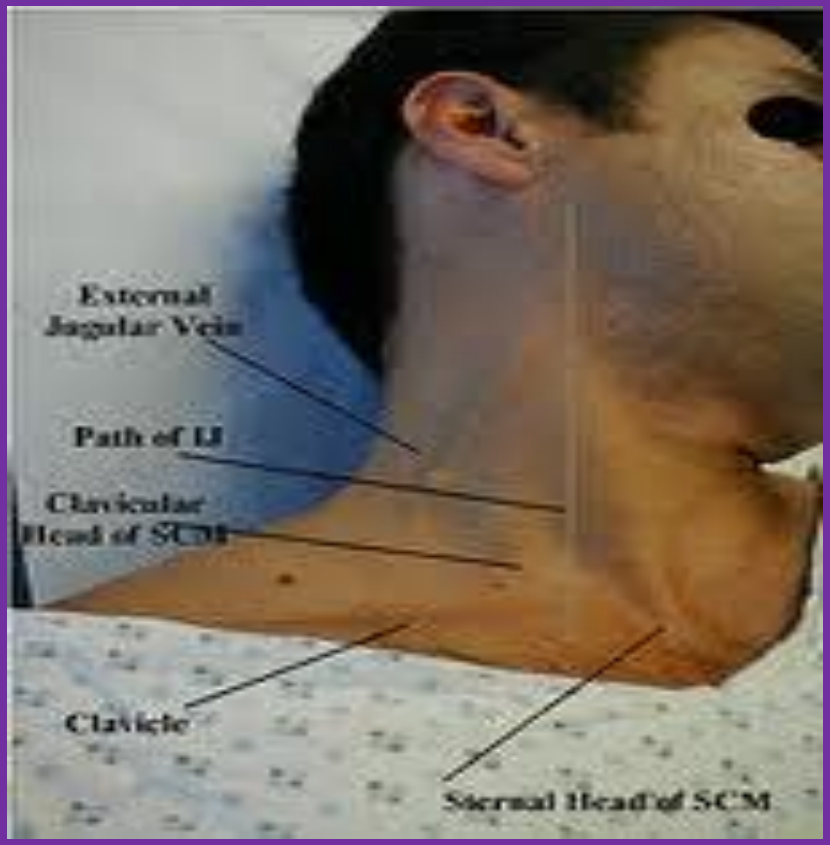
- Aortic stenosis : pressure drops
- Aortic regurgitation: pulse strong

Jugular Venous Pressure

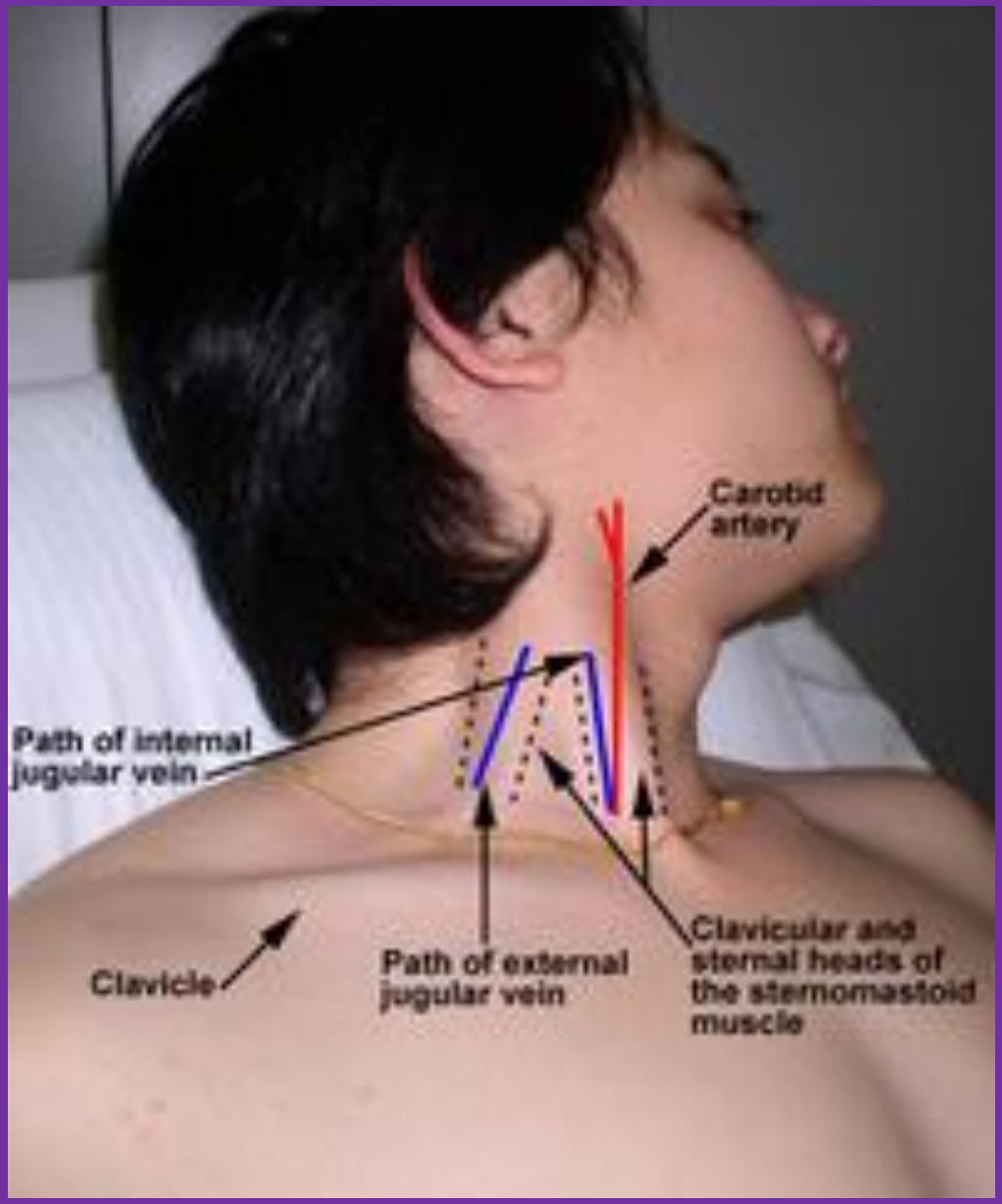
Pressure changes in the right atrium are transmitted directly to the internal jugular vein as there are no valves between this vein and the right atrium

How to examine

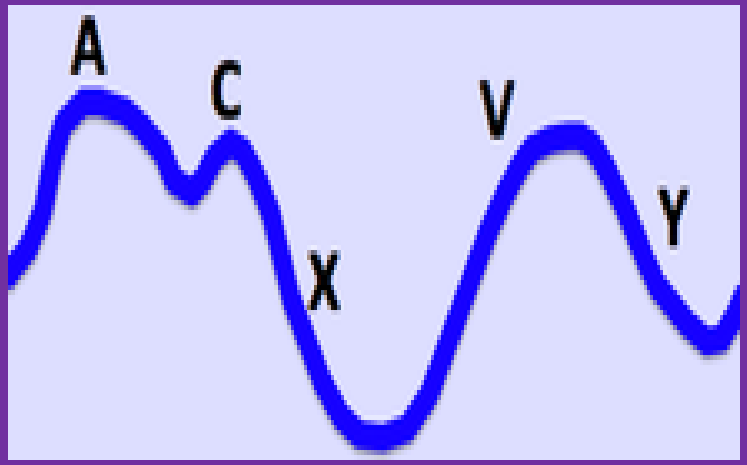
- Use the right internal jugular vein (IJV).
- Patient should be at a 45° angle.
- Head turned slightly to the left.
- Locate the surface markings of the IJV - runs from medial end of clavicle to the ear lobe under medial aspect of the sternocleidomastoid.
- Find its pulsation between the 2 attachments of SCM.



JVP: Method and position of Measurement



Causes of these waves:



‘a’ wave: RA contraction.

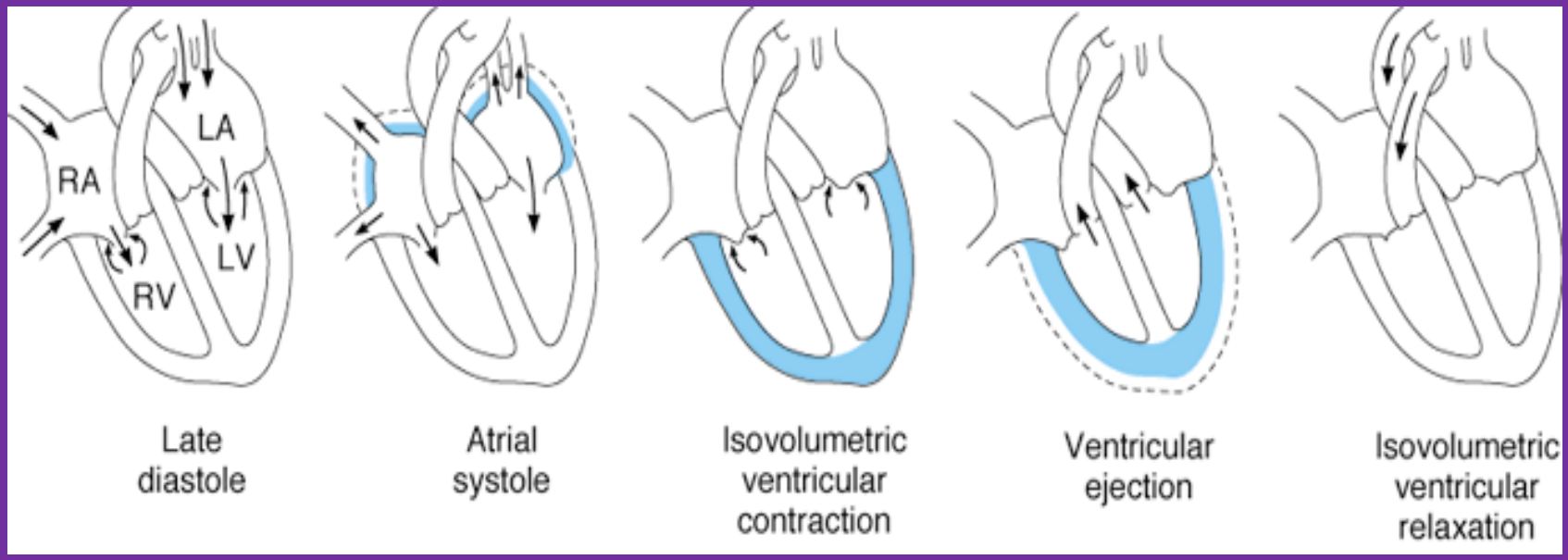
‘c’ wave: Bulging of TV into RA during isovolumetric contraction phase.

‘v’ wave: ↑ RA press due to filling of atrium with blood, (venous return.)

‘x’ descent: Downward displacement of TV during rapid ejection phase.

‘y’ descent: Rapid blood flow from RA to RV.

Cardiac cycle



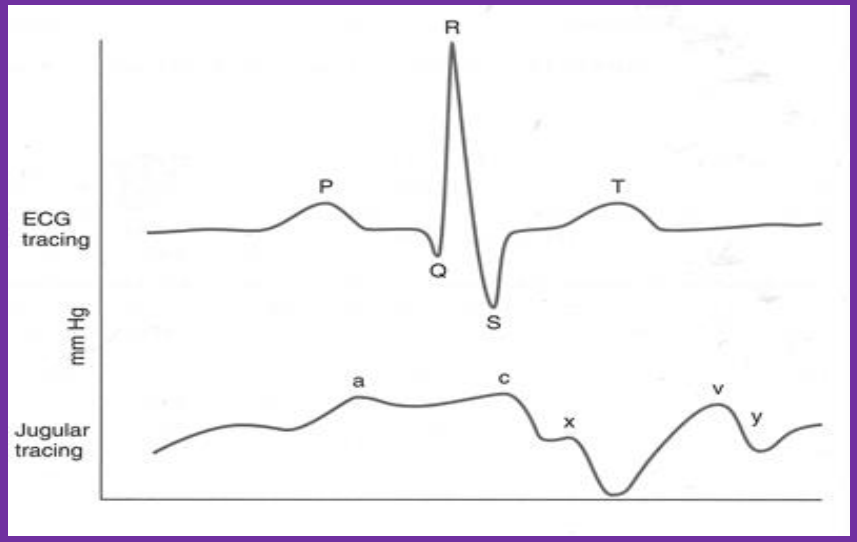
Q. How to identify JVP tracing?

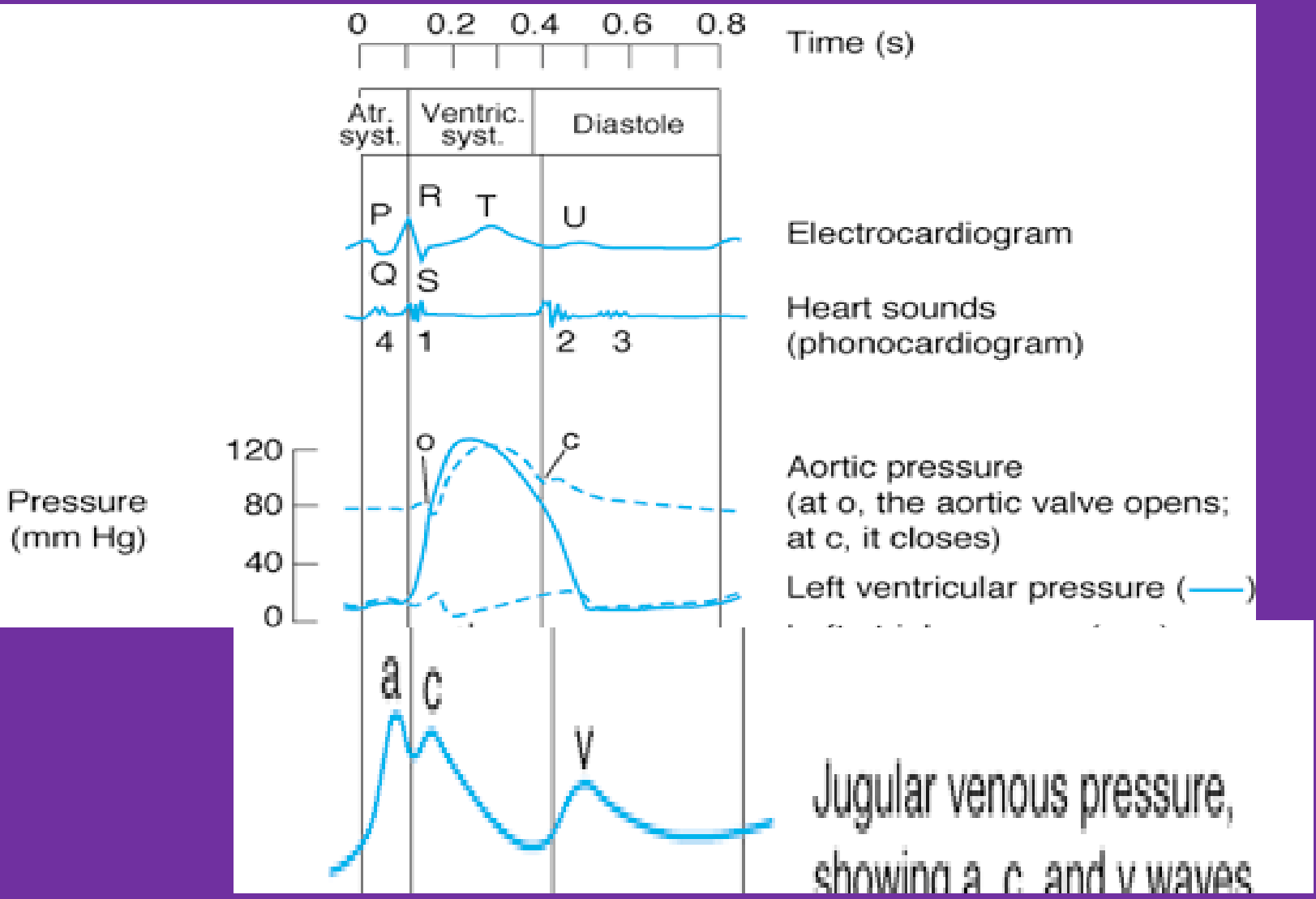
1. First identify ‘v’ wave, you will find it between two descents ‘x’ & ‘y’.

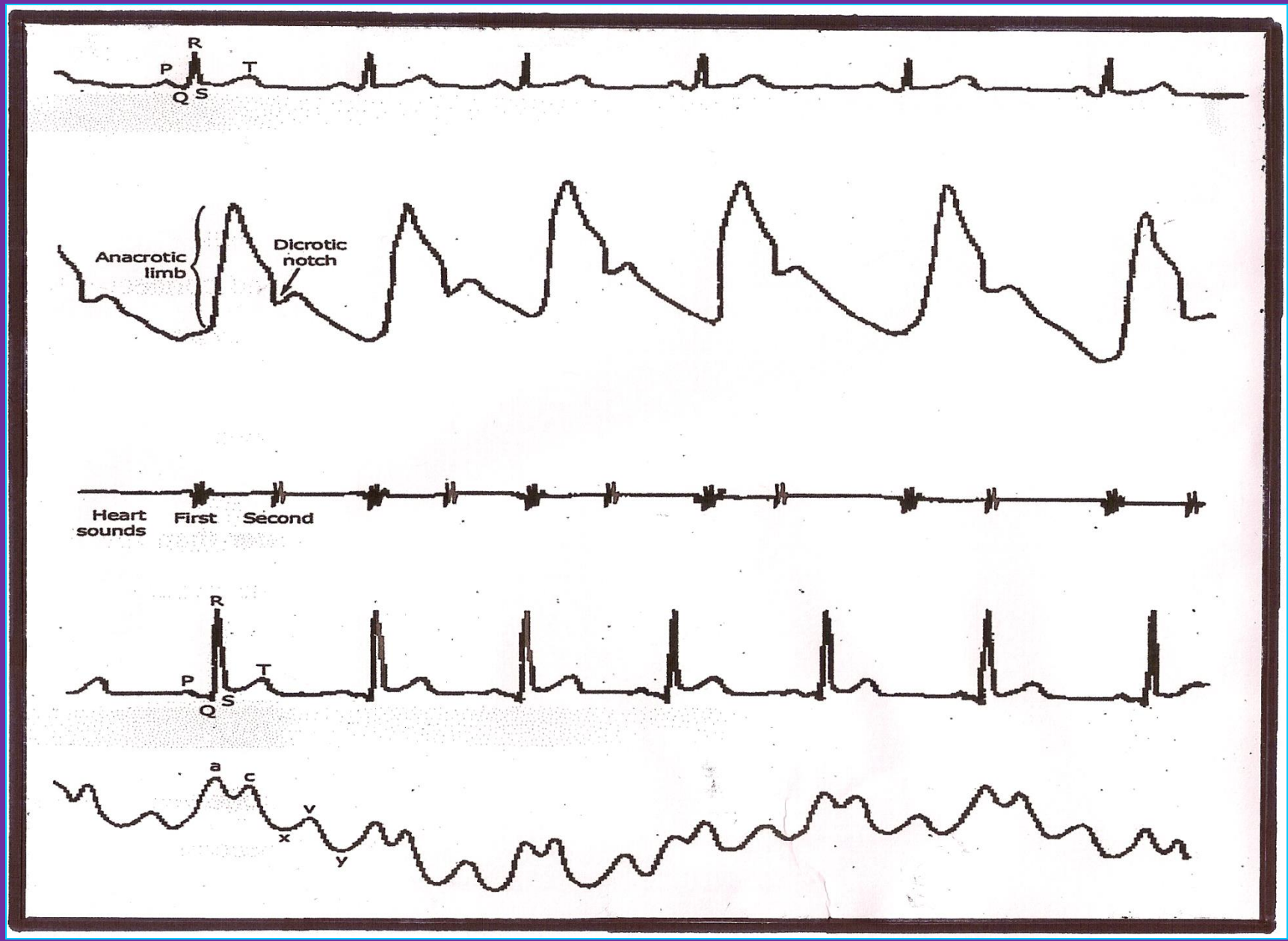
2. The ‘a’ & ‘c’ wave precede the ‘x’ descent.

JVP and ECG

- a wave follows p wave of ECG
- Precedes upstroke of carotid pulse.
- Synchronises with S1.
- c wave follows QRS
- v wave peaks after S2 which is synchronous with dicrotic notch.




0
0.2
0.4
0.6
0.8
Time (s)
Atr. syst.
Ventric. syst.
Diastole
P
R
T
U
Q
S
Electrocardiogram
4
1
2
3
Heart sounds (phonocardiogram)
120
80
40
0
Pressure (mm Hg)
o
c
Aortic pressure (at o, the aortic valve opens; at c, it closes)
Left ventricular pressure (——)
a
c
v
Jugular venous pressure, showing a, c, and v waves


R
P
T
Q
S
Anacrotic limb
Dicrotic notch
Heart sounds
First
Second
R
P
T
Q
S
a
c
v
x
y

Clinical abnormalities

- **‘a’ wave:**
  - Prominent: 1. RV hypertrophy (↑ resist of filling)
    2. Pulmonary stenosis.
    3. Pulmonary hypertension.
    4. Tricuspid stenosis.
  - Absent: Atrial fibrillation, TR.
  - Cannon wave: Complete AV block, atrial flutter, ventricular extrasystole.
- **‘c’ wave:** Prominent in TR; absent in const.peric.
- **‘v’ wave:** Prominent in tricuspid regurgitation.