

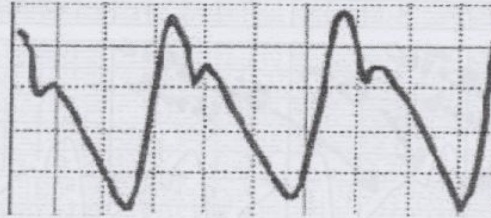
# PULSES

Carotid Arterial  
Jugular Venous

*Dr. Taj*

# PULSES: Causes

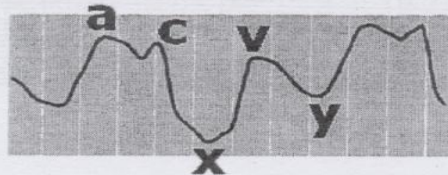
## CAROTID ARTERIAL PULSE



**When we record the carotid arterial pulse, we get a graph having:**

- ❖ **Anacrotic limb ( ANA means up)** – It is a record of pressure wave in the artery (arterial wall) during the maximum ejection phase of ventricular systole.
- ❖ **Dicrotic Notch (Dn) or Incisura** – It is due to closure of aortic valve.
- ❖ **Dicrotic limb** – Due to elastic recoil of arterial wall, pressure is maintained to 80 mmHg in the artery during ventricular diastole.

## JUGULAR VENOUS PULSE (J.V.P.)



**Causes of these waves are:**

- “a” wave:** It is due to right atrial contraction.
- “c” wave:** It is due to bulging of tricuspid valve into right atrium during isovolumetric contraction phase of ventricular systole. OR it is a Carotid Artifact.
- “x” descent:** It is due to downward displacement of tricuspid valve by the contraction of papillary muscles during ventricular systole.
- “v” wave:** It is due to increase in right atrial pressure, when right atrium continues to fill with blood from great veins against closed tricuspid valve.
- “y” descent:** It is due to fall in right atrial pressure, when the blood flows out of the right atrium into the right ventricle as soon as the tricuspid valve opens.

# PULSES: Causes Cont...

## CAROTID ARTERIAL PULSE

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- Anacrotic limb (ANA means up) - It is a record of pressure wave in the artery (arterial wall) during the maximum ejection phase of ventricular systole.
- Dicrotic Notch (Dn) or Incisura - It is due to closure of Aortic valve.
- Dicrotic limb:- Due to elastic recoil of arterial wall, pressure is maintained to 80 mmHg in the artery during ventricular diastole.

## JUGULAR VENOUS PULSE (J.V.P)

Causes of these waves are:

- 'a' wave: It is due to right atrial contraction.
- 'c' wave: Due to bulging of tricuspid valve into the right atrium, during isovolumetric contraction.
- 'v' wave: Increased pressure in right atrium due to filling of atrium with blood, when tricuspid valve is closed.
- 'x' descent: Due to downward displacement of AV ring during ventricular systole.
- 'y' descent: Opening of tricuspid valve, with rapid flow of blood from right atrium to right ventricle.

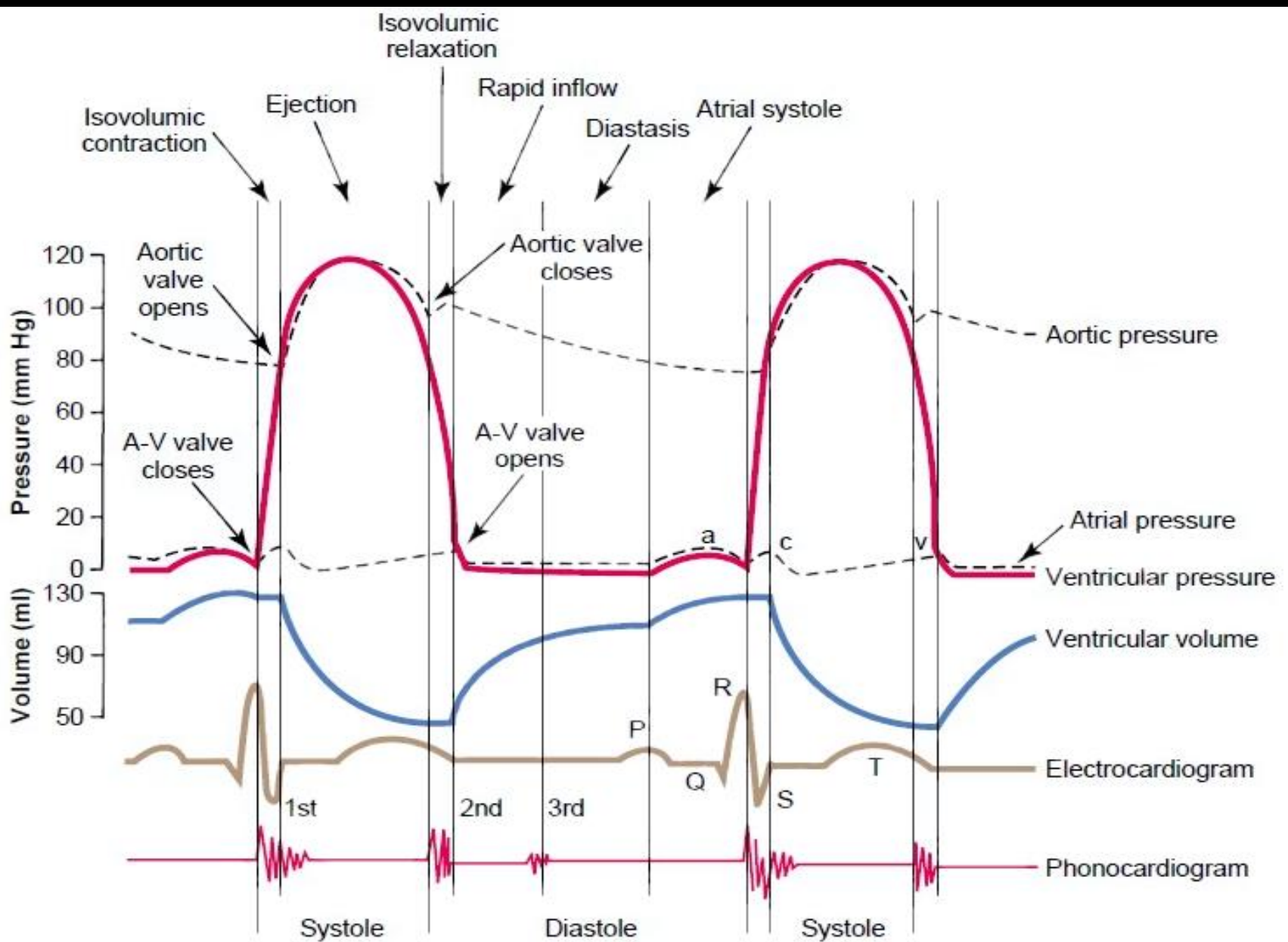
# ARTERIAL PULSES: Parts

When we record a carotid arterial pulse we get a graph having the following:

- An “**Anacrotic Limb**” (**Ana = Up**): It is a pressure wave in the arterial wall during the Max. Ejection period of the Systole.
- “**Dicrotic Notch**” or Incisura: Due to the closure of the Aortic Valve.
- “**Dicrotic Limb**”: Due to the elastic recoil of the arterial wall causing the pressure in the arterial wall during Diastole.

# VENOUS PULSE (JVP): Parts

- **“a” wave:** It is due to Rt. Atrial contraction. (+ve wave)
- **“c” wave:** It is due to the bulging of the Tricuspid valve into the Rt. Atrium during Isovolumetric Contraction. (+ve wave)
- **“v” wave:** Due to the filling of the Right Atrium with a closed tricuspid valve. (+ve wave)
  
- **“x” descent:** Due to downwards displacement of the AV rings during ventricular systole pressure thus creating a suction or a negative pressure in the Rt. Atrium. (- ve wave)
- **“y” descent:** Due to the fall in the Rt. Atrial Pressure when the blood starts to flow from the Right Atrium into the Rt. Ventricle during passive filling. (- ve wave)



# The Events of the Cardiac Cycle



# Causes of raised jugular venous pressure

- Heart failure.
- Constrictive pericarditis (JVP increases on inspiration - called Kussmaul's sign).
- Cardiac tamponade.
- Fluid overload - e.g., renal disease.
- Superior vena cava obstruction (no pulsation).

## **Abnormalities of the a wave**

It disappears in atrial fibrillation.

**Large a waves** occur in any cause of right ventricular hypertrophy (pulmonary hypertension and pulmonary stenosis) and tricuspid stenosis.

**Extra large a waves** (called **cannon waves**) in complete heart block and ventricular tachycardia.

## **Prominent v waves**

Tricuspid regurgitation - called cv or v waves and occurring at the same time as systole (a combination of v wave and loss of x descent); there may be earlobe movement.

## **Slow y descent**

Tricuspid stenosis.

Right atrial myxoma (Atrial tumor on its walls).

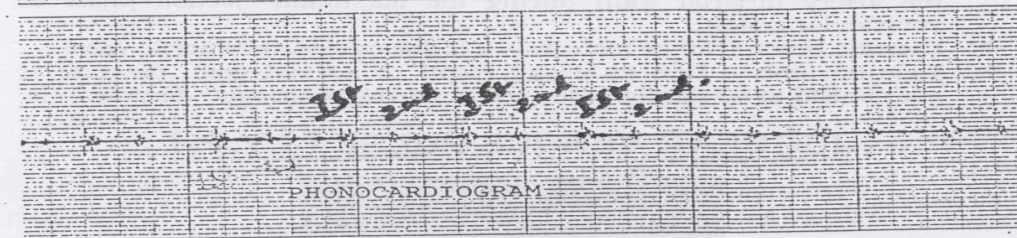
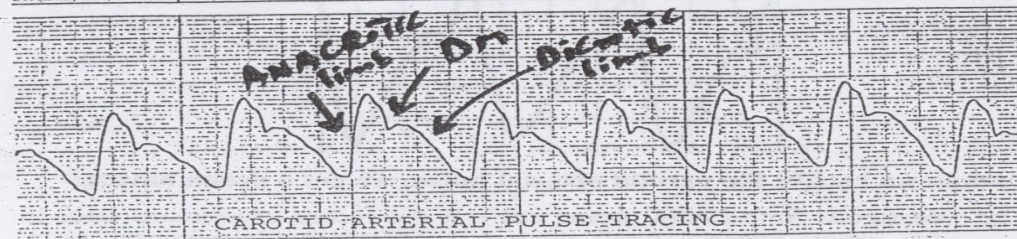
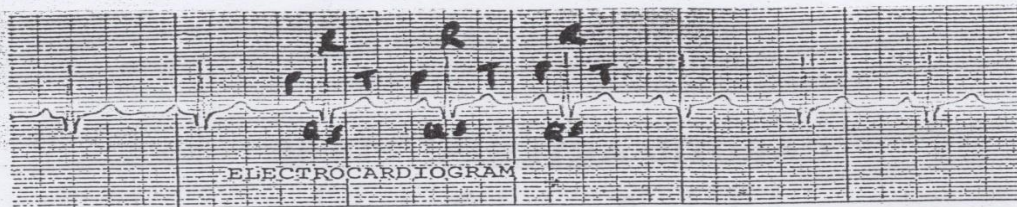
## **Steep y descent**

- Right ventricular failure.
- Constrictive pericarditis.
- Tricuspid regurgitation.

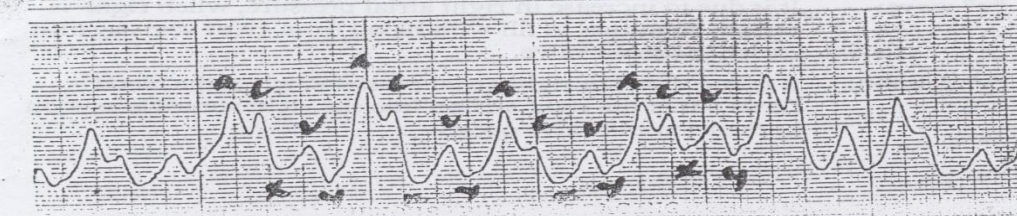
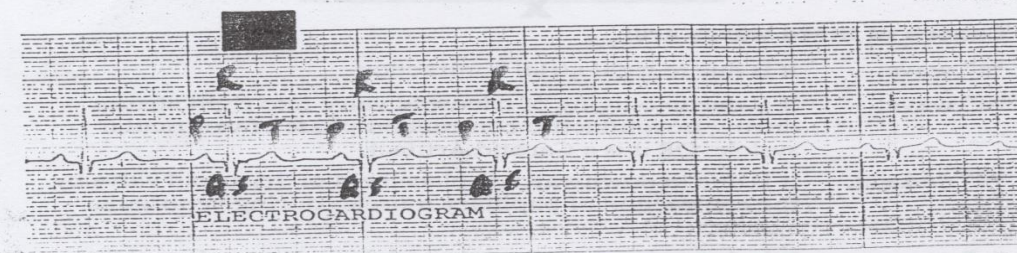
(The last two conditions have a rapid rise and fall of the JVP - called **Friedreich's sign**.)



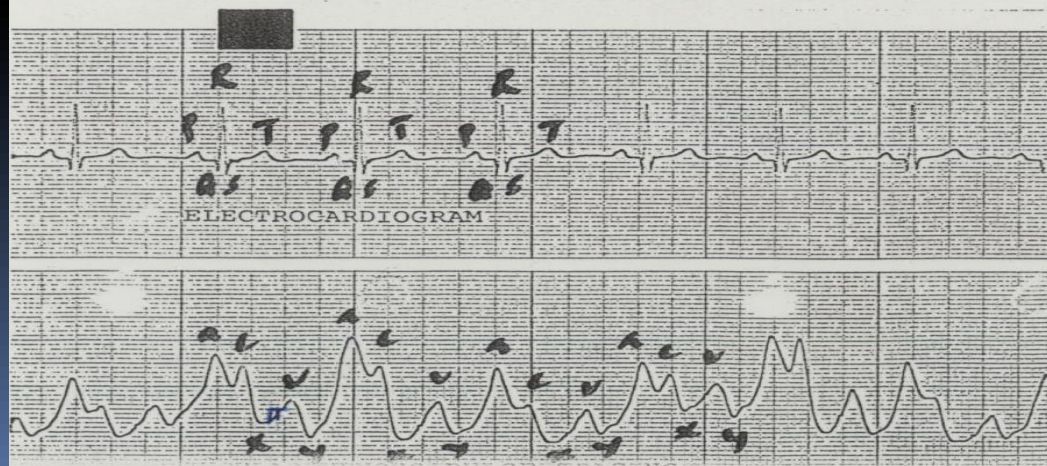
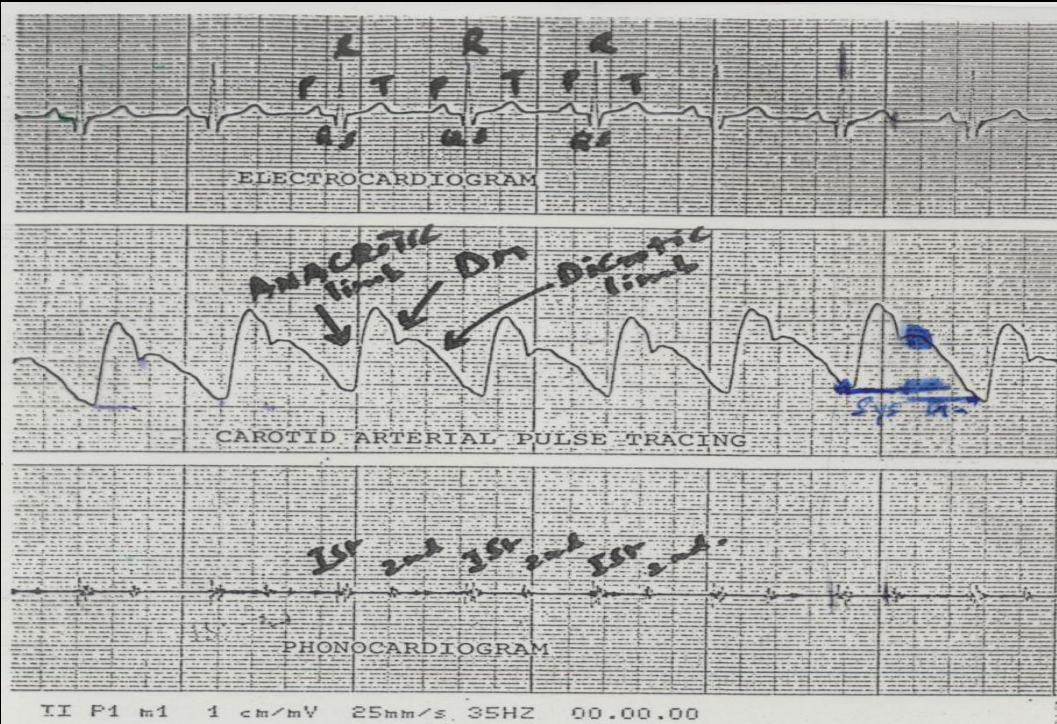
# PULSES: Co-relations



II P1 m1 1 cm/mV 25mm/s 35HZ 00.00.00

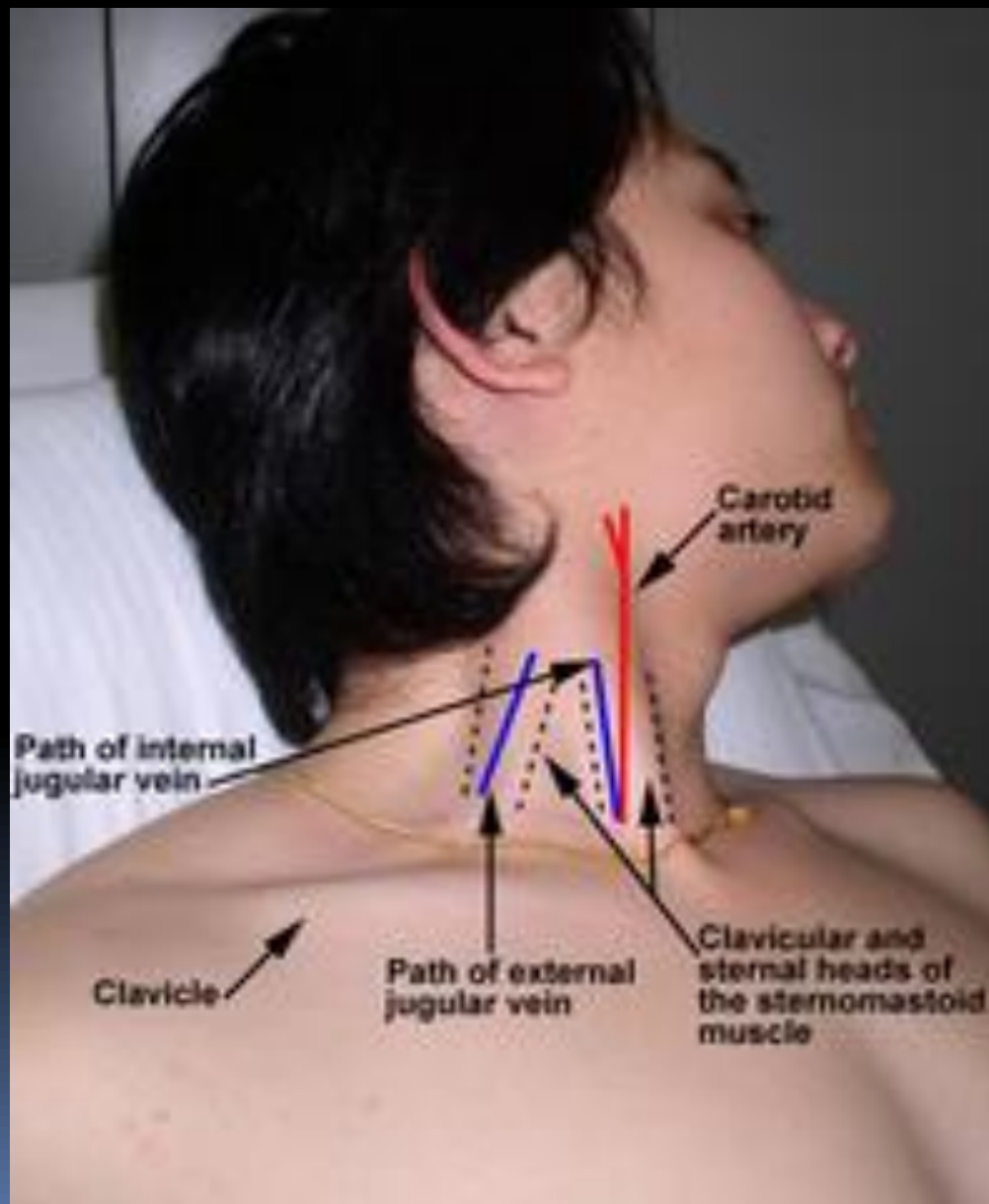


# Pulses: Co-relations

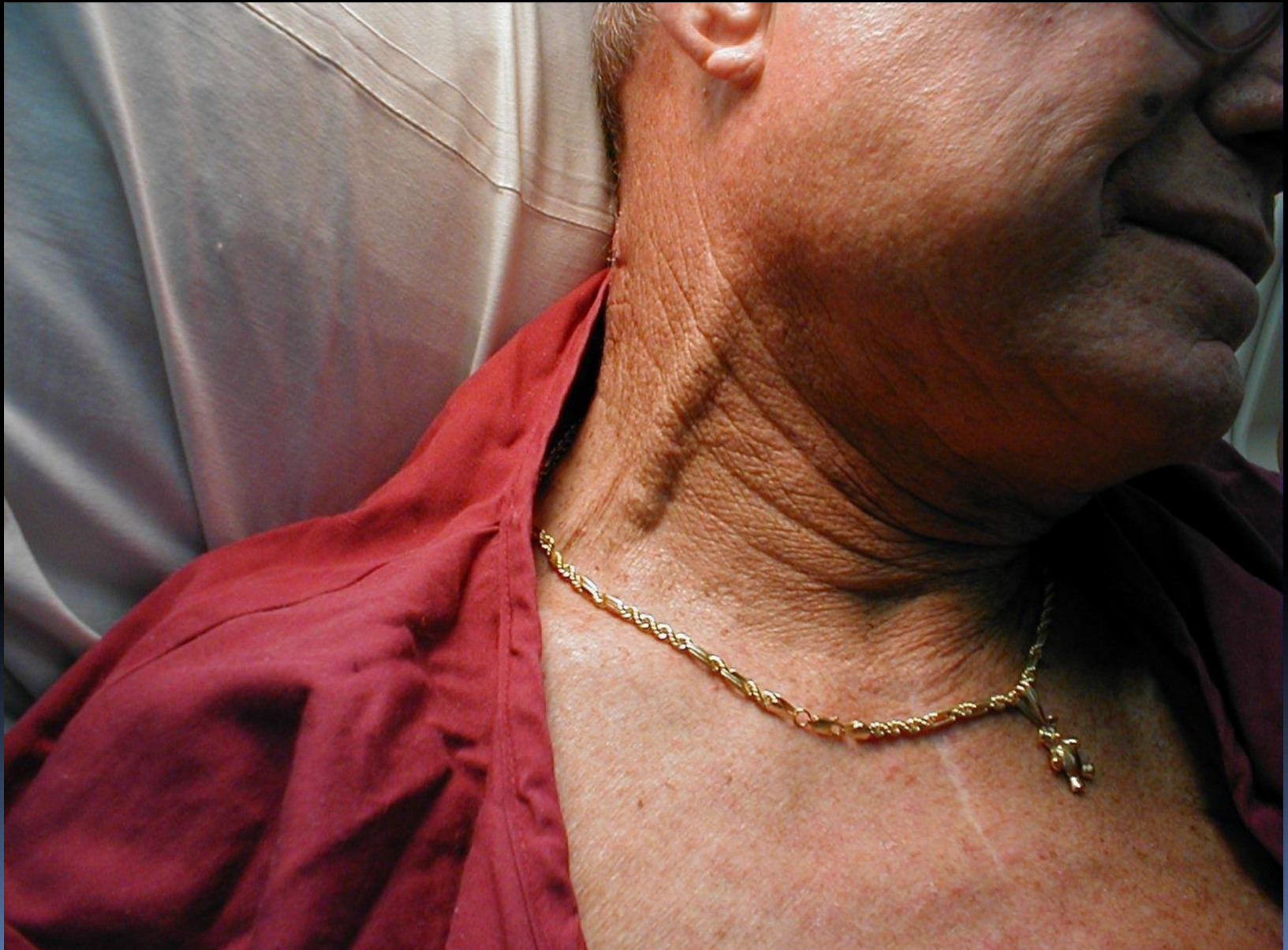




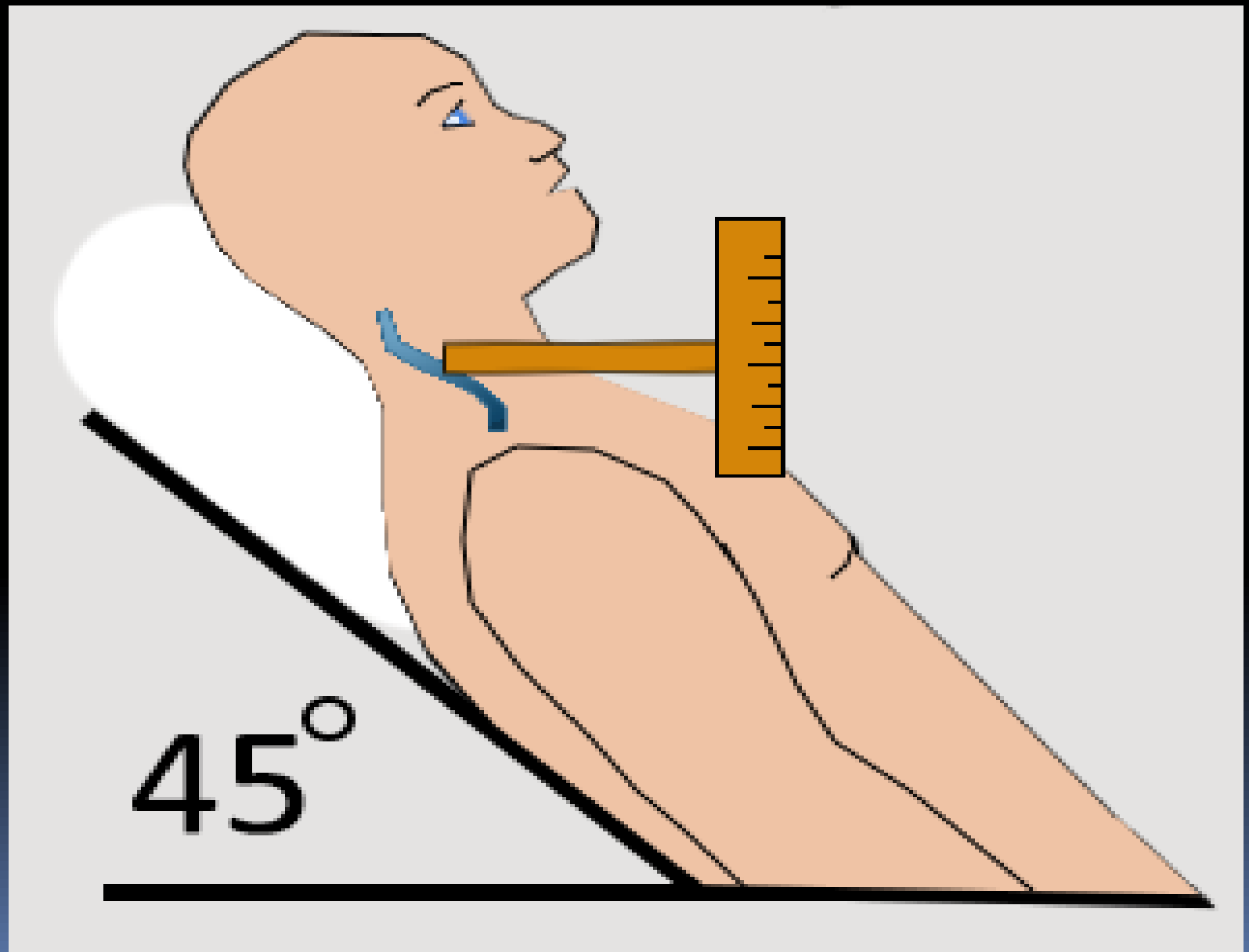
# JVP: Method and position of Measurement



# JVP: Raised



# JVP: Method of Measurement





# Various Arterial Pulses Extra




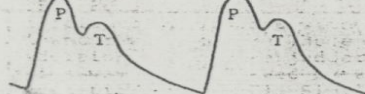
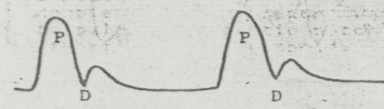
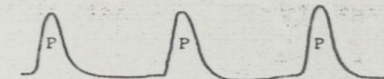
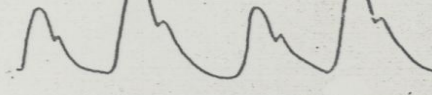
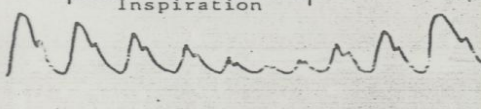
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|---|--|
|    | <p><b>NORMAL</b><br/>P= Percussion wave transmitted up the elastic arterial walls.<br/>D= Dicrotic notch of aortic valve closure.</p>  |
|    | <p><b>COLLAPSING PULSE</b><br/>Run off from the aorta as in aortic regurgitation or AV fistula. Wide pulse pressure. Low diastolic pressure. <u>Dicrotic notch</u> low or absent. Very brisk upstroke.</p>   |
|    | <p><b>ANACROTIC PULSE</b><br/>Aortic valve stenosis. Slow rising pulse with delayed percussion wave and sometimes a palpable judder on the upstroke. A=Anacrotic notch.</p>  |
|    | <p><b>BISFERIENS PULSE</b><br/>Mixed aortic valve disease with significant regurgitation. There may be an additional upstroke judder. Percussion wave is followed by a pronounced tidal wave (T). Similar pulse seen in HOCH. <i>(hypertrophic obstructive cardiomyopathy)</i></p> |
|    | <p><b>DICROTIC PULSE.</b><br/>Also a double pulse but second wave is due to palpable dicrotic notch. Seen in febrile states, typhoid, vasodilatation with normal aortic valve.</p>   |
|    | <p><b>SMALL VOLUME COLLAPSING PULSE</b><br/>Only palpable wave is a small but quickly rising percussion wave. Seen in mitral regurgitation, or VSD (ventricular run-off).</p>  |
|  | <p><b>PULSUS ALTERNANS</b><br/>Alternating big and small beats, often best appreciated following a ventricular ectopic. Indicates very poor LV function. Commonest in LV failure, COCH, aortic stenosis. <i>Chronic obstructive cardiac</i></p>                                    |
|  | <p><b>PULSUS PARADOXUS</b> <i>myopathy</i><br/>An excessive reduction in pulse pressure during inspiration (more than 10mmHg). Occurs in tamponade, pericardial constriction and status asthmaticus.</p>   |

Fig. 2 Examples of carotid pulse waveforms.

# Various Arterial Pulses Cont... Extra

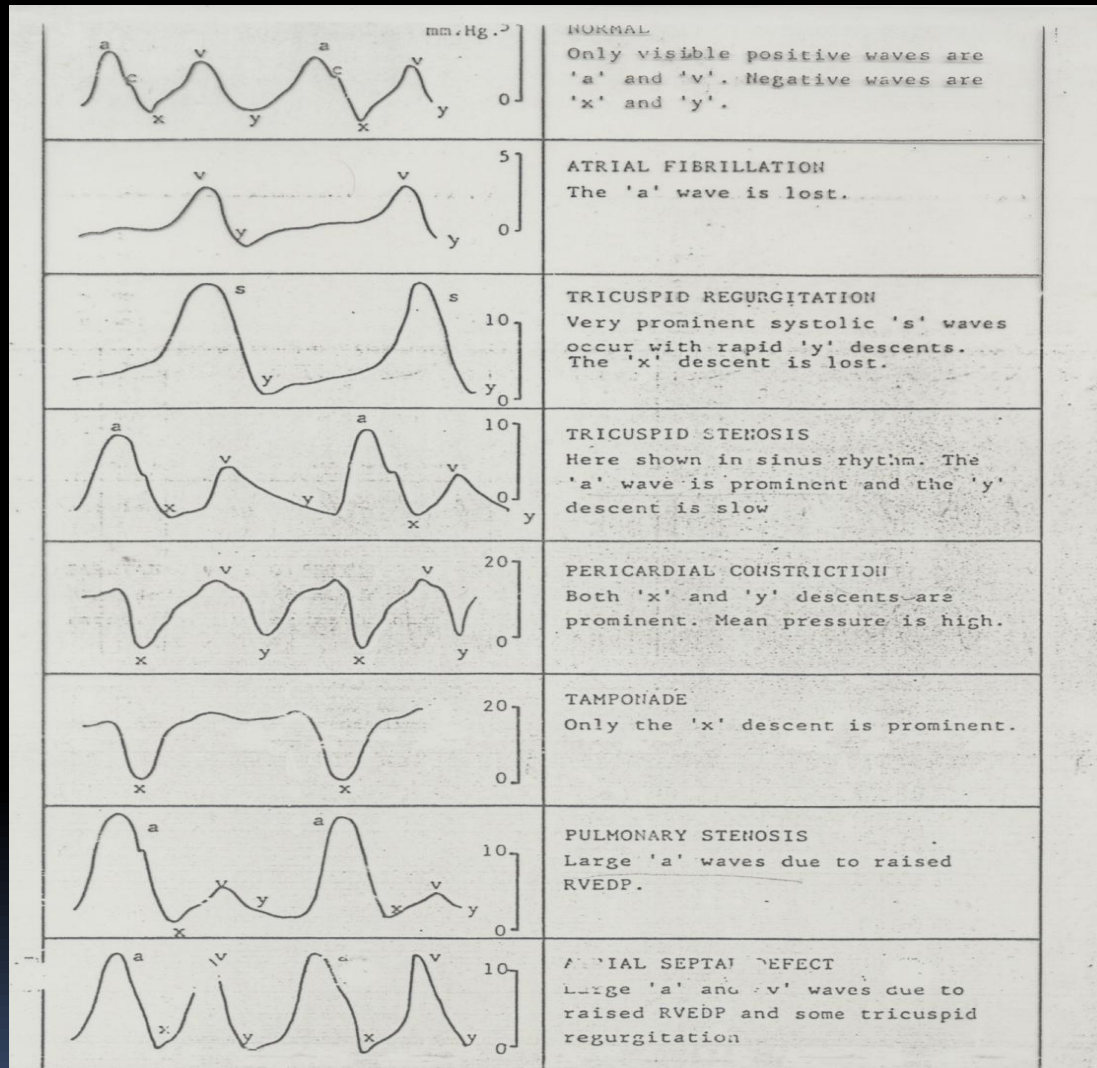


Fig. 1 Examples of waveforms seen on jugular venous pulse.





Thank you