Jugular Venous Pressure

Description

Jugular venous pressure (JVP) provides an indirect measure of central venous pressure. The internal jugular vein connects to the right atrium without any intervening valves - thus acting as a column for the blood in the right atrium. The JVP consists of certain waveforms and abnormalities of these can help to diagnose certain conditions. Unfortunately, detection of these abnormalities and even the JVP itself, can be difficult and has also been superseded by other diagnostic methods.

How to examine jugular venous pressure

- Use the right internal jugular vein (IJV).
- The patient should be at a 45° angle.
- The patient's head should be turned slightly to the left.
- If possible, have a tangential light source that shines obliquely from the left.
- Locate the surface markings of the IJV - this runs from the medial end of the clavicle to the ear lobe, under the medial aspect of the sternocleidomastoid.
- Locate the JVP - look for the double waveform pulsation (palpating the contralateral carotid pulse will help).
- Measure the level of the JVP by measuring the vertical distance between the sternal angle and the top of the JVP. Measure the height - usually less than 3 cm.

Waveforms of jugular venous pressure

- **Waves**: 
  - a - presystolic; produced by right atrial contraction.
  - c - bulging of the tricuspid valve into the right atrium during ventricular systole (isovolumic phase).
  - v - occurs in late systole; increased blood in the right atrium from venous return.

- **Descents**: 
  - x - a combination of atrial relaxation, downward movement of the tricuspid valve and ventricular systole.
  - y - the tricuspid valve opens and blood flows into the right ventricle.

The a and v waves can be identified by timing the double waveform with the opposite carotid pulse. The a wave will occur just before the pulse and the v wave occurs towards the end of the pulse. Distinguishing the c wave, x and y descents is an almost impossible task.

How to differentiate a jugular venous pulse from the carotid pulse

- The jugular venous pulse is:
  - Not palpable.
  - Obliterated by pressure.
  - Characterised by a double waveform.
  - Variable with respiration - it decreases with inspiration.
  - Enhanced by the hepatojugular reflux (see below).
Hepatojugular reflux (abdominojugular reflux sign)\[^4\]

- This can help to confirm that the pulsation is caused by the JVP.
- In the classic test for hepatojugular reflux, firm pressure is applied to the right upper quadrant using the palm of the hand. It has been realised that pressure anywhere over the abdomen will produce the same result (abdominojugular reflux sign).
- Pressure over the peri-umbilical region is the usual method and may be more appropriate in patients with a tender liver.
- A transient increase in the JVP will be seen in normal patients.
- There may be a delayed recovery back to baseline which is more marked in right ventricular failure.

Causes of raised jugular venous pressure

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

Abnormalities of jugular venous pressure\[^1, 2, 5\]

**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.

**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.)

Prognostic use of jugular venous pressure

Elevated JVP in patients with heart failure is associated with an increased risk of hospital admission, death and subsequent hospitalisation for heart failure.\[^6\] Therefore, appreciation of this sign can be clinically helpful.
Further reading & references

2. Kumar and Clark's Clinical Medicine (8th Ed) 2012
5. Witteles R; Neck Veins & Wave Forms, 2015

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