Cardiovascular system

General Examination and Vital signs

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Vital signs

Pulse

Temperature

Blood pressure

Temperature

Pulse

- Rhysm
- Rate
- Volume
- Equality
- Special character
- Vessel wall
- Peripheral pulsation

Rhysm

Examine rhythm before rate, if regular → count in 30 secs and multiply by 2. if irregular → count in one minute.

Types of rhythm:		
Regular	**Regular irregularity**	**Irregular irregularity**
Normal	Pulsus bigeminus. Pulsus trigeminus.	Atrial fibrillation. Atrial flutter with changeable degree of A-V block. Heart block wih changeable degree of block. Ventricular fibrillation.

	Extra systole with sinus rhythm	Atrial fibrillation
Pulse		
Rhythm	Regular irregularity	Irregular irregularity
Exercise	Decrease irregularity	Increase irregularity
Pulsus deficit	< 10 beats/ minute	> 10 beats/ minute
Neck veins		
A wave	Present	Absent
V wave	Systolic collapse	Systolic expansion
Heart sounds		
S1	Normal in intensity	Variable intensity
ECG		
P wave	Preserved	Absent
QRS wave	Premature complex followed by compensatory pause	Marked irregularity

Rate

Normal:60-100 bpm. Tachycardia: >100bpm. Bradycardia: <60bpm.

Ideally count rate in one minute.

Volume

Small volume pulse

Small stroke, shock, tachycardia

Big volume pulse

Hyperkinetic states, bradycardia

Variable volume pulse

AF, multiple extra systole, complete HB

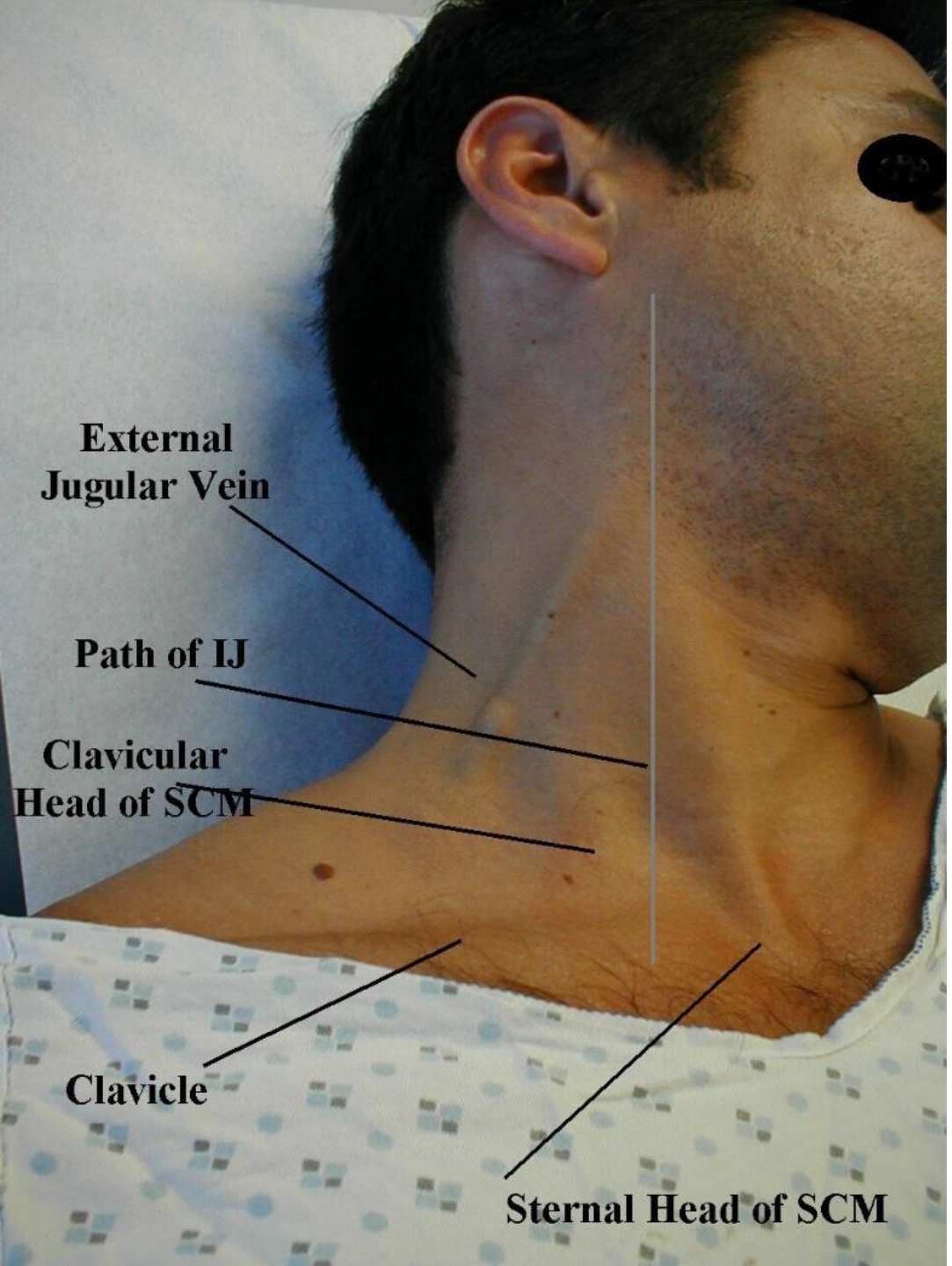
Jugular Veinous Pressure

In the presence of normal sinus rhythm, there are **2 positive** or outward moving waves (***a* and *v***) and **2 negative** or inward moving waves (***x* and *y***). The *x* descent is sometimes referred to as the systolic collapse. Ordinarily, the *c* wave is not readily visible.

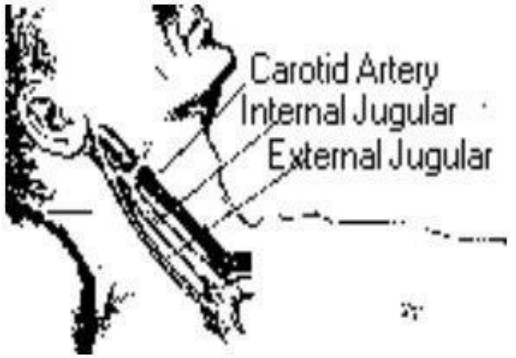
Clinical significance:

Reflects the pressure changes and volume status inside RT atrium, as the internal jagular vein is connected to the RT atrium via superior vena cava without any valves in between.

Measurement:



Distinguishing the internal jugular vein pulsations from the carotid artery



Jugular Vein	Carotid Artery
No pulsations palpable.	Palpable pulsations.
Pulsations obliterated by pressure above the clavicle.	Pulsations **not** obliterated by pressure above the clavicle.
Level of pulse wave decreased on inspiration; increased on expiration.	No effects of respiration on pulse.
Usually two pulsations per systole (x and **x & v**)	One pulsation per systole.
Prominent descents.	Descents **not** prominent.
Pulsations sometimes more prominent with abdominal pressure.	No effect of abdominal pressure on pulsations.

Wave a : atrial contraction

Pre-systole

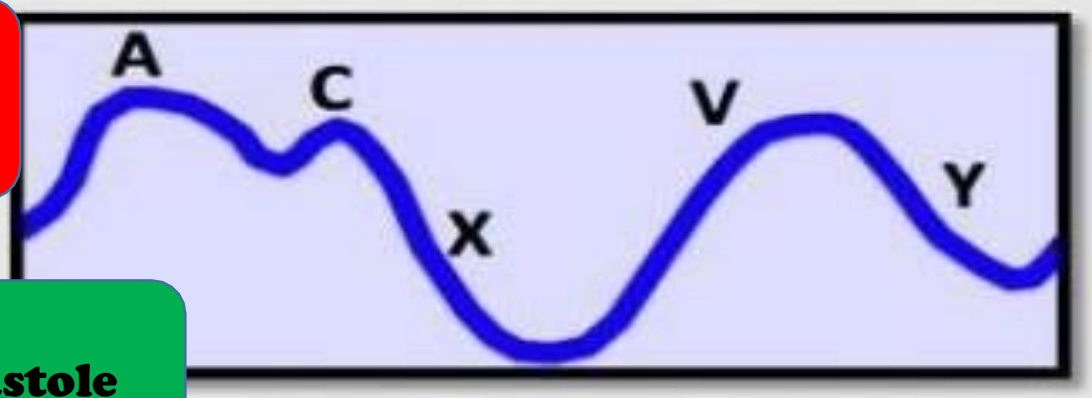
Wave c: bulging of closed tricuspid into the right atrium during isovolumetric systole

Wave x: the tricuspid valve moves downward

Systole

Wave v: venous filling

Systole



Wave y: atrial emptying

Diastole

Abnormal Jugular Venous Pulse Waves

Increased *a* wave

- Tricuspid stenosis
- Decreased right ventricular compliance due to right ventricular hypertrophy in severe pulmonary hypertension
- Pulmonary stenosis
- Pulmonary vascular disease
- Severe left ventricular hypertrophy due to pressure by the hypertrophied septum on right ventricular filling (Bernheim effect)
- Hypertrophic obstructive cardiomyopathy

Rapid *x* descent

- Cardiac tamponade

Increased *v* wave

- Tricuspid regurgitation
- Atrial septal defect

Rapid *y* descent (Friedreich sign)

- Constrictive pericarditis

Hepatojugular" (Abdomino-jugular) Reflux Sign

The neck veins distend with steady (>10 seconds) upper abdominal compression while the patient continues to breathe normally without straining. Straining may cause a false-positive reflux sign.

Jugular venous pressure (JVP) that remains increased and then decreases abruptly (≥4 cm water) indicates an abnormal response. It may occur in **LV failure with secondary pulmonary hypertension.**

If the jugular veins are engorged but not pulsatile, consider **superior vena caval obstruction**.

Arterial Pulse

Abnormalities of the Carotid Pulse

Hyperdynamic Carotid Pulse:

A vigorous, hyperdynamic carotid pulse is consistent with AR, other states of high cardiac output or by the wide pulse pressure associated with atherosclerosis, especially in the elderly.

Dicrotic and Bisferious Pulses

A dicrotic carotid pulse occurs in myocardial failure, especially in association with hypotension, decreased cardiac output, and increased peripheral resistance.

Dicrotic and *bisferious* are the Greek and Latin terms, respectively, for twice beating, but in cardiology they are not equivalent. The second impulse occurs in early diastole with the dicrotic pulse and in late systole with the bisferious pulse. The bisferious pulse usually occurs in combined AR and aortic stenosis, but occasionally it occurs in pure AR.

Pulsus Paradoxus

Paradoxical pulse is an exaggeration of the normal (≤10 mm Hg) inspiratory decrease in arterial pressure. It occurs classically with cardiac tamponade but occurs occasionally with other restrictive cardiac abnormalities, severe congestive heart failure, pulmonary embolism, and chronic obstructive pulmonary Disease.

Pulsus Alternans

Alternation of stronger and weaker beats, rarely occurs in healthy persons and then is transient after a premature ventricular contraction. It usually is associated with severe myocardial failure and is frequently accompanied by an S3, both of which impart an ominous prognosis. Pulsus alternans may be affected by alterations in venous return and may disappear as congestive heart failure progresses. Electrical alternans (alternating variation in the height of the QRS complex) is unrelated to pulsus alternans.

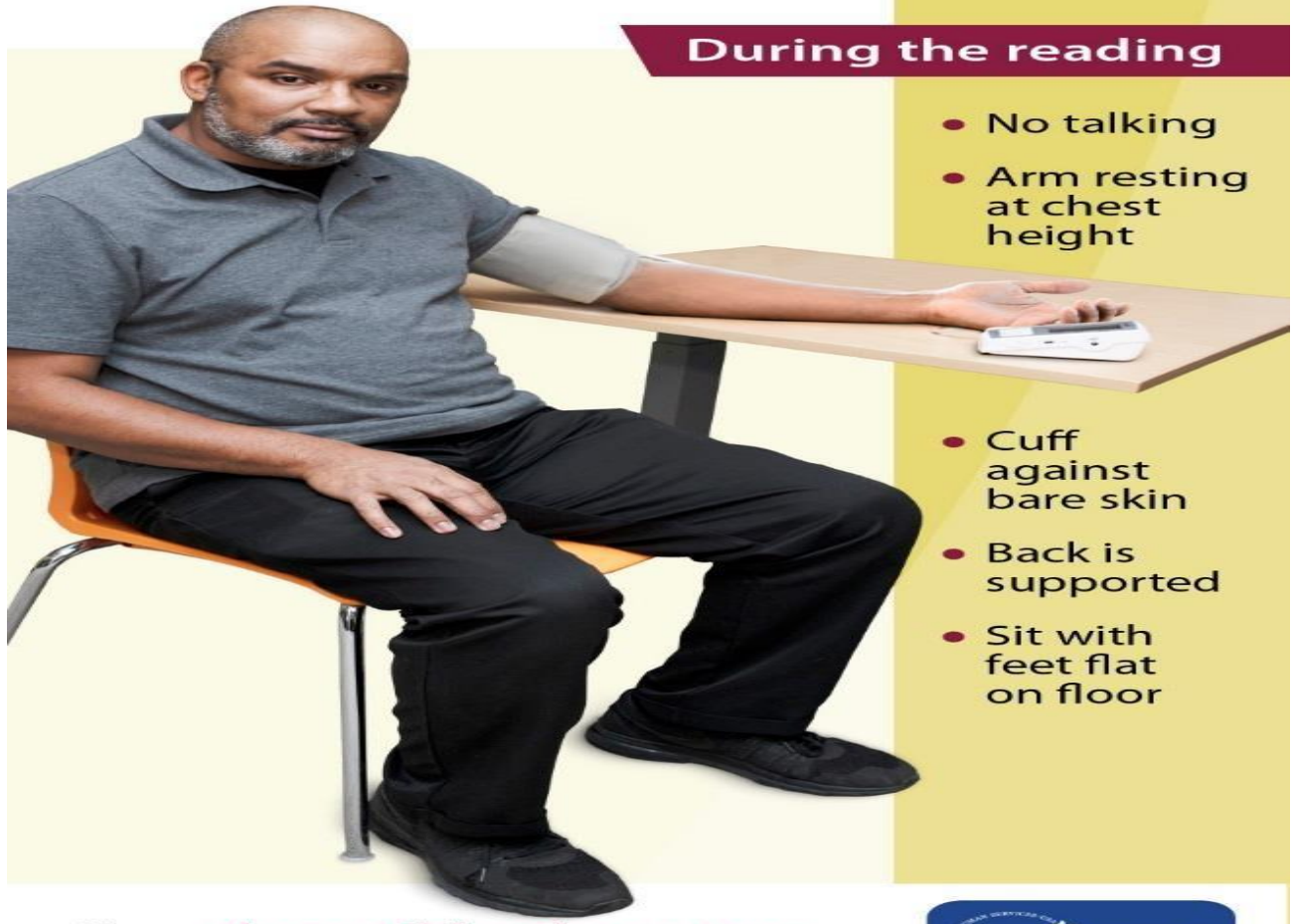
Blood pressure

Category	Systolic (mmHg)		Diastolic (mmHg)
Hypotension	<90		<60
Normal	90-119		60-79
Prehypertension	121-139		80-89
Stage 1 Hypertension	140-159		90-99
Stage 2 Hypertension	160-179		100-109
Stage 3 Hypertension	>180		>110

The Correct Way to **Measure Blood Pressure**

Before your reading

- No food or drink for 30 minutes
- Empty your bladder



During the reading

- No talking
- Arm resting at chest height
- Cuff against bare skin
- Back is supported
- Sit with feet flat on floor

Visit **cdc.gov/bloodpressure** for tips and resources.

CDC

Common positioning problems can lead to inaccurate BP measurement

Patient has ...	*Reading may be off by ... **
Crossed legs	2-8 mmHg
Cuff over clothing	5-50 mmHg
Cuff too small	2-10 mmHg
Full bladder	10 mmHg
Talking or active listening	10 mmHg
Unsupported arm	10 mmHg
Unsupported back/feet	6 mmHg

** These values are not cumulative*