ARTERIAL PULSE

DEFINITION

Arterial pulse is a peripheral expression of the heart’s mechanical activity perceived by palpating the arteries. It is caused by the rhythmic expansion of arterial walls, which is synchronous to ventricular systole.

TAKING THE ARTERIAL PULSE

- Arterial pulse can be perceived by palpating any of the accessible arteries: carotid, brachial, radial, femoral, popliteal, dorsalis pedis, posterior tibial arteries.

⚠️ Do not take the carotid pulse bilaterally at the same time! Avoid taking the carotid pulse for more than 15 seconds! Avoid massaging the carotid region when taking the pulse!

Figure no. 85. Taking the peripheral pulse at the site of the radial artery: press the artery in the radial artery groove using three fingers (index, middle and ring fingers).

- Radial pulse should be taken bilaterally in the same time, as one has to check if the pulse waves have the same amplitude and arrive simultaneously to both sides. Thus, we can describe the symmetry and the synchronicity of the radial pulse wave.

ARTERIAL PULSE CURVE RECORDING

- Arterial pulse can be recorded by mechanical devices (Marey) or with photoelectric pletismography. The recording is called a sphygmogram. Arterial pulse can be recorded on arteries close to the heart (central sphygmogram) or on peripheral arteries (peripheral sphygmogram).
The central sphygmogram is described in the chapter of Mechanocardiographical exploration of the cardiovascular system.

**DIFFERENT QUALITIES OF THE ARTERIAL PULSE**

The different qualities of the arterial pulse might be explored manually by palpation or objectively with help of the sphygmogram. There are five major characteristics of the arterial pulse:

- **Pulse frequency** (pulse rate): the number of pulsations counted in one minute. With rare exceptions it equals heart frequency. It is considered normal between 60-90/min. If it is higher it is called *tachycardia* (*puls frequentus*), if it is lower than *bradycardia* (*puls rarus*).

- **Pulse rhythm** refers to the interval between two consecutive pulsations. In case of regular intervals we speak of *regular pulse* (*puls regularis*), in case of variable intervals it is called *irregular pulse* (*puls irregularis*) or *arrhythmia*. Arrhythmia might be intermittent, superimposed on a regular pulse (e.g. extrasystole) or it might be an absolute arrhythmia (e.g. atrial fibrillation).

- **Pulse velocity**: the speed of advent and disappearance of the pulsations. *Puls celer* refers to rapid appearance and disappearance of the pulse wave, *puls tardus* refers to a pulse wave which can be palpated for a longer time because expansion of arterial walls propagates slowly.

- **Pulse amplitude** means the magnitude of the pulse wave (*puls magnus* is an ample pulsation, *puls parvus* is a weak pulsation, barely felt by the examiner).

- **Pulse tension** is measured by the force used to compress the artery completely in order to make the pulse wave disappear (*puls durus* is hard to compress, *puls mollis* is easily abolished).

**PATHOLOGICAL ASPECTS OF ARTERIAL PULSE**

- **pulsus alternans** means that although the rhythm is regular, every other pulsation has a different amplitude: after each normal pulsation follows one that is weaker and less ample. It is generally associated with severe disturbance of cardiac contractility, e.g. left ventricular failure.

- **pulsus celer et magnus** (Corrigan) is a high amplitude, high velocity pulse, with the pulse wave increasing fast and decreasing even faster, often caused by aortic insufficiency.
► **pulsus tardus et parvus** is a low amplitude, long duration pulse wave, classically seen in aortic stenosis.

► **pulse deficit** refers to the difference between ventricular frequency and pulse frequency. It is seen in atrial fibrillation with high ventricular frequency when some contractions aren’t efficient enough to be transmitted to the periphery.