Arteriovenous anastomosis : (Lec.3)

Are direct communication between arterioles and venules, in certain tissues and organs regulate blood flow.

Arterioles in such shunts have a relatively thick, capsule-like adventitia and a thick smooth muscle layer.

Arteriovenous shunts are richly innervated by the sympathetic and parasympathetic nervous systems.

These interconnections are found in skeletal muscle and in the skin of the hands and feet. .

The diameters of their lumen vary with the physiologic condition of the organ.

Changes in diameter of these vessels regulate blood pressure, blood flow, temperature and heat conservation in affected areas.

- **Veins**
- **Are the vessels that return blood to the heart.**
- **classified as large, medium and small, and the sizes blend into one another with no sharp demarcations. They have the same layers as arteries (intima, media and adventitia) but they are not as well defined as in arteries.**

Walls of veins are thinner and less elastic than corresponding arteries .

- veins show greater structural variation.

- Histological Structure of these vessels:
- **Venules, the smallest, have a diameter of ~ 20um - collect blood from capillaries**
- **Medium-sized veins range from 2 – 9 mm and in general correspond in size to medium-size arteries**
- **Large veins include the great veins, the superior and inferior venae cavae, and their tributaries within the abdominopelvic and thoracic cavities**

- **Features of Venules**:
- **Their size varies from 10 microns (post-capillary venules) to 1 mm (large venules).**
- **The post-capillary venules have diameter larger than capillaries;**

- **The endothelium is simple squamous cells surrounded by pericytes .**
- **Collect blood from capillaries** ,the**y are site of exchange of materials between tissue fluid and blood**,
- **Site of exit of WBCs from blood into tissue**.
- **But large venules have thin; endothelium .**
- **Tunica media - thin; 1 - 3 layers of smooth muscle (in circular manner) with collagen and elastic fibers between muscles.**
- **Tunica adventita - thick; loose connective tissue (collagen fibers and elastic fibers and fibroblasts)**.
- **Small to medium veins**:

The tunica intima – is thin composed of :

- **Endothelium**
- **Subendothelial layer**

- **A thin internal elastic membrane may or may not be present.**
- **(If present, it is not nearly as prominent as in arteries.**

The tunica media :is much thinner relative to that of an artery.

Composed of circularly arranged smooth muscle, collagen fibers and some elastic fibers

- **(The tunica intima and media therefore tend to be less distinct from one**
- **another than is the case in arteries).**

The tunica adventitia: Is usually thicker than the media and is made up mostly of collagen fibers.

Venous Valve:

Most veins in the head and neck, especially in the lower part of the body, in the limbs (small to medium-sized veins) have valves.

- **The valves are formed by loose, pocket-shaped folds of the tunica intima,**
- **(infoldings of the intima), which extend into the lumen of the vein. One to three usually two) pockets form the valve.**

The opening of the pocket will point into the direction of blood flow towards the heart , and the blood will pass the pockets.

They prevent the back flow of blood.

If the flow reverses, blood will fill the pockets which will occlude the lumen of the vein and prevent the return of blood into the part of the vein preceding the valve.

- **The ability of the valves to prevent backflow depends on the state of contraction (tone) of the smooth muscle in the wall of the vein.…**

Large veins do not have valves but changes of pressure in the thoracic cavity assist in moving blood to the heart.

Large veins: are composed of

Tunica antima : contains amount of subendothelial connective tissue.

- **Internal and external elastic laminae are absent or very thin.**

The tunica media appears thin poorly developed.

- **Thinner than the tunica adventitia, and the two layers tend to blend into each other.**

The tunica adventita - very thick; moderately dense connective tissue spirally arranged collagen fibers, elastic fibers, and very well developed longitudinal bundles of smooth muscle.

- **Vasa vasorum are more frequent in the walls of large veins than in that of the corresponding arteries –**
- **Differences between arteries and veins compared to arteries :**
  - **Have thinner walls.**
  - **Their diameter is larger and irregular shape.**
  - **Veins have less elastic tissue than do arteries.**