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1. Describe the importance of vasculature in relation to immune system and outbreak of pandemic Covid-19 on the human body.

 Blood vessels from a closed circulatory system, whereas lymphatic vessels form a one-way conduit for tissue fluid and leukocytes. In most vertebrates, the main function of lymphatic vessels is to collect excess protein rich fluid that has extravasated from blood vessels and transport it back into the blood circulation. Lymphatic vessels have an important immune surveillance function, as they import various antigens and activated antigen-presenting cells into the lymph nodes and export immune effector cells and humoral response factors into the blood circulation. Defects in lymphatic function can lead to lymph accumulation in tissues, dampened immune responses, connective tissue and fat accumulation, and tissue swelling known as lymphedema. The lymphatic vasculature has traditionally been considered important for removal of excessive fluid from the interstitial space, absorption of fat from the intestine and immune system. The lymphatic vessels are actively involved in the regulation of immune cell trafficking and inflammation and it is important in wound healing and tissue repair. Immune cell trafficking play a role in cardiovascular activities such as atherosclerosis, recovery after myocardial infarction. Corona virus is related to the immune system or causes respiratory problems when the virus reaches the lungs, their mucous membranes become inflamed. That can damage the alveoli or lung sacs and they have to work harder to carry out their function of supplying oxygen to the blood that circulates throughout the body thereby, removing carbon dioxide from the blood so that it can be exhaled. This is in return will make the immune system weak and therefore making the body prone to infections and diseases when the alveoli or lung sacs are damaged. If there is a swelling there, it can make it much more difficult for oxygen to reach the mucous membrane, therefore, the swelling and the impaired flow of oxygen can cause those areas in the lungs to be filled with fluid, pus and dead cells.

 For the corona virus to replicate, it needs a host in the form of a living cell. Once infected, this cell does what the virus commands it to do. But this does not go unnoticed by the body’s immune system. Within a few minutes, the body’s immune defence system intervenes with its innate response. Granulocytes, scavenger cells and killer cells from the blood and lymphatic system stream in to fight the virus, they are supported by numerous plasma proteins that either act as messengers or help to destroy the virus. We only notice that the system is working by having a cold or a fever. Numerous immune cells can enter our lungs and cause the membrane through which oxygen enters from the air into the blood to thicken. The exchange of gases is restricted, and in some cases, ventilation may be necessary. Sometimes the reaction may overshoot and be directed against healthy cells as well. So drugs are also tested that suppress an excessive immune reaction and that are already known from the treatment of autoimmune diseases.

2. Subsartorial canal is an important area in the lower limb, Discuss.

 The subsartorial canal also called the Hunter’s canal serves as a passageway for structures moving between the anterior thigh and posterior leg. It transmits the femoral artery, femoral vein (posterior to the artery), nerve to the vastus medialis and the saphenous nerve which is the largest cutaneous branch of the femoral nerve. It is an aponeurotic tunnel in the middle third of the thigh, extending from the apex of the femoral triangle to the opening in the adductor magnus, the adductor hiatus. In the adductor canal block, local anaesthetic is administered in the adductor canal to block the saphenous nerve in isolation, or together with the nerve to the vastus medialis. The block can be used to provide sensory anaesthesia for procedures involving the distal thigh and femur, knee and lower leg on the medial side. The Sartorius and femoral artery are used as anatomical landmarks to locate the saphenous nerve. It is approximately 15cm long, extending from the apex of the femoral triangle to the adductor hiatus of the adductor magnus.

**Borders:** The adductor canal runs from the apex of the femoral triangle to the **adductor hiatus**- a gap between the adductor and hamstring attachments of the adductor magnus muscle. The adductor canal is bordered by muscular structures:

* **Anteromedial:** Sartorius.
* **Lateral:** Vastus medialis.
* **Posterior:** Adductor longus and adductor magnus.

 Adductor Canal Compression Syndrome

 The Adductor canal compression syndrome describes the entrapment of the neurovascular bundle within the adductor canal. A rare condition, it is usually caused by hypertrophy of adjacent muscles such as vastus medialis. It is most common in young males, who may be present with symptoms due to femoral artery occlusion or neurological symptoms due to the entrapment of the saphenous nerve.

 Adductor Canal Block

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3. Describe the Extraocular and Intraocular muscles with their nerve supply.

 Extraocular muscles are the six muscles that control movement of the eye and one muscle that controls eyelid elevation (levator palpebrae). The actions of the six muscles responsible for eye movement depend on the position of the eye at the time of muscle contraction. The extraocular muscles are supplied mainly by branches of the ophthalmic artery. This is done either directly or indirectly, as in the lateral rectus muscle, via the lacrimal artery, a main branch of the ophthalmic artery. Additional branches of the ophthalmic artery include the ciliary arteries, which branch into the anterior ciliary arteries. Each rectus muscle receives blood from two anterior ciiary arteries, except for the lateral rectus muscle, which receives blood from only one. The extraocular muscles develop along with Tenon’s capsule (part of the ligaments) and the fatty tissue of the eye socket (orbit). There are three centers of growth that are important in the development of the eye, and each is associated with a nerve. Hence, the subsequent nerve supply of the eye muscles is from three cranial nerves. The development of the extraocular muscles is dependent on the normal development of the eye socket, while the formation of the ligament is fully independent. The extraocular muscles are located within the orbit, but are extrinsic and separate from the eyeball itself. They act to control the movements of the eyeball and the superior eyelid. There are seven extrocular muscles which are: The levator palpebrae superioris, superior rectus, inferior rectus, medial rectus, lateral rectus, inferior oblique and superior oblique. They can be divided into two groups:

* Responsible for eye movement- Recti and oblique muscles.
* Responsible for superior eyelid movement- Levator palpebrae superioris.

 **Levator Palpebrae Superioris**

 The levator palpebrae superioris is the only muscle involved in raising the superior eyelid. A small portion of this muscle contains a collection of smooth muscle fibres known as the superior tarsal. In contrast to the levator palpebrae superioris, the superior tarsal muscle is innervated by the sympathetic nervous system. It is innervated by the oculomotor nerve.

 MUSCLES OF EYE MOVEMENT

There are six muscles involved in the control of the eyeball itself. There are four recti muscles which are: superior rectus, inferior rectus, medial rectus and lateral rectus. These muscles characteristically originate from the common tendinous ring. This is a ring of fibrous tissue, which surrounds the optic canal at the back of the orbit.

**Superior Rectus**

Originates from the superior part of the common tendinous ring, and attaches to the superior and anterior aspect of the sclera. It is innervated by the Oculomotor nerve.

**Inferior Rectus**

Originates from the inferior part of the common tendinous ring, and attaches to the inferior and anterior aspect of sclera. It is inneravated by Oculomotor nerve. The medial rectus originates from the medial part of the tendinous ring, and attaches to the anteromedial aspect of the sclera while the lateral rectus originates from the lateral part and attaches to the anterolateral aspect of the sclera. The medial rectus is innervated by Oculomotor nerve and the lateral rectus is innervated by the Abducens nerve.

 Oblique Muscles

There are two oblique muscles- the superior and inferior muscles. Unlike the recti group of muscles, they do not originate from the common tendinous ring. From their origin, the oblique muscles take an angular approach to the eyeball (in contrast to the straight approach of the recti muscles). They attach to the posterior surface of the sclera.

**Superior Oblique**

Originates from the body of the sphenoid bone. Its tendon passes through a trochlear, and then attaches to the sclera of the eye, posterior to the superior rectus. It depresses, abducts and medially rotates the eyeball. It is innervated by the Trochlear nerve.

**Inferior Oblique**

 Originates from the anterior aspect of the orbital floor. Attaches to the sclera of the eye, posterior to the lateral rectus. It elevates, abducts and laterally rotates the eyeball. It is innervated by the Oculomotor nerve.

 INTRAOCULAR MUSCLES

They are parasympathetic ciliary muscles inside the eye used for constricting and increasing the power of the lens. They include the ciliary muscle, the sphincter muscle and the dilator muscle. The ciliary muscle is a smooth muscle ring that controls the accommodation by altering the shape of the lens, as well as controlling the flow of aqueous humor into Schlemm’s canal. It changes the shape of the eye. Open angle glaucoma and closed angle glaucoma may be treated which causes rapid miosis and contraction of the ciliary muscles, opening the trabecular meshwork, facilitating drainage of the aqueous humor into the canal of Schlemm and ultimately decreasing intraocular pressure. The ciliary muscle functions are mainly instructed by the parasympathetic nerve fibres of the oculomotor nerve. The contraction of the ciliary muscle loosens the zonular fibres increasing the convexity of the lens, which induces accommodation for near vision.

 The sphincter muscle is a circular muscle that normally maintains constriction of a natural body passage or orifice and which relaxes as required by normal physiological functioning

 The iris dilator muscle is a smooth muscle of the eye, running radially in the iris and therefore fit as a dilator. The dilator muscle of the iris contains fibres that extend radially through the iris of the eye and involuntarily contract ass available light decreases, thus dilating the pupil. Interruption of the innervation of the dilator muscle can cause an abnormally small pupil.