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Matric no:17/MHSO2/037

1. Blood vessels are the highways that transport our immune cells to sites of inflammation. The human circulatory system functions to transport blood and oxygen from the lungs to the various tissues of the body. The heart pumps the blood throughout the body. The lymphatic system is an extension of the human circulatory system that includes cell-mediated and antibody-mediated immune systems.

b. Viruses work by hijacking cells in the body. They enter host cells and reproduce. They can then spread to new cells around the body.

COVID-19 is a respiratory virus so it begins and ends in the lungs. There are cases where the virus is so mild, that patient doesn't know he/she is sick. They spread typically when an infected person coughs or sneezes, spraying droplets that can transmit the virus to anyone in close contact. However, the coronavirus can cause flu-like symptoms: fever, cough and shortness of breath that may progress to pneumonia in both lungs.

COVID-19 infects and kills cilia cells, the hairlike cells in your lungs that clear out viruses and pollen. Without cilia cells, your lungs can fill with fluid and other stuff that shouldn't remain in them. COVID-19 also attacks mucus cells. These cells are important because they keep the lungs moist so they can work. Mucus cells protect the lungs from bacteria or viruses. When lungs are under attack, they alert the body's immune system then sends immune cells to fight the infection. But sometimes, these immune cells kill everything, including healthy tissue. That's why many sick patients are put on oxygen or, in more severe cases, mechanical ventilation. Damaged lungs have a harder time getting oxygen to the bloodstream. Since organs need oxygen to function, if there is none, they can die, starting with the liver, followed by the kidneys.

### **Why are older adults and those with other illnesses more likely to die?**

As we get older, our immune systems get weaker. Smokers also have a higher risk of becoming very ill or dying since smoking damages the lungs and airways and this virus is a respiratory virus. People with heart disease, diabetes or chronic lung disease have a harder time fighting off the virus and recovering from infections.

Symptoms might not show up immediately, but people with COVID-19 may get symptoms 14 days after infected with the virus.

2. The adductor canal (Hunter's canal, subsartorial canal) is a narrow conical tunnel located in the thigh.... The canal serves as a passageway from structures moving between the anterior thigh and posterior leg. Also, The subsartorial or the adductor canal is the space containing the

femoral artery and the vein below the femoral triangle. It is known as Hunter's canal because John Hunter first described the exposure and ligation of the femoral artery for treatment of popliteal aneurysm. It is approximately 15cm long, extending from the apex of the femoral triangle to the adductor hiatus of the adductor magnus.

### BORDERS

It is an intermuscular cleft situated on the medial aspect of the middle third of the thigh on anterior compartment of thigh, and has the following boundaries:

The adductor canal is bordered by muscular structures:

Anteromedial: Sartorius.

Lateral: Vastus medialis.

Posterior: Adductor longus and adductor magnus.

- 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.
- (It is covered in by a strong aponeurosis which extends from the vastus medialis, across the femoral vessels to the adductor longus and magnus.) Lying on the aponeurosis is the sartorius (tailor's) muscle.

### CONTENT

- The adductor 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 – the largest cutaneous branch of the femoral nerve.

As the femoral artery and vein exit the canal, they are called the popliteal artery and vein respectively.

### CLINICAL RELEVANCE

ADDUCTOR CANAL BLOCK 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.

### ADDUCTOR CANAL COMPRESSION SYNDROME

Adductor canal compression syndrome describes 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..

3. 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. The extraocular muscles are innervated by three cranial nerves. ... Oculomotor nerve (CN III) – A lesion of the oculomotor nerve affects most of the extraocular muscles. The affected eye is displaced laterally by the lateral rectus and inferiorly by the superior oblique. The eye adopts a position known as 'down and out'.

- There are seven extraocular muscles – the levator palpebrae superioris, superior rectus, inferior rectus, medial rectus, lateral rectus, inferior oblique and superior oblique. Functionally, they can be divided into two groups:
- Responsible for eye movement – Recti and oblique muscles.
- Responsible for superior eyelid movement – Levator palpebrae superioris.

### MUSCLES OF EYE MOVEMENT

There are six muscles involved in the control of the eyeball itself. They can be divided into two groups; the four recti muscles, and the two oblique muscles.

- RECTI MUSCLES There are four recti muscles; 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. From their origin, the muscles pass anteriorly to attach to the sclera of the eyeball.

The name recti is derived from the latin for 'straight' – this represents the fact that the recti muscles have a direct path from origin to attachment. This is in contrast with the oblique eye muscles, which have an angular approach to the eyeball.

- SUPERIOR RECTUS Attachments: Originates from the superior part of the common tendinous ring, and attaches to the superior and anterior aspect of the sclera.

Actions: Main movement is elevation. Also contributes to adduction and medial rotation of the eyeball.

Innervation: Oculomotor nerve (CN III).

- INFERIOR RECTUS Attachments: Originates from the inferior part of the common tendinous ring, and attaches to the inferior and anterior aspect of the sclera.

Actions: Main movement is depression. Also contributes to adduction and lateral rotation of the eyeball.

Innervation: Oculomotor nerve (CN III).

- MEDIAL RECTUS Attachments: Originates from the medial part of the common tendinous ring, and attaches to the anteromedial aspect of the sclera.

Actions: Adducts the eyeball.

Innervation: Oculomotor nerve (CN III).

- LATERAL RECTUS Attachments: Originates from the lateral part of the common tendinous ring, and attaches to the anterolateral aspect of the sclera.

Actions: Abducts the eyeball.

Innervation: Abducens nerve (CN VI).

- OBLIQUE MUSCLES There are two oblique muscles – the superior and inferior obliques. 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 Attachments: 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.

Actions: Depresses, abducts and medially rotates the eyeball.

Innervation: Trochlear nerve (CN IV).

- INFERIOR OBLIQUE Attachments: Originates from the anterior aspect of the orbital floor. Attaches to the sclera of the eye, posterior to the lateral rectus

Actions: Elevates, abducts and laterally rotates the eyeball.

Innervation: Oculomotor nerve (CN III).

- OBLIQUE MUSCLES There are two oblique muscles – the superior and inferior obliques. 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

## INSERTION

Tarsal plate of upper eyelid, eye

## ARTERY

Ophthalmic artery, lacrimal artery, infraorbital artery, anterior ciliary arteries,  
superior and inferior orbital veins

### NERVE

Oculomotor, trochlear and Abducens nerve.

ACTION:Abducts the eyeball

### WHILE THE

Intraocular muscles include the ciliary muscles they sphincter pupillae and the dilator pupillae. The ciliary is a smooth muscles ring that controls accommodation by altering the shape of the lens as well as controlling the flow of aqueous humor into schlemm's canal,the ciliary muscle receives parasympathetic fibres from the short ciliary nerve that arise from the ciliary ganglion the postganglionic sympathetic innervation arises from the superior cervical ganglia.The sphincter pupillae is situated in the posterior part of the iris,near the pupil and consist of smooth muscles.They sphincter pupillae is supplied by parasympathetic fibres by way of short ciliary nerves and its contraction result in constriction of the pupil(miosis).

### CLINICAL CORRELANCE

#### HORNER'S SYNDROME

- Horner's syndrome refers to a triad of symptoms produced by damage to the sympathetic trunk in the neck:
- Partial ptosis (drooping of the upper eyelid) – Due to denervation of the superior tarsal muscle.
- Miosis (pupillary constriction) – Due to denervation of the dilator pupillae muscle.
- Anhidrosis (absence of sweating) on the ipsilateral side of the face – Due to denervation of the sweat glands.

Horner's syndrome can represent serious pathology, such as a tumour of the apex of the lung (Pancoast tumour), aortic aneurysm or thyroid carcinoma.