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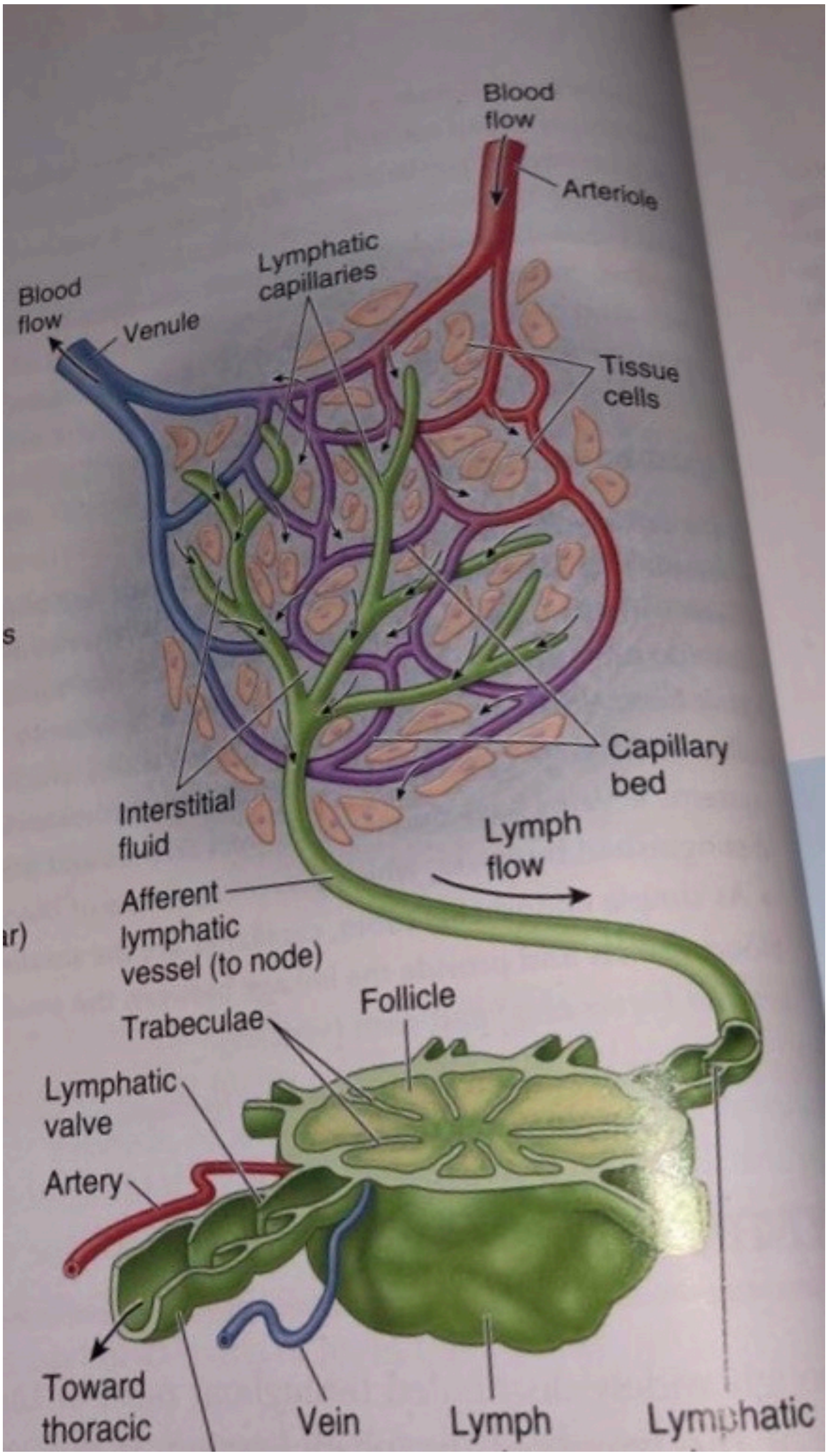
1 Describe the importance of vasculature in relation to immune system and outbreak of pandemic Covid-19 on the human body.

SARS-CoV-2 virus popularly known as coronavirus. Coronaviruses are positive-sense, single-stranded RNA viruses of the family Coronaviridae subfamily Coronavirinae that infect a wide range to produce diseases ranging from common cold to severe/fatal illnesses. Coronavirus disease (COVID-19) is an infectious disease caused by a new virus.

The coronavirus is like any other virus —not much more than a shell around genetic material and a few proteins. 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: copy information, assemble it, release it.
But this does not go unnoticed. Within a few minutes, the body's immune defense 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.
For many viruses and bacteria, this initial activity of the immune system is already sufficient to fight an intruder. It often happens very quickly and efficiently. We often notice only small signs that the system is working: We have a cold, a fever

Interferons are a subgroup of signaling proteins that are normally secreted by infected cells. SARS-CoV-1, which was responsible for the SARS epidemic in 2003, appears to have suppressed the production of one of these interferons and thus at least delayed the attraction of immune cells. To what extent this is also the case with SARS-CoV-2, the name given to the coronavirus behind the current pandemic, is still unclear. However, interferons support the body's own virus defense and are now being tested as a therapy in clinical trials.
At a certain point, however, the host response is so strong that its effect can be counterproductive. For example, numerous immune cells can enter our lungs and cause the membrane through which oxygen normally passes from the air into the blood to thicken. The exchange of gases is restricted, and in the worst case, ventilation may be necessary.
Sometimes the reaction can overshoot and be directed against healthy cells as well. This could also be the case with the novel coronavirus. So drugs are also being tested that suppress an excessive immune reaction and that are already known from the treatment of autoimmune diseases. The balance between protective and overly aggressive immune processes in dealing with the coronavirus is currently a big mystery.
After a time delay, the acquired immune system finally sets itself in motion. It is different for every person and depends on what we have experienced and with which pathogens we have come into contact. While T cells help destroy infected cells, B cells form antibodies that can keep the virus in check. In the case of the coronavirus, these are neutralizing antibodies that bind to the spike protein of the virus. This is the site of attack of the virus, with which it enters the host, i.e. our human cell.

Neutralizing antibodies specifically incapacitate the spike protein. Our immune system remembers the antibodies it has produced and is thus prepared for a new infection with the same intruder.



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

The adductor canal (subsartorial canal) is a narrow conical tunnel located in the thigh. It is approximately 15cm long, extending from the apex of the femoral triangle to the adductor hiatus of the adductor magnus. The canal serves as a passageway from structures moving between the anterior thigh and posterior leg.

Borders

The adductor canal is bordered by muscular structures:

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

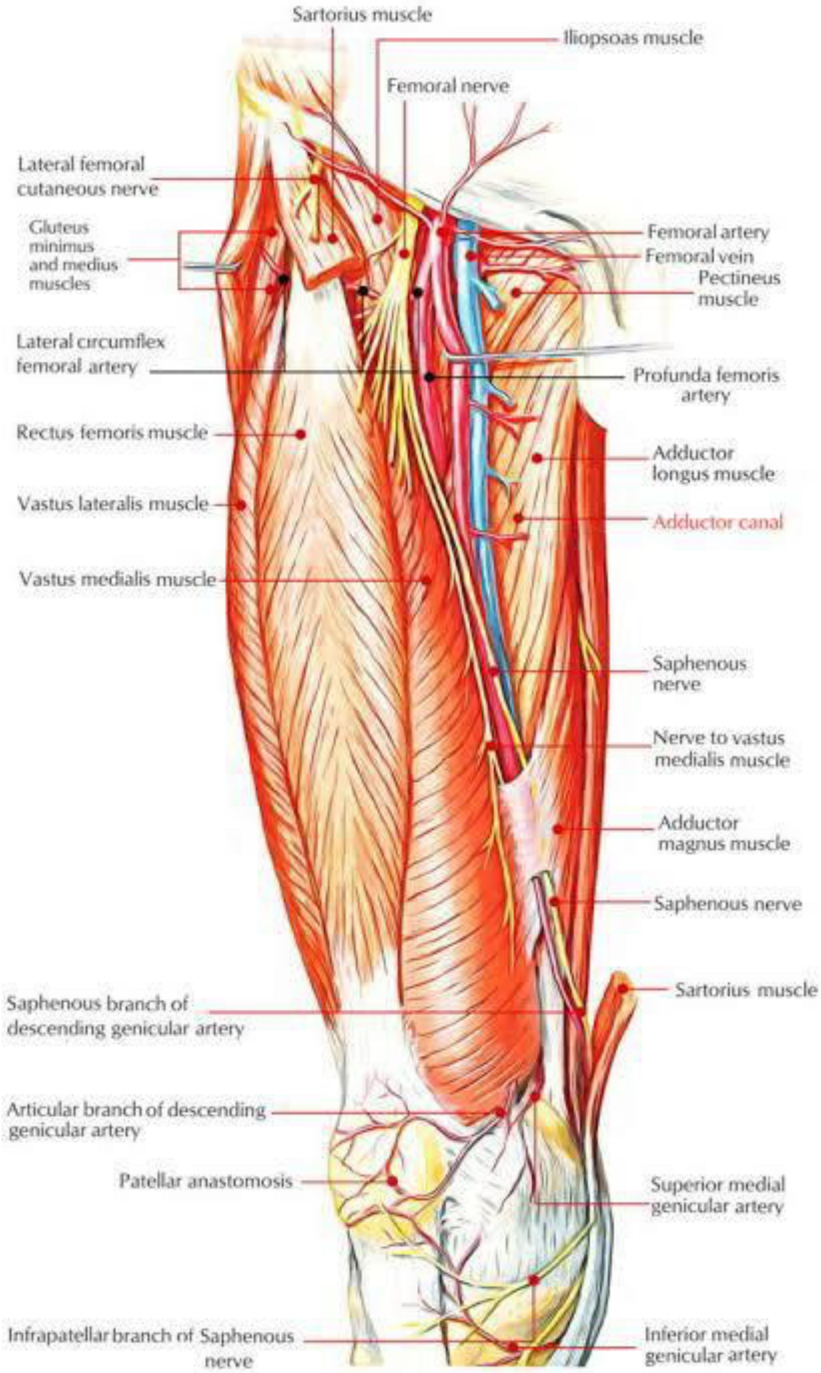
The adductor canal runs from the apex of the femoral triangle to the adductor hiatus – a gap between the adductor and hamstring attachments of the adductor magnus muscle.

Contents

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.



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

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 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:

a Responsible for eye movement – Recti and oblique muscles.

b Responsible for superior eyelid movement – Levator palpebrae superioris.

Levator Palpebrae Superioris

The levator palpebrae superioris (LPS) 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 muscle. In contrast to the LPS, the superior tarsal muscle is innervated by the sympathetic nervous system.

Attachments: Originates from the lesser wing of the sphenoid bone, immediately above the optic foramen. It attaches to the superior tarsal plate of the upper eyelid (a thick plate of connective tissue).

Actions: Elevates the upper eyelid.

Innervation: The levator palpebrae superioris is innervated by the oculomotor nerve (CN III). The superior tarsal muscle (located within the LPS) is innervated by the sympathetic nervous system.

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.

1 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).

2 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).

3 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).

4 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)

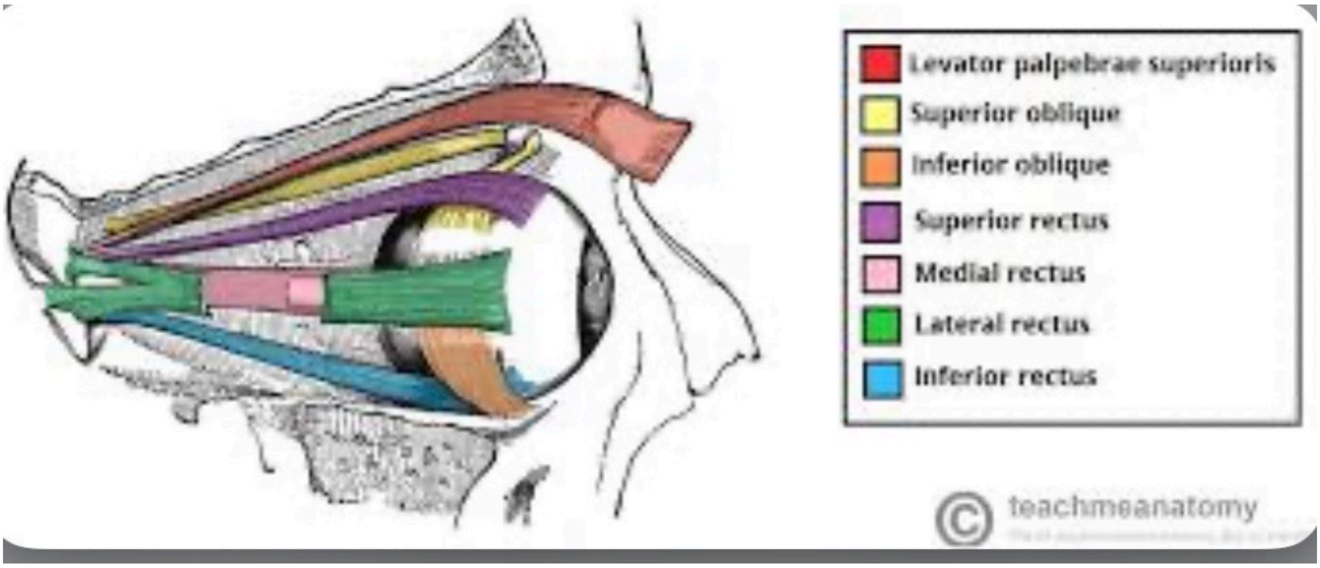
-Oblique Muscles
There are two oblique muscles – the superior and inferior obliques. Unlike the recti group of muscles, they do not originate from the common tendinous ring.
From their origin, the oblique muscles take an angular approach to the eyeball (in contrast to the straight approach of the recti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

1 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).

2 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).

Clinical Relevance: Cranial Nerve Palsies

The extraocular muscles are innervated by three cranial nerves. Damage to one of the cranial nerves will cause paralysis of its respective muscles. This will alter the resting gaze of the affected eye. Thus, a lesion of each cranial nerve has its own characteristic appearance:
-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’.
-Trochlear nerve (CN IV) – A lesion of CN IV will paralyse the superior oblique muscle. There is no obvious affect of the resting orientation of the eyeball. However, the patient will complain of diplopia (double vision), and may develop a head tilt away from the site of the lesion.
-Abducens nerve (CN VI) – A lesion of CN VI will paralyse the lateral rectus muscle. The affected eye will adducted by the resting tone of the medial rectus.

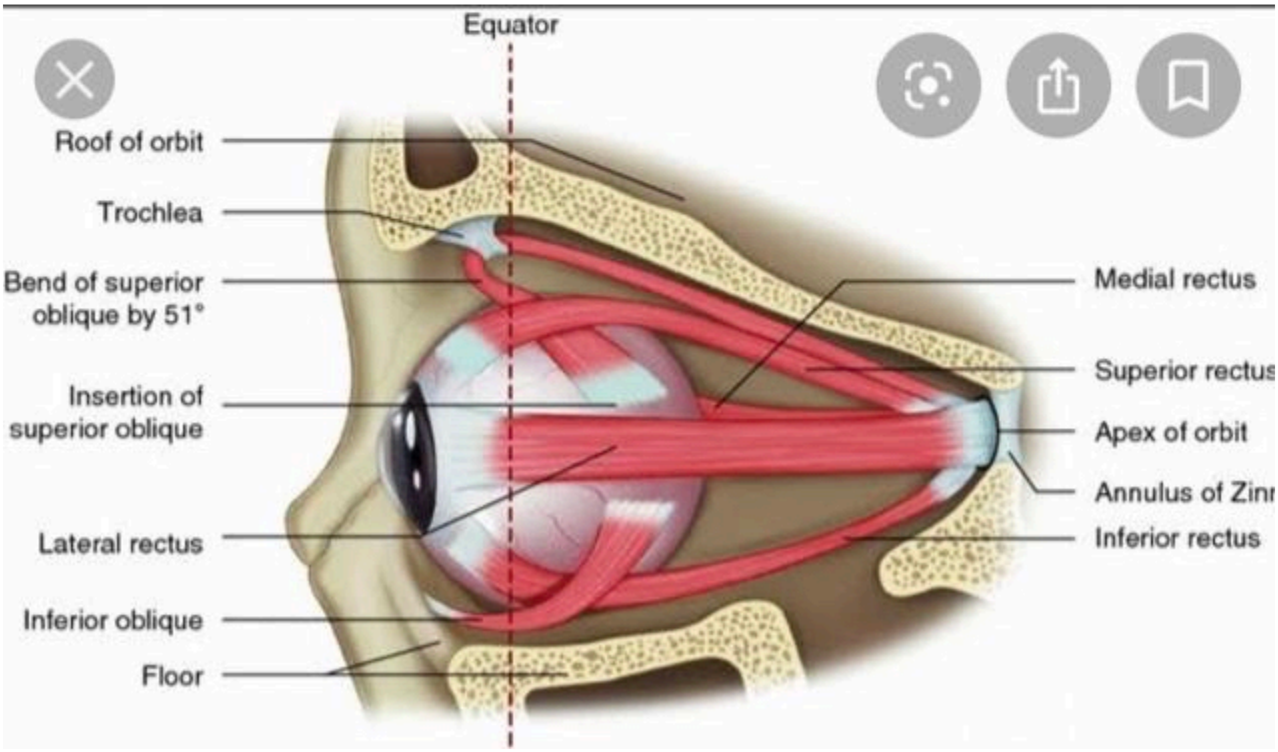


EXTRAOCULAR MUSCLE.

The intraocular muscles include the ciliary muscle, the sphincter pupillae, and the dilator pupillae. The ciliary muscle is a smooth muscle 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 is attached to the zonular fibers which suspend the lens. Upon contraction of the ciliary muscle, the tension on the lens is lessened which causes it to adopt a more spherical shape to focus on near objects. Relaxation of the ciliary muscle has the opposite effect, optimising distant focus. The sphincter pupillae and dilator pupillae are also composed of smooth muscle. The sphincter pupillae encircles the pupil and is responsible for the constriction of its diameter, while the dilator muscle is arranged radially and increases the pupillary diameter.

There are three primary axes of ocular movements: vertical, transverse, and anteroposterior. Rotation around the vertical axis results in either adduction (medial movement) or abduction (lateral movement) of the eye. Rotation around the transverse axis causes elevation (superior motion) or depression (inferior motion). The anteroposterior axis enables movement of the superior pole of the eye medially (intorsion) or laterally (extorsion). The rotations around the anteroposterior axis allow the eye to adjust to tilting of the head. The medial rectus muscle is responsible for medial rotation around the vertical axis, and the lateral rectus lateral rotation. The superior rectus muscle primarily elevates the eye and contributes to adduction and intorsion. The inferior rectus depresses and laterally rotates the eye and contributes to adduction and extorsion. The superior oblique abducts, depresses, and medially rotates the eye, while the inferior oblique abducts, elevates, and laterally rotates the eye.

The primary retractor of the upper eyelid is the levator palpebrae superioris, which is a skeletal muscle. The superior tarsal muscle (Müller's muscle) is comprised of smooth muscle and also contributes to the elevation of the upper eyelid. In the lower eyelid, the retractors are the capsulopalpebral fascia and the inferior tarsal muscle. The orbicularis oculi is the main protractor (closure) of the eyelids. It is a flat, ringlike band of skeletal muscle surrounding the anterior orbit composed of three parts: the orbital portion, the palpebral portion, and the lacrimal portion.



INTRAOCULAR MUSCLE