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Anatomy assignment

Questions

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

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

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

(1) The relation of vasculature in relation to immune system on the human body over the outbreak of pandemic Covid-19,when the virus gets in your body, it comes into contact with the mucous membranes that line your nose, mouth, and eyes. The virus enters a healthy cell and uses the cell to make new virus parts. It multiplies, and the new viruses infect nearby cells.

Example is the respiratory tract is seen as an upside-down tree. The trunk is your trachea, or windpipe. It splits into smaller and smaller branches in your lungs. At the end of each branch are tiny air sacs called alveoli. This is where oxygen goes into your blood and carbon dioxide comes out.

The new coronavirus can infect the upper or lower part of your respiratory tract. It travels down your airways. The lining can become irritated and inflamed. In some cases, the infection can reach all the way down into your alveoli.

COVID-19 is a new condition, and scientists are learning more every day about what it can do to your lungs. They believe that the effects on your body are similar to those of two other coronavirus diseases, severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS).

Mild cases:

As the infection travels your respiratory tract, your immune system fights back. Your lungs and airways swell and become inflamed. This can start in one part of your lung and spread.

About 80% of people who have COVID-19 get mild to moderate symptoms. You may have a dry cough or a sore throat. Some people have pneumonia, a lung infection in which the alveoli are inflamed.

Doctors can see signs of respiratory inflammation on a chest X-ray or CT scan. On a chest CT, they may see something they call “ground-glass opacity” because it looks like the frosted glass on a shower door.

Severe Cases

About 14% of COVID-19 cases are severe, with an infection that affects both lungs. As the swelling gets worse, your lungs fill with fluid and debris.

You might also have more serious pneumonia. The air sacs fill with mucus, fluid, and other cells that are trying to fight the infection. This can make it harder for your body to take in oxygen. You may have trouble breathing or feel short of breath. You may also breathe faster.

If your doctor takes a CT scan of your chest, the opaque spots in your lungs look like they start to connect to each other.

Critical Cases

In critical COVID-19 -- about 5% of total cases -- the infection can damage the walls and linings of the air sacs in your lungs. As your body tries to fight it, your lungs become more inflamed and fill with fluid. This can make it harder for them to swap oxygen and carbon dioxide.

You might have severe pneumonia or acute respiratory distress syndrome (ARDS). In the most critical cases, your lungs need help from a machine called a ventilator to do their job.

(2)The **adductor canal** (Hunter’s canal, subsartorial canal) is a narrow conical tunnel located in the thigh approximately 15cm long, extending from the apex of 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.

 The adductor canal 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:

Anteromedial wall - sartorius.

Posterior wall - adductor longus and adductor magnus.

Laterally - vastus medialis.

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.

Contents

The canal contains the :

(1)subsartorial artery (superficial femoral artery)

(2) subsartorial vein (superficial femoral vein)

(3) branches of the femoral nerve (specifically, the saphenous nerve, and the nerve to the vastus medialis).[

 The femoral artery with its vein and the saphenous nerve enter this canal through the superior foramen. Then, the saphenous nerve and artery and vein of genus descendens exit through the anterior foramen, piercing the vastoadductor intermuscular septum. Finally, the femoral artery and vein exit via the inferior foramen (usually called the hiatus) through the inferior space between the oblique and medial heads of adductor magnus

Clinical Relevance of this canal

1. 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. The sartorius and femoral artery are used as anatomical landmarks to locate the saphenous nerve.

(2)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.

It is most common in young males, who may present with claudication symptoms due to femoral artery occlusion (more common) or neurological symptoms due to entrapment of the saphenous nerve.

1. 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)Recti and oblique muscles: Responsible for eye movement

 (b)Levator palpebrae superioris: Responsible for superior eyelid movement

MUSCLES OF SUPERIOR EYELID MOVEMENT

**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 MOEMENT

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

(a)Recti Muscles

There are four recti muscles; superior rectus, inferior rectus, medial rectus and lateral rectus.

|  |  |  |  |
| --- | --- | --- | --- |
| Muscle | [Innervation](https://en.wikipedia.org/wiki/Innervation) | Origin |  Insertion action |
| [Medial rectus](https://en.wikipedia.org/wiki/Medial_rectus_muscle) | [Oculomotor nerve(inferior branch)](https://en.wikipedia.org/wiki/Inferior_branch_of_oculomotor_nerve) |  Medial part of common tendinous ring of [Annulus of Zinn](https://en.wikipedia.org/wiki/Annulus_of_Zinn) | Sclera through the tendon about 5.5mm posterior to the limbus adduction |
| [Lateral rectus](https://en.wikipedia.org/wiki/Lateral_rectus_muscle) | [Abducens nerve](https://en.wikipedia.org/wiki/Abducens_nerve) | [lateral part of common tendinous ring of Annulus of Zinn](https://en.wikipedia.org/wiki/Annulus_of_Zinn) | Sclera through the tendon about 6.9mm posterior to the limbus abduction |
| [Superior rectus](https://en.wikipedia.org/wiki/Superior_rectus_muscle) | [Oculomotor nerve(superior branch)](https://en.wikipedia.org/wiki/Superior_branch_of_oculomotor_nerve) | Superior part of common tendinous ring of [Annulus of Zinn](https://en.wikipedia.org/wiki/Annulus_of_Zinn) | Sclera through the tendon about 7.7mm posterior to the limbus elevation |
| [Inferior rectus](https://en.wikipedia.org/wiki/Inferior_rectus_muscle) | [Oculomotor nerve(inferior branch)](https://en.wikipedia.org/wiki/Inferior_branch_of_oculomotor_nerve) | Inferior part of common tendinous ring of [Annulus of Zinn](https://en.wikipedia.org/wiki/Annulus_of_Zinn) | Sclera through the tendon about 6.5mm posterior to the limbus depression |

The name recti is derived from the latin word for ‘straight’ that 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.

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.

(b ) 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).

Clinical anatomy: 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.

INTRAOCULAR MUSCLES

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.

BLOOD SUPPLY

The majority of the blood supply to the orbit is supplied by the ophthalmic artery which branches off of the internal carotid artery. A branch of the external carotid artery, the infra-orbital artery, also contributes blood supply to the orbital floor. Branches of the ophthalmic artery include the central retinal, supra-orbital, supratrochlear, lacrimal, dorsal nasal, short posterior ciliary, long posterior ciliary, posterior ethmoidal, anterior ethmoidal, and anterior ciliary (off of the muscular branches of the ophthalmic artery) arteries. Except for the central retinal artery and the ciliary arteries, which supply intraocular structures, these branches, as well as the infra-orbital artery off of the external carotid, all contribute to the vascular supply of the extraocular muscles and structures. The superior and inferior ophthalmic veins are responsible for venous drainage of the orbit.

CLINICAL ANATOMY

Strabismus occurs when the eyes are misaligned such that an object is not focused simultaneously on the fovea of each eye. A phoria is defined as the turning of an eye in (esophoria) or out (exophoria) upon occlusion of the opposite eye. Phorias are often asymptomatic but may degenerate into tropias. Tropias are recognized as spontaneous eye turn in the absence of an ocular occlusion. Tropias are often more prevalent with tiredness as phorias become more pronounced and the ability to compensate decreases. There are certain drugs which can result in temporary tropias.

Amblyopia results when the vision in one of the eyes is reduced because the eye and the brain are not working together properly. Strabismic amblyopia is the result of an eye misalignment and is treated initially by patching the good eye to force the child to use the amblyopic eye, and may ultimately require strabismus surgery. After age five, it is difficult to reverse amblyopic vision.