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1. IMPORTANCE OF VASCULATURE IN RELATION TO IMMUNE SYSTEM AND OUTBREAK OF PANDEMIC COVID-19

Covid-19 is a disease caused by the corona virus, it infects both the upper and lower airways.

Vasculature can be said to be the arrangement or distribution of blood vessels in an organ or a part of the body.

The body has several layers of protection, both physical and chemical barriers. They are always ready to react when something foreign enters the body, they are part of what we call the innate immune system. And a lot of the chemicals that these cells produces are some of the things that gives us sickness behavior, makes us feel ill but later the body starts to produce a specific molecule that targets a specific pathogen and reproduces potent antibodies.

RELATING THE CORONA VIRUS AND RESPIRATION

The corona virus enters human cells via the envelope spike glycoprotein, which is also responsible for the host –to- host transmission. This glycoprotein, which is found on the surface of the virus, binds to the ectoenzyme angiotensin-converting enzyme 2(ACE2; located on human cells) to gain entry into the cell.

In the respiratory system, ACE2 has the function of degrading angiotensin II into angiotensin 1-7 and acts as a key regulatory point for the angiotensin system. When ACE1 activity is increased and ACE2 is inhibited, intact angiotensin II acts via the angiotensin 1 receptor (AT1R) or ATR2 to exert pro-inflammatory response and stimulate aldosterone secretion; these effects not only increase blood pressure and potentially cause hypokalemia, but will also increase vascular permeability locally, increasing the risk of respiratory distress syndrome. By contrast, angiostensin1-7 acts on the Mas receptor pathway, which leads to anti-inflammatory and anti-fibrotic responses that would be favourable to the recovery of patients with COVID-19. It could be postulated that individuals with more severe COVD-19 have an imbalance in the activation of these pathways, with an increase in the activation of these pathways, with an increase in the activation of AT1R and AT2R, which could be the case in T2DM, hypertension and insulin-resistant states.

VIRAL ACTIVATION OF IMMUNITY

Immunity to viral infection is caused by a variety of specific and non-specific mechanisms. The activation of different immune functions and the duration and magnitude of the immune response depend on how the virus interacts with host cells (on whether it is a cytolytic, steady state, latent, and /or integrated infection) and on how the virus spreads. Therefore, viral antigens may be present in different parts of the body depending on the route of spread and phase of infection.

We have; a) Humoral immunity

b) Cell mediated immunity

ROLES OF IMMUNE FUNCTIONS DURING VIRAL INFECTIONS

The early, nonspecific responses (nonspecific inhibition, natural killer cell activity, and interferon) limit virus multiplication during the acute phase of virus infections. The later specific immune (humoral and cell-meditated) responses function to help eliminate virus at the end of the acute phase, and subsequently to maintain specific resistance to reinfection.

2. THE SUBSARTORIAL CANAL

The subsartorial canal is also called the ‘Hunter’s canal or the Adductor canal’. It is an intermuscular space or an aponeurotic tunnel situated on the medial side of the middle one-third of the thigh. It is approximately 15cm long, it is triangular on cross section and it extends from the apex of the femoral triangle above to the tendinous, opening in the adductor magnus below.

BOUNDARIES;

Anterior wall; formed by the vastus medialis

Posterior wall(floor); formed by the adductor longus above and the adductor magnus below

Medial wall(roof); formed by a strong fibrous membrane joining the anterior and posterior walls. The roof is overlapped by the sartorious.

CONTENTS;

1. The femoral vein lies posterior to the femoral artery in the upper part and lateral to the artery in the lower part of the canal
2. The sapheneous nerve crosses the femoral artery anteriorly from lateral to medial side
3. The nerve to the vastus medialis
4. Two divisions of the obturator nerve
5. The femoral artery enters the canal at the apex of the femoral triangle
6. The largest cutaneous branch of the femoral nerve

-As the femoral artery and vein exit the canal, they become the popliteal artery and vein respectively.

IMPORTANCE

-The canal serves as a passageway from structures moving between the anterior thigh and the posterior leg.

- It transmits the femoral artery, femoral vein, nerve to the vastus medialis and the saphenous nerve. The femoral artery with its vein and the saphenous nerve enter the adductor canal through the “superior foramen”. Then, the saphenous nerve and artery and vein of genus exit through the “anterior foramen”, piercing the vastoadductor intermuscular septum. Finally, the femoral artery and vein exits via the “inferior foramen”

CLINICAL SIGNIFICANCE

1. The femoral artery is exposed and ligated in the adductor canal during surgery for aneurysm of the popliteal artery.
2. 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.

c)Adductor canal compression syndrome; This describes the entrapment of the neurovascular bundle within the adductor canal. It is a rare condition and 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 or neurological symptoms due to entrapment of the saphenous nerve.

THE SUBSARTORIAL PLEXUS OF NERVES

This is located on the roofing under the “Sartorius”. It supplies the overlying fascia lata and the skin. The plexus is composed of; a) branches from the medial cutaneous nerve of the thigh.

b) The saphenous nerve

c) The anterior section of the obturator nerve.

3. EXTRAOCULAR AND INTRAOCULAR MUSCLES

EXTRAOCULAR MUSCLES

The extraocular muscles are located within the orbit, but they are extrinsic and separate from the eyeball itself. They act as controllers of the movement of the eyeball and the superior eyelid. They are derivatives of periocular mesenchyme.

There are seven extraocular muscles;

- levator palpebrae superioris

- Superior rectus

- Inferior rectus

-Medial rectus

- Lateral rectus

- Inferior oblique

- Superior oblique

These muscles are divided functionally into two groups;

1. RESPONSIBLE FOR EYE MOVEMENT; Recti and oblique muscles.
2. ; Levator palpebrae superioris.

MUSCLES FOR EYE MOVEMENT

There are six muscles involved in the movement of the eyeball itself and is divided into “the four recti muscles, and the two oblique muscles”.

RECTI MUSCLES; They originate from the common tendinous ring. From their origin, they pass anteriorly to attach the sclera of the eyeball. The recti muscles have a direct path from origin to attachment. We have four recti muscles namely; superior rectus, inferior rectus, medial rectus, lateral rectus.

INNERVATION; Oculomotor nerve

OBLIQUE MUSCLES; There are two oblique muscles, the superior and inferior oblique. And unlike the recti group, they do not originate from the common tendinous ring.

INNERVATION; Superior oblique is innervated by the trochlear nerve. While, the Inferior oblique is innervated by the oculomotor nerve.

MUSCLE FOR SUPERIOR EYELID MOVEMENT

The levator palpebrae superiosis (LPS) Is the only muscle involved in raising the superior eyelid. A small portion of this muscle contains a collection of smooth muscle fibers-known as the superior tarsal muscle.

INNERVATION; The levator paloebrae superioris is innervated by the oculomotor nerve. The superior tarsal muscle is innervated by the sympathetic nervous system.

INTRAOCULAR MUSCLES

The intraocular muscles include; the ciliary muscle, the sphincter pupillae, and the dilator pupillae.

THE CILIARY MUSCLE

This 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. Relaxation of the ciliary muscle optimizes distant focus. Its functions are mainly instructed by the parasympathetic nerve fibers of oculomotor nerve. It occupies the biggest portion of the ciliary body, which lies between the anterior border of the choroid and iris.

INNERVATION; Parasympathetic component of oculomotor nerve.

SPHINCTER PUPILLAE AND DIALATOR PUPILLAE

-The diameter of the pupil is dynamic and it is regulated by a pair of antagonistic muscles found in the iris; The sphincter pupillae and dilator pupillae. They are also composed of smooth muscle. Their function is to change the diameter of the pupil during two reflexive events;

The sphincter pupillae encircles the pupil and it is responsible for the constriction of its diameter(miosis). The dilator pupillae is arranged radially and dilates the pupillary diameter(midriasis).

INNERVATION; Parasympathetic fibers of oculomotor nerve via short ciliary nerves.