**OKOYE IFECHUKWU CHINELO**

**MEDICAL LABORATORY SCIENCE**

**GROSS ANATOMY**

**18/MHS01/271**

**THE DIFFERENCES BETWEEN VISCEROCRANIUM AND NEUROCRANIUM.**

The neurocranium is the bony covering of the brain and its membranous coverings, the cranial meninges. It also contains proximal parts of the cranial nerves and the vasculature of the brain. Meanwhile, the viscerocranium is the facial skeleton which comprises of facial bones. It forms the anterior part of the cranium. It consists of the bones surrounding the mouth, nose, and most of the orbits.

The neurocranium has two parts;the calvaria and basicranium. The neurocranium in adults is formed by a series of eight bones. Four are singular and the other two sets of bones occur as bilateral pairs. The four singular bones are; frontal,ethmoidal, sphenoidal and occipital bones. Thetwo sets of bones occurring as bilateral pairs are; temporal and parietal bone. Meanwhile the viscerocranium consists of 15 irregular bones. Three are singular bones while six bones occur as bilateral pairs. The three singular boones are mandible, ethmoid, vomer bones. The 6 bilateral paired bones are; maxillae, inferior nasal conchae, zygomatic, palatine, nasal and lacrimal bones.

**THE FEMORAL TRIANGLE AS A SPECIAL AREA OF THE THIGH.**

The femoral triangle is a wedge shaped depression formed by the muscles in the upper thigh at the junction between the anterior abdominal wall and the lower limb;

* The base of the triangle is the inguinal ligament.
* The medial border is the medial margin of the adductor longus muscle in the medial compartment of the thigh.
* The lateral margin is the medial margin of the Sartorius muscle in the anterior compartment of the thigh.
* The floor of the triangle is formed medially by the pectineus and adductor longus muscles in the medial compartment of the thigh and laterally by the iliopsoas muscle descending f4rom the abdomen.
* The apex of the femoral triangle points inferiorly and is continuous with a fascial canal which descends medially down the thigh and posteriorly through an aperture in the lower end of one of the largest of the adductor muscles in the thigh(the adductor magnus muscle) to open into the popliteal fossa behind the knee.

The femoral nerve, artery, and vein and lymphatics pass between the abdomen and lower limb under the inguinal ligament and in the femoral triangle. The femoral artery and vein pass inferiorly through the adductor canal and become the popliteal vessels behind the knee where they meet and are distributed with branches of the sciatic nerve, which descends through the posterior thigh from the gluteal region.

From lateral to medial, major structures in the femoral triangle are the femoral nerve, the femoral artery, the femoral vein, and the lymphatic vessels. The femoral artery can be palpated in the femoral triangle just inferior inguinal ligament and midway between the anterior superior iliac spine and the pubic symphisis.

CLINICAL SIGNIFICANCE; since the femoral triangle provides easy access to a major artery, coronary angioplasty and peripheral angioplasty is often performed by entering the femoral artery at the femoral triangle. Heavy bleeding in the leg can be stopped by applying pressure to points at the femoral triangle. A nother clinical significance of the femoral triangle is that the femoral artery is positioned at the midinguinal point, medial to it lies the femoral vein. Thus the femoral vein once located allows for femoral venipuncture. Femoral venipuncture is useful when there are no superficial veins that can be aspirated in a patient, in the case of collapsed veins in other parts of the body. The positive pulsation of the femoral artery signifies that the heart is beating and also blood is flowing from to the lower extremity.

**THE MUSCLES OF THE LOWER LIMB THAT PARTICIPATES DURING 1METER SOCIAL DISTANCING AT THE PERIOD OF COVID 19.**

MUSCLES OF THE GLUTEAL REGION

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| --- | --- | --- | --- | --- |
| MUSCLE | ORIGIN | INSERTION | INNERVATION | FUNCTION |
| piriformis | Anterior surface of sacrum between anterior sacral foramina | Medial side of superior border of greater trochanter of femur | Branches from S1 to S2 | Laterally rotates the extended femur at the hip joint; abducts flexed femur at the hip joint |
| Obturator internus | Anterolateral wall of true pelvis; deep surface of obturator membrane and surrounding bone | Medial side of greater trochanter of femur | Nerve to obturator internus (L5 to S1) | Laterally rotates the extended femur at hip joint; abducts flexed femur at the hip joint |
| Gemellus superior | Extend surface of ischial spine | Along length of superior surface of the obturator internus tendon and into the medial side of the greater trochanter of the femur with obturator internus tendon | Nerve to obturator internus ( L5 to S1) | Laterally rotates the extended femur at hip joint; abducts flexed femur at the hip joint |
| Gamellus inferior | Upper aspect of ischial tuberosity | Along length of inferior surface of the obturator internus tendon and into the medial side of the greater trochanter of femur with obturator internus tendon | Nerve to quadratus femoris ( L5 to S1) | Laterally rotates the extended femur at hip joint; abducts flexed femur at hip joint |
| Quadrates femoris | Lateral aspect of the ischium just anterior to the ischial tuberosity. | Quadrate tubercle on thr intertrochanteric crest of the proximal femur | Nerve to quadrates femoris (L5 to S1) | Laterally rotates femur at hip joint |
| Gluteus minimus | External surface of ilium between inferior and anterior gluteal lines | Linear facet on anterolateral aspect of the greater trochanter | Superior gluteal nerve ( L4, L5,S1) | Abducts femur at the hip joint; holds pelvis secure over stance leg and prevents pelvic drop on the opposite swing side during walking; medially rotates thigh |
| Gluteus medius | External surface of ilium between anterior and posterior gluteal lines | Elongate facet on the lateral surface of the greater trochanter | Superior gluteal nerve | Abducts femur at hip joint; holds pelvis secure over stance leg and prevents pelvic drop on the opposite swing side during walking; medially rotates thigh. |

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| Gluteus maximus | Fascia covering gluteus medius, esternal surface of ilium behind posterior gluteal line,fascia of erector spinae, dorsal surface of lower sacrum, lateral margin of coccyx, external surface of sacrotuberous ligament | Posterior aspect of iliotibial tract of facia lata and gluteus tuberosity of proximal femur | Inferior gluteal nerve | Powerful extensor of flexed femur at hip joint; lateral stabilizer of hip joint and knee joint; laterally rotates and abducts thigh |
| Tensor fascia latae | Lateral aspect of crest of ilium between anterior superior iliac spine and tubercle of the crest | Iliotibial tract of facia lata | Superior gluteal nerve | Stabilizes the knee in extension |

MUSCLES OF THE ANTERIOR COMPARTMENT OF THE THIGH

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| MUSCLE  | ORIGIN | INSERTION | INNERVATION | ACTION |
| Psoas major | Posterior abdominal wall | Lesser trochanter of femur | Anterior rami | Flexes the thigh at the hip joint |
| iliacus | Posterior abdominal wall | Lesser trochanter of femur | Femoral nerve | Flexes the thigh at the hip joint |
| Vastus medialis | Femur-medial part of intertrochanteric line, pectineal line, medial lip of linea aspera, medial supracondylar line | Quadriceps femoris tendon and medial border of patella | Femoral nerve | Extends the leg at the knee joint |
| Vastus intermedius | Femur- upper two thirds of anterior and lateral surfaces | Quadriceps femoris tendon and lateral margin of patella, and lateral condyle of tibia | Femoral nerve | Extends the leg at the knee joint |
| Vastus lateralis | Femur- lateral part of intertrochanteric line, margin of greater trochanter, lateral margin of gluteal tuberosity, lateral lip of linea aspera. | Quadriceps femoris tendon and lateral margin of patella | Femoral nerve | Extends the leg at the knee joint |
| Rectus femoris | Straight head originates from the anterior inferior iliac spine; reflected head originates from the ilium just superior to the acetabulum | Quadriceps femoris tendon | Femoral nerve | Flexes the thigh at the hip joint and extends the leg at the knee joint |
| sartorius | Anterior superior iliac spine | Medial surface of tibia just inferomedial to tibial tuberosity | Femoral nerve | Flexes the thigh at the hip joint and flexes the leg at the knee joint |

MUSCLES OF THE MEDIAL COMPARTMENT OF THE THIGH

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| MUSCLE | ORIGIN | INSERTION | INNERVATION | ACTION |
| Gracilis | A line on the external surfaces of the body of the pubis, the inferior pubic ramus, and the ramus of the ischium | Medial surface of the proximal shaft of tibia | Obturator nerve | Adducts thigh at hip joint and flexes leg at knee joint |
| Pectineus | Pectineal line and adjacent bone of pelvis | Obligue line extending from base of lesser trochanter to linea aspera on posterior surface of proximal femur | Femoral nerve | Adducts and flexes thigh at hip joint |
| Adductor longus | External surface of pubis  | Linea aspera on middle one- third of shaft of femur | Obturator nerve | Adducts and medially rotates thigh at hip joint |
| Adductor brevis | External surface of body of pubis and inferior pubic ramus | Posterior surface of proximal femur and upper one-third of linea aspera | Obturator nerve | Adducts and medially rotates thigh at hip joint |
| Adductor magnus | Adductor part- ischipubic ramus Hamsting part- ischial tuberosity | Posterior surface of proximal femur, linea aspera,medial supercondylar lineAdductor tubercle and supercondylar line | Obturator nerve and sciatic nerve for the hamstring part | Adducts and medially rotates thigh at hip joint |
| Obturator internus | External surface of obturator membrane and adjacent bone | Trochanteric fossa | Obturator nerve | Laterally rotates thigh at hip joint |
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MUSCLES OF THE POSTERIOR COMPARTMENT OF THE THIGH

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| MUSCLES  | ORIGIN | INSERTION | INNERVATION | ACTION |
| Biceps femoris | Long head- inferomedial part of the upper area of the ischial tuberosity;Short head- lateral lip of linea aspera | Head of fibula | Sciatic nerve | Flexes leg at knee joint; extends and laterally rotates thigh at hip joint and laterally rotates leg at knee joint |
| semitendinosus | Inferomedial part of the upper area of the ischial tuberosity | Medial surface of proximal tibia | Sciatic nerve | Flexes leg at knee joint and extends thigh at hip joint; medially rotaes thigh at the hip joint and leg at the knee joint |
| semimembranosus | Superolateral impression on the ischial tuberosity | Groove and adjacent bone on medial and posterior surface of the medial tibial condyle | Sciatic nerve | Flexes leg at knee joint and extends thigh at the hip joint; medially rotates thigh at the hip joint and leg at the knee joint |

SUPERFICIAL GROUP OF MUSCLES IN THE POSTERIOR COMPARTMENT OF THE LEG

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| MUSCLE  | ORIGIN | INSERTION | INNERVATION | ACTION |
| Gastrocnemius | Medial head- posterior surface of distal femur just superior to medial condyle; lateral head- upper posterolateral surface of lateral femoral condyle | Via calcaneal tendon, to posterior surface of calcaneus | Tibial nerve | Planterflexes foot and flexes knee |
| Plantaris | Inferior part of lateral supracondylar line of femur and oblique popliteal ligament of knee | Via calcaneal tendon, to posterior surface of calcaneus | Tibial nerve | Planterflexes foot and flexes knee |
| soleus | Soleal line and medial border of tibia; posterior aspect of fibular head and adjacent surfaces of neck of proximal shaft; tendinous arch between tibial and fibular attachments  | Via calcaneal tendon, to posterior surface of calcaneus | Tibial nerve | Planterflexes the foot |

DEEP GROUP OF MUSCLES IN THE POSTERIOR COMPARTMENT OF THE LEG

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| --- | --- | --- | --- | --- |
| MUSCLE | ORIGIN | INSERTION | INNERVATION | ACTION |
| popliteus | Lateral femoral condyle | Posterior surface of proximal tibia | Tibial nerve | Stabilizes knee joint |
| Flexor hallucis longus | Posterior surface of fibula and adjacent interosseous membrane | Plantar surface of distal phalanx of great toe | Tibial nerve | Flexes great toe |
| Flexor digitorum longus | Medial side of posterior surface of tibia | Plantar surfaces of bases of distal phalanges of the lateral four toes | Tibial nerve | Flexes lateral four toes |
| Tibialis posterior | Posterior surfaces of interosseous membrane and adjacent regions of the tibia nad fibula | Mainly to tuberosity of navicular and adjacent region of medial cuneiform | Tibial nerve | Inversion and planterflexion of foot; support of medial arch of foot during walking |

MUSCLES OF THE LATERAL COMPARTMENT OF THE LEG

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| MUSCLES | ORIGIN | INSERTION | INNERVATION | ACTION |
| Fibularis longus | Upper lateral surface of fibula, head of fibula, and occasionally the lateral tibial condyle | Undersurface of lateral side of disatal end of medial cuneiform and base of metatarsals | Superficial fibular nerve | Eversion and planterflexion of foot; supports arches of the foot |
| Fibularis brevis | Lower two-thirds of lateral surface of shaft of fibular | Lateral tubercle at base of metatarsal V | Superficial fibular nerve | Eversion of foot |

MUSCLES OF THE ANTERIOR COMPARTMENT OF LEG

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| --- | --- | --- | --- | --- |
| MUSCLE | ORIGIN | INSERTION | INNERVATION | ACTION |
| Tibialis anterior |  Lateral surface of tibia and adjacent interosseous membrane | Medial and inferior surfaces of medial cuneiform and adjacent surfaces on the base of metatarsal 1 | Deep fibular nerve | Dorsiflexion of foot at ankle joint; inversion of foot; dynamic support of medial arch of foot |
| Extensor hallucis longus | Middle one- half of medial surface of fibula and adjacent surface of interosseous membrane | Dorsal surface of base of distal phalanx of great toe | Deep fibular nerve | Extension of great toe and dorsiflexion of foot |
| Extensor digitorum longus | Proximal one- half of medial surface of fibula and related surface of lateral tibial condyle | Via dorsal digital expansions into bases of distal and middle phalanges of lateral four toes | Deep fibular nerve | Extension of lateral four toes and dorsiflexion of foot  |
| Fibularis tertius | Distal part of the medial surface of the fibula | Dorsomedial surface of base of metatarsal V | Deep fibular nerve | Dorsiflexion and eversion of foot |

MUSCLES OF THE DORSAL ASPECT OF THE FOOT

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| MUSCLES  | ORIGIN | INSERTION | INNERVATION | ACTION |
| Extensor digitorum brevis | Superolateral surface of the calaneus | Lateral sides of the tendons of extensor digitorum longus of toes II to IV | Deep fibular nerve | Extension of toes II to IV |
| Extensor hallucis brevis | Superolateral surface of calceneus | Base of proximal phalanx of great toe | Deep fibular nerve | Extension of metatarsophalangeal joint at great toe |

FIRST LAYER OF MUSCLES IN THE SOLE OF THE FOOT

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| --- | --- | --- | --- | --- |
| MUSCLE | ORIGIN | INSERTION | INNERVATION | ACTION |
| Abductor hallucis | Medial process of calceneal tuberosity | Medial side of base of proximal phalanx of great toe | Medial plantar nerve from the tibial nerve | Abducts and flexes toe at metatarsophalangeal joint |
| Flexor digitorum brevis | Medial process of calceneal tuberosity and planter aponeurosis | Sides of plantar surface of middle phalanges of lateral four toes | Medial plantar nerve from the tibial nerve | Flexes lateral four toes at the proximal interphalangeal joint |
| Abductor digiti minimi | Lateral and medial processes of the calcaneal tuberosity | Lateral side of base of proximal phalanx of little toe | Lateral plantar nerve from the tibial nerve | Abducts little toe at the metatarsophalangeal joint |

SECOND LAYER OF MUSCLES IN THE SOLE OF THE FOOT

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| --- | --- | --- | --- | --- |
| MUSCLE | ORIGIN | INSERTION | INNERVATION | ACTION |
| Quadratus plantae | Medial surface of calcaneus and lateral process ocalcaneal tuberosity | Lateral side of tendon of flexor digitorum longus in proximal sole of the foot | Lateral plantar nerve from tibial nerve | Assists flexor digitorum longus tendon in flexing toes II to IV |
| Lumbricals | First lumbricals- medial side of tendon of floxor digitorum longus associated with toe II; second, third, and fourth lumbricals- adjacent surfaces of adjacent tendons of flexor digitorum longus | Medial free margins of extensor hoods of toes II to V | First lumbical- medial plantar nerve from the tibial nerve; second, third, and fourth lumbricals- lateral plantar nerve from the tibial nerve | Flexion of metatarsophalangeal joint and extension of interphalangeal joint and extension of interphalangeal joints |

THIRD LAYER OF MUSCLES IN THE SOLE OF THE FOOT

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| --- | --- | --- | --- | --- |
| MUSCLES | ORIGIN | INSERTION | INNERVATION | ACTION |
| Flexor hallucis brevis | Plantar surface of cuboid and lateral cuneiform; tendon of tibialis posterior | Lateral and medial sides of base of proximal phalanx of the great toe | Medial plantar nerve from tibial nerve | Flexes metatarsophalangeal joint of the great toe  |
| Adductor hallucis | Transverse head- ligaments associated with metatarsophalangeal joints of lateral three toes; oblique head- bases of metatarsals II to IV and from sheath covering fibularis longus | Lateral side of base of proximal phalanx of great toe | Latearal plantar nerve from tibial nerve | Adducts great toe at metatarsophalangeal  |
| Flexor digiti minimi brevis | Base of metatarsal V and related sheath of fibularis longus tendon | Latearal side of base of proximal phalanx of the little toe | Lateral plantar nerve from tibial nerve | Flexes little toe at metatarsophalangeal joint |

FOURTH LAYER OF MUSCLES IN THE SOLE OF THE FOOT

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| --- | --- | --- | --- | --- |
| MUSCLE  | ORIGIN | INSERTION | INNERVATION | ACTION |
| Dorsal interossei | Sides of adjacent metatarsals | Extensor hoods and bases of proximal phalanges of toes II to IV | Lateral plantar nerve from tibial nerve | Abduction of toes II to IV at metatarsophalangeal joints |
| Plantar interossei | Medial sides of metatarsals of toes III to V | Extensor hoods and bases of proximal phalanges of toes III to V | Lateral plantar nerve from tibial nerve | Adduction of toes III to V at metatarsophalangeal joints |

WHAT CORONA VIRUS AFFECTS IN THE BODY WITH THE UNDERSTANDING OF GROSS ANATOMY.

Corona virus affects the respiratory system, which is a group of organs and tissues that allow thw body to breathe, especially the lungs. The lungs when affected by corona virus exhibits edema, liquid proteinaceous secretions, fibrous connective tissue lesions with patchy inflammation, and multinucleated giant cells.