**IQRA NATIONAL UNIVERSITY**

 **DEPARTMENT OF ALLIED HEALTH SCIENCES**

**Mid-Term Examination (Summer 2020)**

**Course Title: Human Anatomy- II Instructor: Dr. Arooba.**

**Time: 4 hours**

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**Note:**

* **Attempt all questions from this section, all questions carry equal marks.**
* **Add diagrams where needed.**

Q1. Write a complete note on the walls of pelvis.

Answer No 1!The bony pelvis is formed by the hip bones in front and at the sides and by the sacrum and coccyx behind. When a subject is in the anatomical position, the anterior superior iliac spines and the pubic tubercles are in the same coronal plane. The pelvic surface of the body of the pubis, on which the bladder rests, faces more upward than backward. The pelvic surface of the sacrum faces more downward than forward.

The (lesser) pelvis has an inlet, a cavity, and an outlet, each of which has three main diameters: anteroposterior (or conjugate) oblique, and transverse.

The pelvic inlet.

The pelvic inlet, or brim (upper pelvic aperture), is indicated by the lineae terminales, the iliac parts of which are the arcuate lines. The inlet is at about half a right angle to the horizontal. The anteroposterior (or true) conjugate diameter extends from the upper margin of the pubic symphysis to the middle of the sacral promontory. The obstetrical conjugate diameter, which is measured from the back ofthe pubic symphysis. is the shortest diameter through which the fetal head must pass in its course through the inlet. The diagonal conjugate diameter, between the lower margin of the pubic symphysis and the sacral promontory is measured per vaginam Inability to palpate the sacral promontory suggests that the conjugate diameter of the inlet is adequate for parturition, whereas palpation indicates a contracted pelvis.

The pelvic cavity.

The pelvic cavity extends backward and downward from the inlet to the outlet. It curves with the sacrum and coccyx, and hence is longer behind than in front

The pelvic outlet.

The pelvic outlet (lower pelvic aperture) extends from the pubic symphysis to the tip of the coccyx (its anteroposterior, or conjugate, diameter and, from side to side, between the ischial tuberosities; hence it is diamond shaped. The outlet is at a slight angle to the horizontal.

The pubic arch formed by the conjoined rami of the pubes and ischia has its apex at the symphysis, where it forms the subpubic angle.

The path taken through the pelvic cavity by the fetal head is known as the axis of the birth canal. The axis intersects the inlet at a right angle, turns forward at the uterovaginal angle (level of ischial spines), and follows the axis of the vagina. During parturition, the fetal head (usually the suboccipitobregmatic diameter) occupies successively the inlet (transverse diameter), cavity (oblique diameter, and outlet (anteroposterior diameter).

Classification of Pelves.

Although pelves can be arranged by the measurements of their diameters, it is usual in obstetrics and radiology to classify pelves according to the shape of the pelvic inlet. Four main types are recognized: (1) gynecoid, a rounded inlet; (2) android, a heart-shaped inlet; (3) anthropoid, a long, narrow, oval inlet; and (4) platypelloid, an ovoid inlet with its long axis transverse, like a flat bowl. A female pelvis may belong to any of the four types (only about half are gynecoid), but intermediate types are more frequent. The female pelvis tends to have thinner and lighter bones with less prominent muscular markings, and the subpubic angle is less acute (approximating a right angle. Pelvic diameters and shape can be determined in vivo by radiographic pelvimetry.

Joints of pelvis

The joints of the pelvis include the lumbosacral, sacrococcygeal, and sacro-iliac, and the pubic symphysis. Associated ligaments include the sacrotuberous, sacrospinous, and iliolumbar.

The lumbosacral joint is that between L.V.5 and the sacrum. It includes an intervertebral disc and joints between the articular processes. The sacrococcygeal joint, which may undergo bony fusion, consists of an intervertebral disc between the sacrum and coccyx and accessory ligaments.

The sacro-iliac joints are synovial articulations between the auricular surfaces of the sacrum and ilium on each side. The surfaces may be smooth and flat or reciprocally curved and irregular. The joint is strengthened posteriorly by interosseous and dorsal sacro-iliac ligaments. The weight of the body is transmitted through the sacrum and ilia to the femora during standing and to the ischial tuberosities in sitting.

The pubic symphysis is a cartilaginous joint between the bodies of the pubic bones in the median plane. The symphysial surfaces, each covered by hyaline cartilage, are united by an interpubic disc of fibrocartilage, which may present a cleft. The ligaments around the joint become relaxed during pregnancy.

The sacrotuberous ligament extends from the dorsal surface ofthe sacrum (as well as from the ilium and coccyx) to the ischial tuberosity. The sacrospinous ligament extends from the lateral margin of the sacrum (and coccyx) to the ischial spine. The sacrotuberous ligament converts the sciatic notches into foramina, which are separated from each other by the sacrospinous ligament. The greater sciatic foramen transmits the piriformis muscle, superior and inferior gluteal vessels and nerves, (internal) pudendal vessels and nerve, sciatic and posterior femoral cutaneous nerves, and the nerves to the obturator intemus and quadratus femoris muscles. The lesser sciatic foramen transmits the obturator intemus tendon, the nerve to the obturator intemus, and the (internal) pudendal vessels and nerve .

Walls of pelvis

The wall of the pelvic cavity includes (1) superficial muscles, such as the glutei; (2) the hip bones, the sacrum and coccyx, and their associated ligaments; and (3) deep muscles, blood vessels, nerves, and peritoneum. For descriptive purposes, the pelvic wall can be subdivided into two lateral walls, a posterior wall, and a floor.

Each lateral wall limited by the hip bone below the linea terminalis, is lined by the obturator internus muscle, medial to which are the obturator nerve and vessels and other branches of the internal iliac artery. Rarely, the intestine may protrude through the obturator canal (obturator hernia) and lie under cover of the pectineus. The lateral wall of the pelvis is crossed behind by the ureter and in front by the round ligament or the ductus deferens. The ovary lies in a slight depression on the lateral wall. The lateral and posterior walls are separated by the sacrotuberous and sacrospinous ligaments and by the greater and lesser sciatic foramina.

The posterior wall, formed by the sacrum and coccyx, is lined laterally by the piriformis and coccygeus muscles. The lumbosacral trunk and sacral plexus are situated in front of the piriformis. In the median plane is the median sacral artery (from the aorta), which ends in a vascular mass, the coccygeal body or glomus.

The pelvic floor (a term variously defined) may conveniently be considered as the main structures that support the abdominal and pelvic viscera, i.e., the peritoneum and the pelvic and urogenital diaphragms. The peritoneum descends to be reflected from the front of the rectum to the bladder (rectovesical pouch in the male) or to the uterus and vagina (rectouterine and rectovaginal pouches in the female. The pouches are bounded laterally by peritoneal elevations that are frequently termed sacrogenital folds. In front, the peritoneum is reflected from the uterus to the bladder (uterovesical pouch). The blood vessels and neural plexuses to the viscera (as well as the ureter and ductus deferens) are situated in the connective tissue between the peritoneum and the pelvic diaphragm. Localized thickenings of this extraperitoneal tissue form ligaments. The pelvic floor has two median openings, one for the rectum and the other for the urethra (and vagina).

Q2. What do you know about the anatomy of talus bone?

Answer No 2: The talus Latin for ankle, talus bone or ankle bone is one of the group of foot bones known as the tarsus. The tarsus forms the lower part of the ankle joint. It transmits the entire weight of the body from the lower legs to the foot.The talus has joints with the two bones of the lower leg, the tibia and thinner fibula. These leg bones have two prominences (the lateral and medial malleoli) that articulate with the talus. At the foot end, within the tarsus, the talus articulates with the calcaneus (heel bone) below, and with the curved navicular bone in front; together, these foot articulations form the ball-and-socket-shaped talocalcaneonavicular joint.

The talus is the second largest of the tarsal bones it is also one of the bones in the human body with the highest percentage of its surface area covered by articular cartilage. It is also unusual in that it has a retrograde blood supply, i.e. arterial blood enters the bone at the distal end.[citation needed]

In humans, no muscles attach to the talus, unlike most bones, and its position therefore depends on the position of the neighbouring bones.

Q3. Write a brief note on the hip joint.

Answer NO 3 The hip joint is a ball and socket synovial joint, formed by an articulation between the pelvic acetabulum and the head of the femur.

It forms a connection from the lower limb to the pelvic girdle, and thus is designed for stability and weight-bearing – rather than a large range of movement.

In this article, we shall look at the anatomy of the hip joint – its articulating surfaces, ligaments and neurovascular supply.

Articulating Surfaces

The hip joint consists of an articulation between the head of femur and acetabulum of the pelvis.

The acetabulum is a cup-like depression located on the inferolateral aspect of the pelvis. Its cavity is deepened by the presence of a fibrocartilaginous collar – the acetabular labrum. The head of femur is hemispherical, and fits completely into the concavity of the acetabulum.

Both the acetabulum and head of femur are covered in articular cartilage, which is thicker at the places of weight bearing.

The capsule of the hip joint attaches to the edge of the acetabulum proximally. Distally, it attaches to the intertrochanteric line anteriorly and the femoral neck posteriorly.Ligaments

The ligaments of the hip joint act to increase stability. They can be divided into two groups – intracapsular and extracapsular:

Intracapsular

The only intracapsular ligament is the ligament of head of femur. It is a relatively small structure, which runs from the acetabular fossa to the fovea of the femur.

It encloses a branch of the obturator artery (artery to head of femur), a minor source of arterial supply to the hip joint.

Extracapsular

There are three main extracapsular ligaments, continuous with the outer surface of the hip joint capsule:

Iliofemoral ligament  arises from the anterior inferior iliac spine and then bifurcates before inserting into the intertrochanteric line of the femur.Stabilising Factors

The primary function of the hip joint is to weight-bear. There are a number of factors that act to increase stability of the joint.

The first structure is the acetabulum. It is deep, and encompasses nearly all of the head of the femur. This decreases the probability of the head slipping out of the acetabulum (dislocation).

There is a horseshoe shaped fibrocartilaginous ring around the acetabulum which increases its depth, known as the acetabular labrum. The increase in depth provides a larger articular surface, further improving the stability of the joint.

The iliofemoral, pubofemoral and ischiofemoral ligaments are very strong, and along with the thickened joint capsule, provide a large degree of stability. These ligaments have a unique spiral orientation; this causes them to become tighter when the joint is extended.

In addition, the muscles and ligaments work in a reciprocal fashion at the hip joint:

Anteriorly, where the ligaments are strongest, the medial flexors (located anteriorly) are fewer and weaker.Posteriorly, where the ligaments are weakest, the medial rotators are greater in number and stronger – they effectively ‘pull’ the head of the femur into the acetabulum.Movements and Muscles

The movements that can be carried out at the hip joint are listed below, along with the principle muscles responsible for each action:

Flexion :  iliopsoas, rectus femoris, sartorius, pectineus

Extension : gluteus maximus; semimembranosus, semitendinosus and biceps femoris (the hamstrings)

Abduction : gluteus medius, gluteus minimus, piriformis and tensor fascia latae

Adduction : adductors longus, brevis and magnus, pectineus and gracilis

Lateral rotation : biceps femoris, gluteus maximus, piriformis, assisted by the obturators, gemilli and quadratus femoris.

Medial rotation : anterior fibres of gluteus medius and minimus, tensor fascia latae

The degree to which flexion at the hip can occur depends on whether the knee is flexed – this relaxes the hamstring muscles, and increases the range of flexion.

Extension at the hip joint is limited by the joint capsule and the iliofemoral ligament. These structures become taut during extension to limit further movement.

Q4. Write note on the ligaments of knee joint.

Answer No 4: The knee joint is a hinge type synovial joint, which mainly allows for flexion and extension (and a small degree of medial and lateral rotation). It is formed by articulations between the patella, femur and tibia.

In this article, we shall examine the anatomy of the knee joint – its articulating surfaces, ligaments and neurovascular supply.Articulating Surfaces

The knee joint consists of two articulations – tibiofemoral and patellofemoral. The joint surfaces are lined with hyaline cartilage and are enclosed within a single joint cavity.

Tibiofemoral : medial and lateral condyles of the femur articulate with the tibial condyles. It is the weight-bearing component of the knee joint.

Patellofemoral : anterior aspect of the distal femur articulates with the patella. It allows the tendon of the quadriceps femoris (knee extensor) to be inserted directly over the knee : increasing the efficiency of the muscle.

As the patella is both formed and resides within the quadriceps femoris tendon, it provides a fulcrum to increase power of the knee extensor and serves as a stabilising structure that reduces frictional forces placed on femoral condyles.Neurovascular Supply

The blood supply to the knee joint is through the genicular anastomoses around the knee, which are supplied by the genicular branches of the femoral and popliteal arteries.

The nerve supply, according to Hilton’s law, is by the nerves which supply the muscles which cross the joint. These are the femoral, tibial and common fibular nerves.

Menisci:

The medial and lateral menisci are fibrocartilage structures in the knee that serve two functions.

To deepen the articular surface of the tibia, thus increasing stability of the joint.

To act as shock absorbers by increasing surface area to further dissipate forces.

They are C shaped and attached at both ends to the intercondylar area of the tibia.

In addition to the intercondylar attachment, the medial meniscus is fixed to the tibial collateral ligament and the joint capsule. Damage to the tibial collateral ligament usually results in a medial meniscal tear.

The lateral meniscus is smaller and does not have any extra attachments, rendering it fairly mobile.Bursae

A bursa is synovial fluid filled sac, found between moving structures in a joint – with the aim of reducing wear and tear on those structures. There are four bursae found in the knee joint:

Suprapatellar bursa : an extension of the synovial cavity of the knee, located between the quadriceps femoris and the femur.

Prepatellar bursa : found between the apex of the patella and the skin.

Infrapatellar bursa : split into deep and superficial. The deep bursa lies between the tibia and the patella ligament. The superficial lies between the patella ligament and the skin.

Semimembranosus bursa : located posteriorly in the knee joint, between the semimembranosus muscle and the medial head of the gastrocnemius.

The major ligaments in the knee joint are:

Patellar ligament – a continuation of the quadriceps femoris tendon distal to the patella. It attaches to the tibial tuberosity.

Collateral ligaments – two strap-like ligaments. They act to stabilise the hinge motion of the knee, preventing excessive medial or lateral movement

Tibial (medial) collateral ligament – wide and flat ligament, found on the medial side of the joint. Proximally, it attaches to the medial epicondyle of the femur, distally it attaches to the medial condyle of the tibia.

Fibular (lateral) collateral ligamen: thinner and rounder than the tibial collateral, this attaches proximally to the lateral epicondyle of the femur, distally it attaches to a depression on the lateral surface of the fibular head.

Cruciate Ligaments :  these two ligaments connect the femur and the tibia. In doing so, they cross each other, hence the term ‘cruciate’ (Latin for like a cross)

Anterior cruciate ligament : attaches at the anterior intercondylar region of the tibia where it blends with the medial meniscus. It ascends posteriorly to attach to the femur in the intercondylar fossa. It prevents anterior dislocation of the tibia onto the femur.

Posterior cruciate ligament : attaches at the posterior intercondylar region of the tibia and ascends anteriorly to attach to the anteromedial femoral condyle. It prevents posterior dislocation of the tibia onto the femur

 Movements:

There are four main movements that the knee joint permits:

Extension:  Produced by the quadriceps femoris, which inserts into the tibial tuberosity.

Flexion: Produced by the hamstrings, gracilis, sartorius and popliteus.

Lateral rotation: Produced by the biceps femoris.

Medial rotation: Produced by five muscles; semimembranosus, semitendinosus, gracilis, sartorius and popliteus.Movements

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Lateral rotation: Produced by the biceps femoris.

Medial rotation: Produced by five muscles; semimembranosus, semitendinosus, gracilis, sartorius and popliteus.

Q5. What do you know about the anatomy of patella?

Answer NO 5 The patella (knee-cap) is located at the front of the knee joint, within the patellofemoral groove of the femur. Its superior aspect is attached to the quadriceps tendon, and inferior aspect to the patellar ligament.

It is classified as a sesamoid type bone due to its position within the quadriceps tendon, and is the largest sesamoid bone in the body. In this article we will look at the anatomy of the patella – its surface features, functions and clinical relevance.

Bony Landmarks

The patella has a triangular shape, with anterior and posterior surfaces. The apex of the patella is situated inferiorly, and is connected to the tibial tuberosity by the patella ligament. The base forms the superior aspect of the bone, and provides the attachment area for the quadriceps tendon.

The posterior surface of the patella articulates with the femur, and is marked by two facets:

Medial facet : articulates with the medial condyle of the femur.

Lateral facet : articulates with the lateral condyle of the femur.Functions

The patella has two main functions:

Leg extension : Enhances the leverage that the quadriceps tendon can exert on the femur, increasing the efficiency of the muscle.

Protection : Protects the anterior aspect of the knee joint from physical trauma.

Q6. Write note on the anatomy of femur.

Answer No 6 : The femur  femurs or femora or thigh bone, is the proximal bone of the hindlimb in tetrapod vertebrates (for example, the largest bone of the human thigh. The head of the femur articulates with the acetabulum in the pelvic bone forming the hip joint, while the distal part of the femur articulates with the tibia and kneecap, forming the knee joint. By most measures the two (left and right) femurs are the strongest bones of the body, and in humans,[vague] the longest.