

The hip bone (innominate) is a large irregular bone formed by the fusion of the ilium, ischium and pubis (Slide 1 and Slide 2). On its external surface all three parts form the cup-shaped acetabulum for articulation with the femoral head, anterior to this is the obturator foramen.

The two hip bones articulate anteriorly at the (secondary cartilaginous) symphysis pubis joint and posteriorly at the synovial sacro-iliac joint to form the pelvic girdle

The thin curved superior part of the bone is the ilium, a broad fan-shaped structure. It forms about two-fifths of the acetabulum and is expanded superiorly to form the slightly sinuous fan-shaped ala. The ilium has gluteal (external) and iliac (internal) surfaces; its superior border is convex and sinuous and is referred to as the 'iliac crest'. The crest ends as the anterior and posterior superior iliac spines. Below the superior spines are the anterior and posterior inferior iliac spines on the anterior and posterior borders respectively. The posterior superior iliac spines (PSIS) can be palpated lateral to the S2 tubercle and may be visualized when overlying skin dimples are present.

The gluteal surface gives attachment to muscles of the lower limb. The internal surface has a posterior sacro-pelvic component and an anteriorly situated iliac fossa.

The anterior two-thirds of the iliac crest is the ventral segment; it has internal and external lips enclosing a roughened area. The tubercle of the crest projects about 5cm onto the external lip postero-superior to the anterior superior iliac spine. The posterior third of the crest is the dorsal segment, it has two sloping surfaces separated by a longitudinal ridge ending at the posterior superior iliac spine, below which is the iliac tuberosity medially. In the majority of people the crest's summit is level with the L4/L5 interspinous space.

Attached to the anterior two-thirds of the outer lip of the iliac crest is the external oblique muscle; while just behind the summit is the attachment of latissimus dorsi. The interval between these two muscles is the lumbar triangle. To the intermediate area of the iliac crest is attached the internal oblique muscle, while to the anterior two-thirds of the inner lip is attached transversus abdominis. Behind this attaches the thoracolumbar fascia and quadratus lumborum, which also attaches to the supero-medial part of the iliac tuberosity. Erector spinae is attached to the medial part of the posterior third of the iliac crest, and along the medial margin and iliac tuberosity the interosseous and posterior sacro-iliac ligaments arise. The iliolumbar ligament attaches to the anterior part of the iliac tuberosity.

The postero-inferior part of the bone is the ischium, which forms about two-fifths of the acetabulum. It has posterior, femoral and pelvic surfaces. On the posterior surface is the large roughened ischial tuberosity, providing attachment for the hamstring muscle group, above which are the rounded borders of the lesser and greater sciatic notches separated by the pointed ischial spine. From the tuberosity the inferior ramus passes antero-medially at an acute angle, to meet the inferior pubic ramus, which, with the infero-posterior part of the acetabulum, forms the lower border of the obturator foramen.

Ossification

The hip bone ossifies from three primary centers. There is one for the ilium above the greater sciatic notch at nine weeks in-utero, one below the acetabulum for the ischium at four months, and one in the superior pubic ramus between four and five months. At birth the three parts are separated by cartilage, particularly at the acetabulum. The ischium and pubis fuse along the inferior ischiopubic ramus between the ages of seven and eight years. Between the eighth and ninth years, three major secondary ossification centers appear in the acetabular cartilage. The largest appears anteriorly and fuses with the pubis, one appears superiorly and fuses with the ilium, the other appears posteriorly to fuse with the ischium. These epiphyses expand towards the periphery of the acetabulum during puberty with fusion of the three bones occurring between the sixteenth and eighteenth years. Secondary centers appear for the iliac crest (usually two), the ischial tuberosity, anterior inferior iliac spine and body of the pubis during puberty fusing between the fifteenth and twenty-fifth years.

The Articulated Pelvis

In the erect posture, the pelvis lies obliquely so that the anterior superior iliac spine and the top of the

pubic symphysis lie in the same vertical plane. The pelvis is divided into greater and lesser parts by a plane through the pelvic brim. The pelvic brim is bounded by the arcuate lines anteriorly and laterally and by the sacral promontory posteriorly. The greater, or false, pelvis is above the pelvic brim and forms the lower part of the abdominal cavity. The lesser, or true, pelvis is below the pelvic brim.

In the female, the lesser pelvis forms the birth canal and is described in terms of its inlet, cavity and outlet. The pelvic brim forms the inlet. The outlet is diamond-shaped with the coccyx posteriorly, the pubic symphysis anteriorly, the ischiopubic rami antero-laterally and sacrotuberous ligaments postero-laterally. The largest diameter of the inlet is in the transverse plane, and the largest diameter of the outlet is in the sagittal plane.

In the male, the pelvis tends to be heavier, with more prominent muscle and ligamentous attachments. The brim is heart-shaped, the cavity longer and narrower and the ischiopubic rami are everted. The subpubic angle is less than 90 degrees. The auricular surface of the sacrum extends over the three upper vertebrae. The greater sciatic notch forms a more acute angle than in the female. The female pelvis is lighter, thinner and less roughened by its muscle and ligamentous attachments. The brim tends to be rounded or oval, with a shorter and wider pelvic cavity. The subpubic angle is greater than 90 degrees. The auricular surface of the sacrum extends over the two upper vertebrae. The differences between the male and female pelvis are summarized below:

FEATURE	MALE	FEMALE
Subpubic Angle	<90°	>90°
Pelvic Inlet	rounded	heart-shaped
Pelvic Brim	heart-shaped	rounded or oval
Pelvic Cavity	long & narrow	short & wide

Hip Joint

The hip joint is a synovial ball and socket joint between the **acetabulum of the hip bone** and the head of the femur. The articular surface of the femoral head forms two-thirds of a spheroid and is covered in hyaline articular cartilage. The cartilage extends to the junction of the head and the neck but is interrupted at the fovea, a small hollow postero-inferior to the center of the head that provides attachment for the ligament of the head of the femur.

For more information on the Hip, see 'The Interactive Hip'.