

Lecture 13

The skeletal system VII - The Pelvic Girdle and Lower Limb

Plan of the Lecture

1. The Pelvic Girdle
2. The Lower Limb
 - a. The Femur
 - b. The Patella
 - c. The Tibia
 - d. The Fibula
 - e. The Ankle and Foot

LEARNING OUTCOMES

1. identify and describe the features of the pelvic girdle, femur, patella, tibia, fibula, and bones of the foot;
2. compare the anatomy of the male and female pelvic girdles and explain the functional significance of the differences.

The terms pelvis and pelvic girdle are used in contradictory ways by various anatomical authorities. Here we will follow the practice of Gray's Anatomy and the Terminologia Anatomica in considering the pelvic girdle to consist of a complete ring composed of three bones—two hip (coxal) bones and the sacrum (which, as you know, is also part of the vertebral column). The hip bones are also frequently called the ossa coxae or innominate bones; the latter is arguably the most self-contradictory term in human anatomy (the “bones with no name”). The pelvis is a bowl-shaped structure composed of these bones as well as the ligaments and muscles that line the pelvic cavity and form its floor. The pelvic girdle supports the trunk on the lower limbs and encloses and protects the viscera of the pelvic cavity—mainly the lower colon, urinary bladder, and internal reproductive organs. Each hip bone is joined to the vertebral column at one point, the sacroiliac joint, where its auricular surface matches the auricular surface of the sacrum. The two hip bones articulate with each other on the anterior side of the pelvis, where they are joined by a pad of fibrocartilage called the interpubic disc. The disc and the adjacent region of each pubic bone constitute the pubic symphysis, which can be palpated as a hard prominence immediately above the genitalia. The pelvis has a bowl-like shape with the broad greater (false) pelvis between the flare of the hips, and the narrower lesser (true) pelvis below. The two are separated by a round margin called the pelvic brim. The opening circumscribed by the brim is called the pelvic inlet—an entry into the lesser pelvis through which an infant's head passes during birth. The lower margin of the lesser pelvis is called the pelvic outlet. The pelvis is the most sexually dimorphic part of the skeleton—that is, the one whose anatomy most differs between the sexes. In identifying the sex of skeletal remains, forensic scientists focus

especially on the pelvis but on many other bones as well. The average male pelvis is more robust (heavier and thicker) than the female's owing to the forces exerted on the bones by stronger muscles. The female pelvis is adapted to the needs of pregnancy and childbirth. It is wider and shallower and has a larger pelvic inlet and outlet for passage of the infant's head. The number and arrangement of bones in the lower limb are similar to those of the upper limb. In the lower limb, however, they are adapted for weight bearing and locomotion and are therefore shaped and articulated differently. The femur and tibia are essentially pillar for supporting the weight of the body. Each lower limb has 30 bones distributed in the following regions. 1. The thigh (femoral region) extends from hip to knee and contains the femur. The patella (kneecap) is a sesamoid bone at the junction of the femoral and crural regions. 2. The leg proper (crural region) extends from knee to ankle and contains two bones, the medial tibia and lateral fibula. 3. The foot consists of the tarsal region, with 7 tarsal bones extending from the heel to the midpoint of the foot arch; metatarsal region, with 5 bones extending from there to the "balls" of the feet just proximal to the toes; and toes (digits), with 14 bones. The feet and hands together contain more than half of all the body's bones (106 of the total 206). As with the colloquial versus anatomical meaning of wrist, the colloquial meaning of ankle (the narrow point where one might wear an ankle bracelet) is different from the anatomical meaning: the posterior half of the foot containing the seven tarsal (ankle) bones. In anatomical terms, the wrist is part of the hand and the ankle is part (indeed, about half) of the foot.

Check yourself! The questions for self-control

1. Name the bones of the adult pelvic girdle. What three bones of a child fuse to form the hip bone of an adult?
2. Name any four structures of the pelvis that you can palpate and describe where to palpate them.
3. Describe several ways in which the male and female pelvic girdles differ.
4. What parts of the femur are involved in the hip joint? What parts are involved in the knee joint?
5. Name the prominent knobs on each side of your ankle. What bones contribute to these structures?
6. Name all the bones that articulate with the talus and describe the location of each.

Recommended readings:

1. Kenneth S Saladin - Anatomy & Physiology. The Unity of Form and Function (2016, McGraw-Hill Education)
2. Barbara Gylys - Medical Terminology Systems (2012, F.A. Davis Company)
3. Richard L. Drake A. Wayne Vogl, Adam W. M. Mitchell - Gray's Atlas of Anatomy, Second Edition (2015, Churchill Livingstone Elsevier)