

Radiography positioning for pelvis

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AP pelvis (bilateral hips) projection

- AP position with the patient supine.

Most traumatic conditions involving the sacral wings, the iliac bones, ischium, the pubis, and the femoral head and neck can sufficiently be evaluated on the AP projection of the pelvis and hip.

- This view also demonstrates an important anatomical relationship in the longitudinal axes of the femoral neck and shaft. Normally, the angle formed by these axes ranges from 125° - 135° . Varus and valgus configuration of a femoral neck fracture is said to occur if there is decrease or increase, respectively, in this angle.



R

Technical factors

- Image receptor (IR): 14 x 17 inch (35 x 43 cm) crosswise
- 75- 85 kVp range
- mAs 12 (at 80 kVp)
- Moving or stationary grid
- Surface-to-image distance (SID) of 40 inches (100 cm)

Positioning for the AP pelvis (bilateral hips) projection

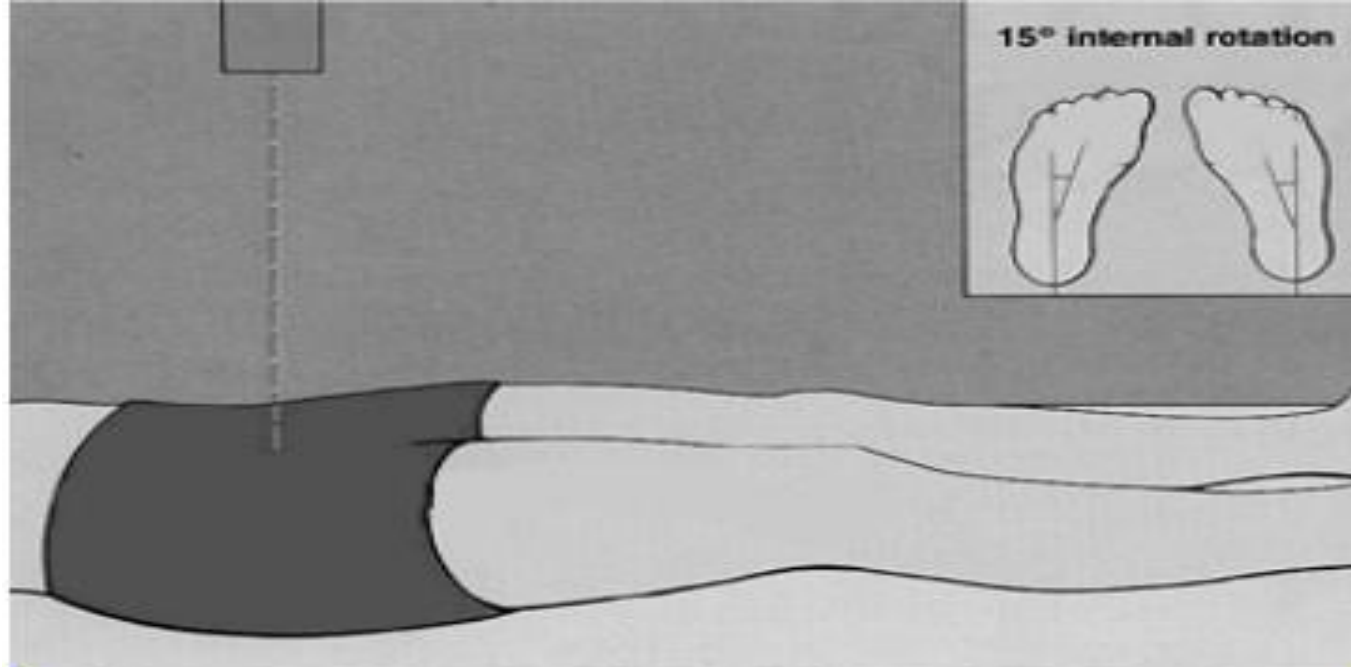
- The patient is positioned supine on the radiographic table, with arms placed at the side or across the upper chest. Place a support under the head and knee.
- The midsagittal plane of the body should be centered to the midline of the grid device.
- There should be no rotation of the pelvis.
- The distance from tabletop to each anterior superior iliac spine (ASIS) should be equal.

- The feet are placed in approximately 15°-20° of internal (medial) rotation. This is done to overcome the normal anteversion of the femoral necks and to place their longitudinal axes parallel to the film. The heels should be 8-10 inches (20-24 cm) apart.
- adjust the position of the cassette so that the upper border of the cassette is 1-1 ½ inches above the iliac crest.
- The center of the cassette should be midway between the ASIS and the pubic symphysis.
- Shield gonads on all male patients. Ovarian shielding on females, however, is generally not possible without obscuring essential pelvic anatomy (unless interest is in area of hips only).
- Ask the patient to suspend their breathing on expiration.

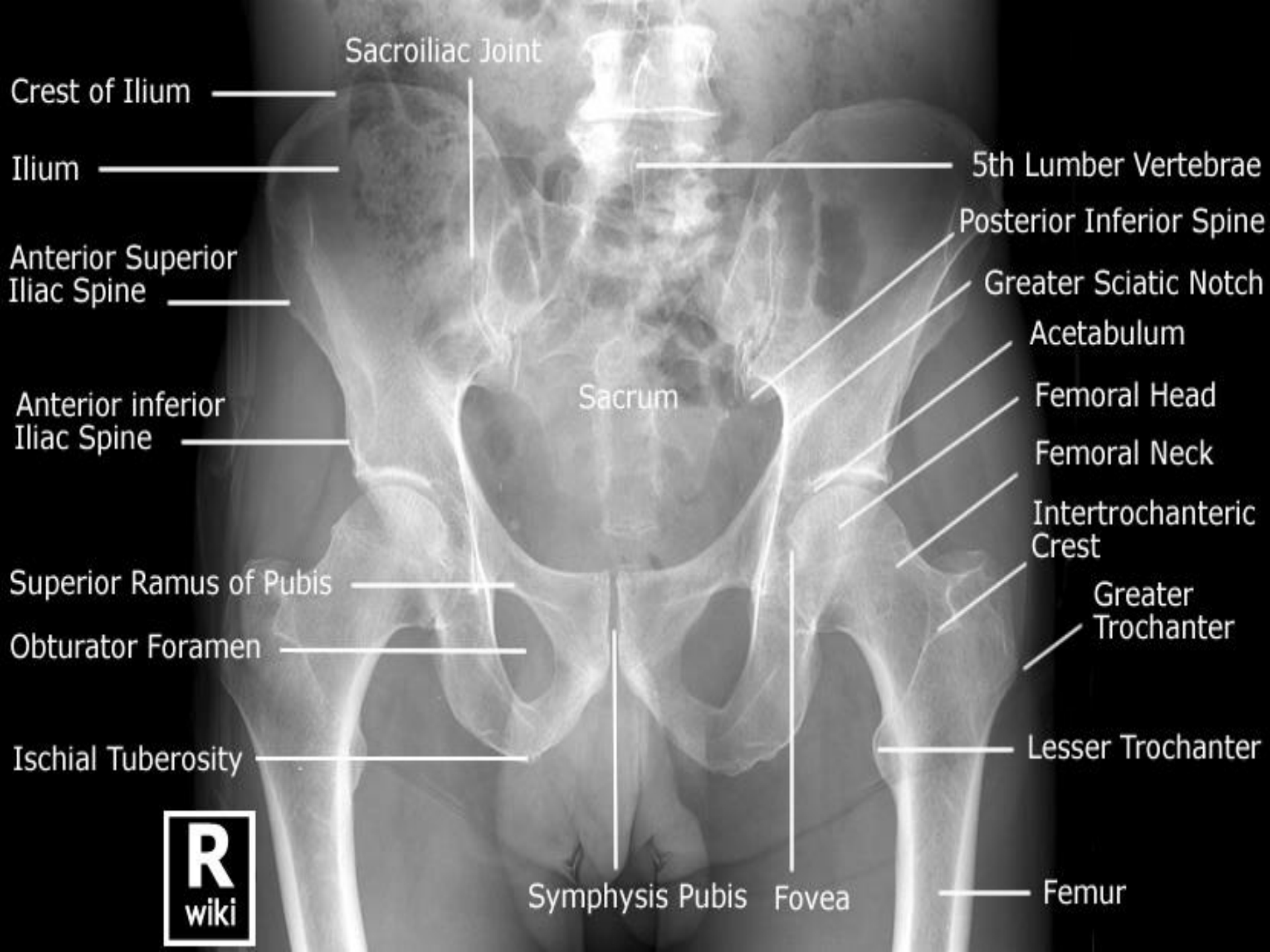
Evaluation criteria for AP pelvis (bilateral hips)

- The entire pelvis along with proximal femoral neck including pelvic girdle, L5, sacrum, and coccyx should be seen.
- The lesser trochanters usually are not visible at all, or if they are, should appear equal in size and shape. The greater trochanters should be visible in profile.
- No rotation is evidenced by symmetric appearance of the two obturator foramina, as well as a symmetric iliac alae and ischial spines. A closed or narrowed obturator foramen indicates rotation in that direction.

- Correct collimation and centering is evidenced by demonstration of both greater trochanters equidistant to the edge of the radiograph, and the lower vertebral column centered to the middle of the radiograph
- Optimal exposure should clearly demonstrate L5, sacral area, and margins of the femoral heads and acetabula without overexposing the ischium and the pubic bones.
- No motion is evidenced by sharp orbicular markings of the proximal femoral and the pelvic structures.



For an AP view of the pelvis and hip, the patient is supine



Sacroiliac Joint

Crest of Ilium

Ilium

Anterior Superior Iliac Spine

Anterior inferior Iliac Spine

Superior Ramus of Pubis

Obturator Foramen

Ischial Tuberosity

Sacrum

5th Lumbar Vertebrae

Posterior Inferior Spine

Greater Sciatic Notch

Acetabulum

Femoral Head

Femoral Neck

Intertrochanteric Crest

Greater Trochanter

Lesser Trochanter

Symphysis Pubis

Fovea

Femur



AP unilateral hip projection

- An AP unilateral hip study is usually a postoperative or a follow-up exam to demonstrate the acetabulum, femoral head and neck, and the greater trochantae, as well as the condition and placement of any existing orthopedic appliance. Technical factors and patient positioning are the same as for an AP pelvis (bilateral hips) exam.
- The CR is placed perpendicular to the femoral neck, approximately 2 ½ inches (6.4 cm) distal on a line drawn perpendicular to the mid point of a line between the ASIS and the pubic symphysis.
- In other words, the CR is directed 1-2 inches (2.5-5 cm) distal to mid femoral neck.

- The femoral neck can be located about 1-2 inches medial and 3-4 inches distal to the ASIS. The collimated field should demonstrate the femoral head and neck, trochanters, the proximal third of the femur shaft, regions of the ilium, and the pubic bones adjoining the pubic symphysis.
- The greater trochanter and femoral head and neck should be in full profile without foreshortening. The lesser trochanter should not project beyond the medial border of the femur. Optimal exposure should ensure visualization of the femoral head through the acetabulum.

AP oblique pelvis projection x-ray positioning techniques

- This projection is also called the bilateral “frog leg” position. It is useful for demonstration of a non-trauma hip or developmental dysplasia of the hip, also known as congenital hip dislocation (CHD). It shows an AP oblique projection of the femoral heads, necks, and the trochanteric areas projected onto one radiograph for comparative purposes.
- **Technical factors**
- IR: 14 x 17 inch (35 x 43 cm) crosswise •
- 75-85 kVp range •
- mAs of 12 (at 80 kVp) •
- Moving or stationary grid •
- SID of 40 inches (100 cm)•

Positioning for the AP oblique pelvis projection

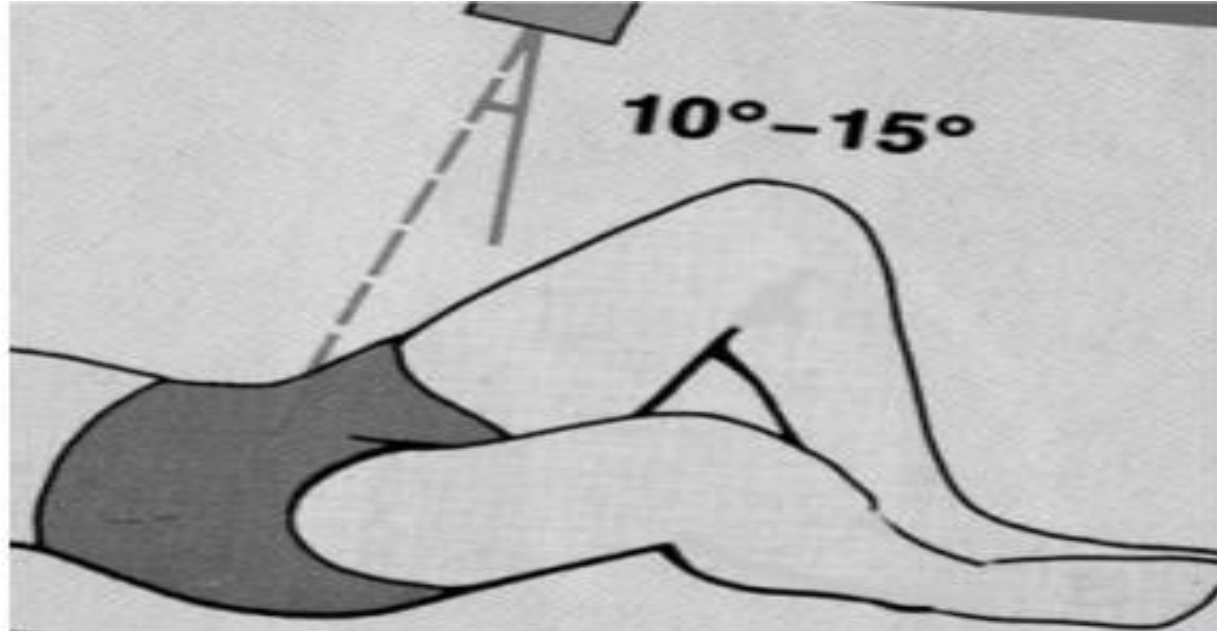
- The patient is positioned supine on the radiographic table, arms placed at the side or across the upper chest. Placing a support under the head helps relieve the strain on the patient while in the supine position.
- The midsagittal plane of the body should be centered to the midline of the grid device. There should be no rotation of the pelvis. The distance from tabletop to each ASIS should be equal.
- For a bilateral projection, both hips and knees are flexed approximately 90° . Have the patient draw the feet up as much as possible. After correctly centering the cassette 1 inch (2.5 cm) superior to the pubic symphysis,

- abduct both thighs approximately 45° from the vertical plane to place the long axis of femoral necks parallel with the plane of the cassette. Ensure that both thighs are abducted the same amount and that pelvis is not rotated (equal distance of both ASIS to the tabletop). Have the patient turn their feet to brace the soles against one another for support.
- For unilateral frog leg projection center the ASIS of the affected side to the midline of the grid. Ask the patient to flex the hip and knee of the affected side, then abduct the thigh laterally, approximately 45° . Have the patient draw the foot up to the opposite knee as much as possible so that the sole of the foot is against the opposite knee. The pelvis may rotate slightly in a unilateral projection.

- Carefully palpate the superior portion of iliac crest and direct the CR to a point 5.3 inches (7.5 cm) below the level of the ASIS (1 inch or 2.5 cm above symphysis pubis). For the unilateral position, direct the CR to the femoral neck.
- Shield gonads on all male patients. Ovarian shielding on females, however, generally not possible without obscuring essential pelvis anatomy (unless interest is in area of hips only).

Evaluation criteria

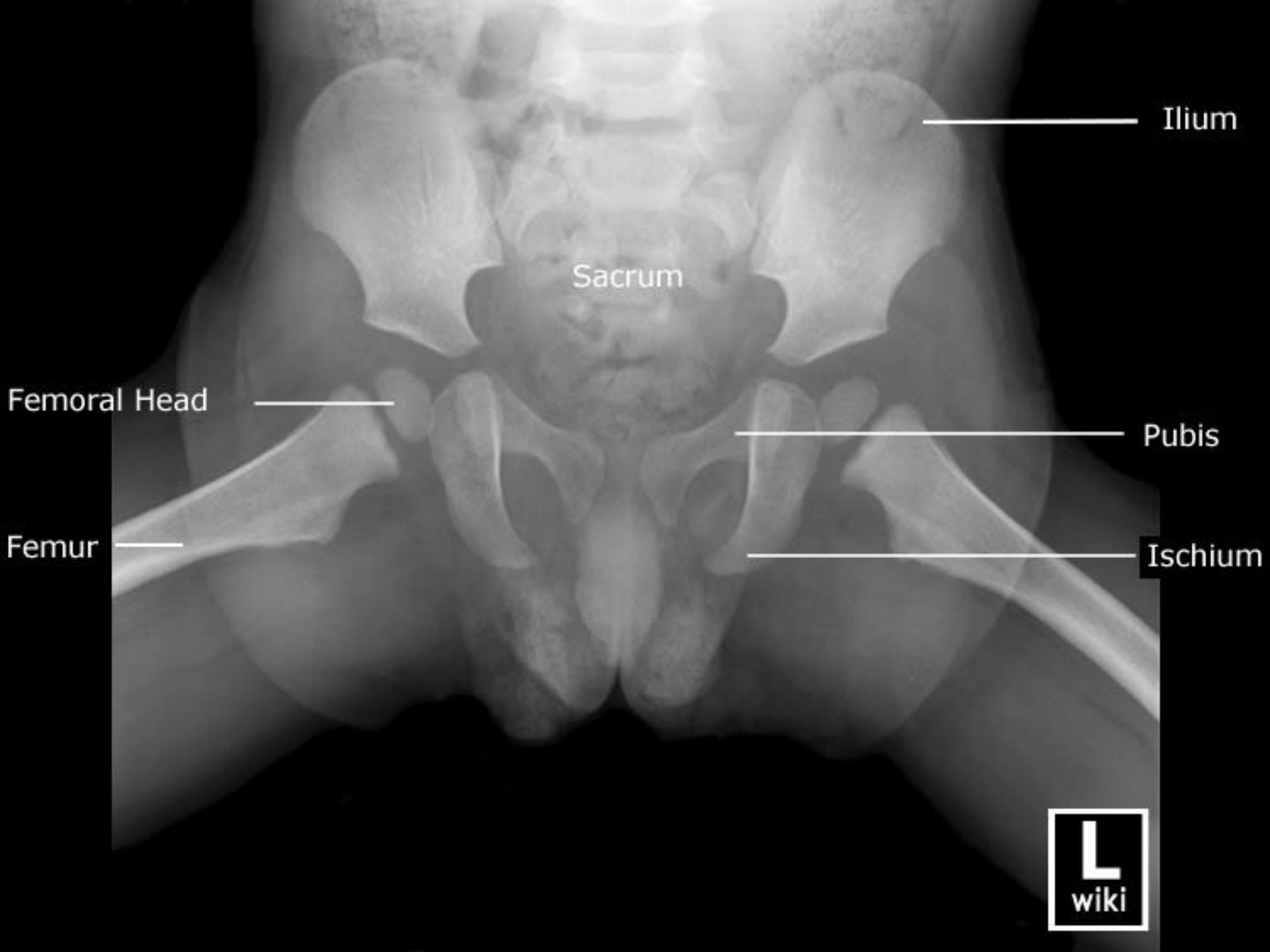
- Femoral heads and necks, acetabulum, and trochanteric areas should be visible on a single radiograph.
- No rotation is evidenced by symmetric appearance of the two obturator foramina and pelvic bones. The lesser trochanters should appear equal in size as projected on the medial margins of the femora. The greater trochanters are superimposed over the femoral necks.
- The femoral heads and necks and trochanters should appear symmetric if both thighs are abducted equally.



For the bilateral frog leg view of the proximal







Ilium

Sacrum

Femoral Head

Pubis

Femur

Ischium





Special projections of pelvis and proximal femur

- **AP axial pelvic outlet and AP axial pelvic inlet projections**
- The AP axial outlet projection shows an elongated projection of the pubic and ischial rami. This projection provides an excellent view of the bilateral pubes and ischia to assess pelvic bones for fractures and displacements. The AP axial inlet projection provides assessment of the pelvic ring.
- The technical factors and patient positioning for these projections are the same as for an AP pelvis projection. The main difference lies in the CR angulations.
- For **an AP axial outlet** projection, the CR is angulated cephalad 20°-35° for males and 30°-45° for females and is centered to a point 2 inches (5 cm) distal to the superior border of the pubic symphysis. For an AP axial inlet projection, the CR is angulated caudad 40° and is centered to a midline point at the level of both ASIS.

Oblique projections of the acetabulum

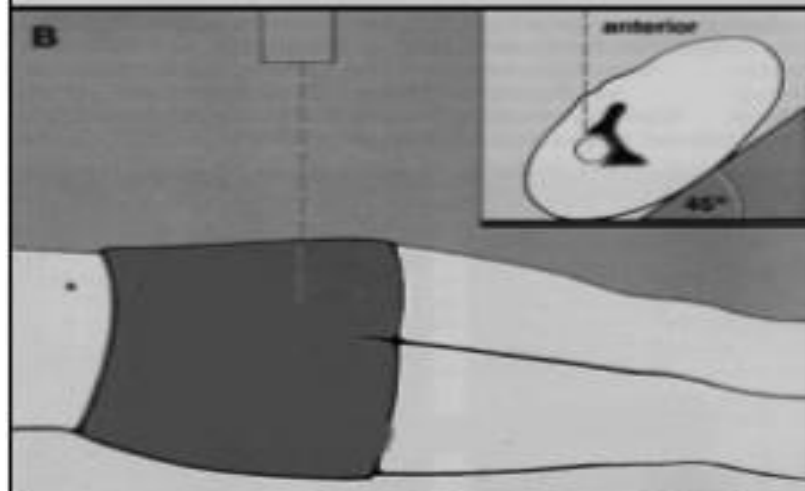
- Oblique projections, known as Judet's views, are necessary to evaluate the acetabulum.
- The anterior (internal) oblique projection helps delineate the anterior column and the posterior rim of the acetabulum. The posterior (external) oblique projection delineates the posterior column and the anterior acetabular rim.
- For a posteroanterior (PA) oblique projection the patient lies in a semi-prone position on the affected side. The unaffected side is elevated so that the anterior surface of the body forms a 38° angle from the table. The CR is directed 12° cephalic to the side being examined, approximately 2 inches (5 cm) lateral to the midsagittal plane at the inferior level of coccyx, permitting the CR to be directed through the acetabulum.

Judet view

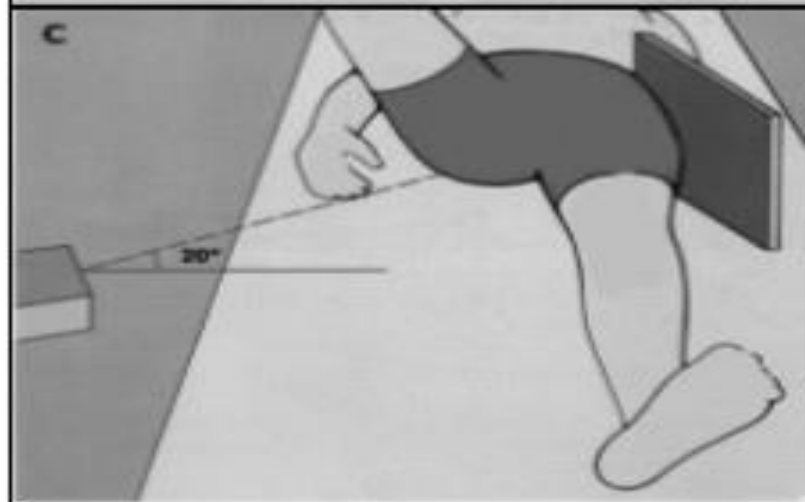




A: For the angled AP (Ferguson) view of the pelvis, the patient is in the same position as for the standard AP projection. The radiographic tube, however, is angled at about 30°-35° cephalad, and the CR is directed toward the midportion of the pelvis.



B: For the posterior oblique view of the pelvis, the patient is supine and anteriorly rotated; the unaffected hip is elevated 45°. The CR is directed through the affected hip.



C: For the groin lateral view of the hip, the patient is supine with the affected extremity extended and the opposite leg elevated and abducted. The cassette is placed against the affected hip on the lateral aspect, and the CR is directed horizontally toward the groin with about 20° cephalad angulation. Images courtesy of Dr. Naveed Ahmad.

Axiolateral projection of the hip and proximal femur (groin projection)

- The groin projection is particularly useful in evaluating anterior and posterior displacement of fracture fragments in proximal femoral fractures, as well as the degree of rotation of the femoral head. This projection provides a true lateral image of the proximal femur and also demonstrates an important anatomic feature, the angle of the anteversion of the femoral neck, which normally ranges from 25°-30°.
- It may be done on a stretcher or at bedside if the patient cannot be moved. The unaffected leg is elevated and flexed so that the unaffected thigh is outside the collimation field. The IR is placed in a crease above the iliac crest so that it is parallel to the femoral neck and perpendicular to the CR. If the limb can be safely moved,
- internally rotate the foot about 15° by grasping the heel to overcome the anteversion of the femoral neck. The CR is directed to the femoral neck and to IR.

Oblique projection for the SI joints

- Various methods have been used to examine the sacroiliac joints; however, none is ideal as the normal undulating articular surfaces make evaluation of these joints extremely difficult. An angled AP radiograph can be taken with the tube angulated 30° - 35° in a cephalad direction.
- This projection is known as a Ferguson view. It not only shows the SI joints to a better advantage but also helps in more effectively evaluating injury to the sacral bone, the pubis, and the ischial rami. Some radiologists prefer a PA radiograph with 25° - 30° of caudal angulation of the tube to evaluate the SI joints. In either case, both sacroiliac joints are exposed on a single film, facilitating a comparative evaluation.

