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Introduction

Pain felt in the hip and buttock does not necessarily originate from a lesion in these areas. Cyriax stated that most pain in the buttock derived from the lumbar spine (reference from L1 and S2), whereas pain in the thigh is referred from the lumbar spine and hip region as often as it has a local origin. When dealing with pain in this area, it is often not easy at first to determine if there is a problem in the lower back, the sacroiliac joint or the hip. Therefore, a detailed and chronologically ordered history is first taken, as described for the lumbar spine (see Ch. 36). Past and present symptoms are noted and the examiner is informed about the exact site and nature of the pain. Next, a preliminary examination must be performed that includes the whole lower quadrant: from the lumbar spine, over the sacroiliac and hip joints to the upper leg. Once it is clear that the symptoms do not arise from the lumbar spine or sacroiliac joint, the structures of the hip are examined more intensively.

If the diagnosis is still obscure after taking the history and carrying out a physical examination, the focus should turn to disorders outside orthopaedics that could be responsible for the symptoms – usually intra-abdominal lesions. In such conditions the pain is usually unrelated to movements that have been undertaken during the examination. Another cause of pain in the buttock of non-orthopaedic origin is occlusion of the common iliac artery with intermittent claudication. Finally, it must be remembered that hip complaints may be claimed but can have a non-physical basis in the psyche.

Referred pain

Pain referred to the buttock and hip region

Most pain in the buttock and hip results from a lumbar lesion with a segmental (L1–S2) or multisegmental (dural) reference of pain. Knowledge of the dermatomes that meet in the buttock and hip is therefore essential.

The first lumbar dermatome is represented by an area of skin at the outer and upper buttock which is partly overlapped by the second and third lumbar dermatomes (Fig. 45.1).

The skin of the lower part of the buttock is derived from the first and second sacral segments. The fourth and fifth lumbar segments are not present in the buttock. In spite of
does not always occupy the whole dermatome, it is possible for a hip lesion to refer pain to the knee only, perhaps also spreading along the front of the tibia.\(^1,2\) But pain felt only at the upper inner quadrant of the buttock strongly points to the low back or the sacroiliac joint.

Sacroiliac joint

The sacroiliac joint normally gives rise to pain along the back of the thigh and calf. In rare instances, pain is felt in the groin as well (see p. 598).

Bursae

The bursae may also give rise to referred pain in the same way as other soft tissues. In gluteal bursitis, pain is felt at the lateral or posterior trochanteric area and may be referred to the outer thigh, i.e. a lesion in a tissue derived from the fourth or fifth lumbar segments. The psoas bursa is developed from the second and third lumbar segments. Pain is felt in the groin and may spread to the front of the thigh.

Referred pain in the buttock and hip is summarized in Box 45.1.
Box 45.2

Summary of symptoms

- Onset: congenital/acquired (traumatic/non-traumatic)
- Evolution
- Current symptoms
  - Site of pain
  - Influence of posture, movement
  - Nocturnal pain
  - Twinges
  - Coughing and pain
  - Instability
  - Functional disablement
- Symptoms in other parts of the body

History

History taking is largely the same as in lumbar spine disorders (see Ch. 36) because it is not always clear from the onset if the patient has a lumbar, sacroiliac or hip problem. However, once it has become more or less apparent that the complaints are the outcome of a hip lesion, some particular questions should be asked.

After the usual questions on the patient’s age, sex, occupation and hobbies, the examiner tries to find out what the actual problem is: pain, functional disability or instability? The problem should then be worked out systematically via a chronological approach: when and how did the problem start, what was its evolution and what are the current symptoms (Box 45.2)?

Onset

- When did it start? Is it an acute, subacute or chronic problem?
- What brought it on or how did it start? Was there an injury or did the pain appear without obvious reason?

If there was an injury:
- How did it happen? In what position was the body and what forces were applied to the hip?
- What were the immediate symptoms? Where was the pain? Was there any swelling? Was there any functional disablement?

If there was no injury:
- Did the symptoms come on suddenly or gradually?

Evolution

In long-standing cases or in traumatic conditions it is important to have an idea of the evolution of the complaints in terms of:
- Intensity: Did it worsen, improve or remain constant, or did it fluctuate with complete or no complete relief between attacks?
- Localization? Did the pain expand or move? Moving pain is characteristic of a loose body.
- Treatment? What was the effect of previous treatments?

Current symptoms

- What is the problem now? The examiner makes further enquiries about pain, pins and needles, instability or functional disability.
- Where do you feel the pain (which dermatome)? As exact a description as possible must be obtained.
- Do you have pain at rest or during the night? Nocturnal pain indicates a high degree of inflammation and may point to a serious disorder such as arthritis, haemarthrosis, tumour, metastasis or fracture. However, in an ordinary gluteal bursitis, lying on the affected side at night is also often painful.
- What brings the pain on? Sitting, standing up, walking and running, climbing stairs, sitting or lying? If the pain starts after walking a certain distance, ask if it disappears after standing still for a while and reappears after walking the same distance: this suggests claudication in the buttoc.
- Does a particular movement provoke the pain?
- Does the pain appear at the beginning, during or after some sort of exertion?
- Do you have twinges, and when? This symptom is defined as a sudden, sharp and unexpected pain and is clearly indicative of momentary subluxation of a loose body. On walking, a severe twinge is felt shooting down the front of the thigh and the leg gives way at this point.
- Is any movement accompanied by a click? Clicking may be indicative of loose bodies or acetabular labrum tears.
- Does coughing hurt? This dural sign is highly suggestive of a lumbar intervertebral disc lesion but is also found in sacroiliac arthritis.
- Do you have a feeling of instability? Any disorder altering the anatomical relations in the hip region – for example, congenital dislocation, coxa vara or epiphysiolysis – may lead to instability. Painful conditions at the hip and neurological disorders, such as paresis of the fifth lumbar root involving the gluteus medius, or of the third lumbar root involving the quadriceps, are other possibilities.
- Do you have any functional disability? This may be stiffness on standing up or starting to walk, or inability to put on shoes. All these direct attention to an arthrotic joint.
- Do you have symptoms in other parts of the body? The possibility of systemic disease arises: for example, rheumatoid arthritis or ankylosing spondylitis.

Inspection

Gait

When the patient enters the room, observe the gait. Disorders that affect the hip joint or any other joint of the lower extremity become especially perceptible during walking. The patient’s
gait can be restricted so as to avoid a painful component. Excessive movement of the pelvis may compensate for a stiff hip joint. In gross weakness of the gluteus medius or gluteus maximus, an abduction or extension lurch respectively is present.

The patient’s face should be in harmony with the reported symptoms: for example, haggard due to sleepless nights. While the patient undresses, note should be taken of any manoeuvre that seems painful or awkward.

**Posture**

Next, posture is assessed, especially in relation to the lower back, pelvis and lower extremities. Details of observing the patient’s posture are dealt with in the chapter on the lumbar spine (see p. 498).

**Hip joint position**

The position of the hip joint can be informative about a pathological condition. In acute arthritis and gross osteoarthrosis, the hip joint is often in flexion, which is compensated for by an anterior tilt of the pelvis together with increased lordosis of the lumbar spine. The femur is also slightly abducted and laterally rotated. This in turn influences the position of the knee and foot, which are also rotated. It is important to remember, however, that excessive external rotation of the leg, with ‘toeing out’, also occurs in external femoral neck retroversion or a slipped upper femoral epiphysis and in pelvic torsion. Posterior rotation of the innominate bone may also be responsible for slight external rotation of the leg. In contrast, ‘toeing in’ may be the result of extreme femoral neck anteversion.

In third lumbar root pain, patients may also adopt a flexed position to relax the nerve root.

The combination of excessive internal rotation together with adduction is typical of a non-organic cause.

**Muscle contours**

The contours of the glutei, hamstrings and quadriceps muscles are observed. Unilateral or bilateral muscular atrophy is noted.

**Skin folds**

Lastly, the skin folds, i.e. gluteal folds and groin, are assessed. These are normally situated symmetrically. Asymmetrical folds may be the result of underlying anatomical alterations, such as muscular atrophy, pelvic obliquity, leg-length discrepancy or congenital dislocation of the hip joint.

Box 45.3 summarizes the aspect of inspection.

**Basic functional examination**

Routine clinical examination consists of 15 functional tests (Table 45.1). If signs warrant or the history is indicative, complementary tests can be performed.

**Supine**

**Passive movements**

The range, painfulness and end-feel of passive flexion, lateral and medial rotation, adduction and abduction are noted, carefully comparing both sides.

**Passive flexion**

The anterior thigh is moved upwards until it touches the abdomen (Fig. 45.2). The average range of movement is 140°, with a soft end-feel caused by tissue approximation. It is important to remember that the last 30° of this apparent hip movement is carried out by the pelvis, which flexes at the lumbar joints. This backward tilt of the pelvis also moves the other thigh towards extension, and when there is a restriction joint (summarized in Box 45.4) should be performed to confirm the absence of a lesion in these regions (see Ch. 36).
of extension in the contralateral hip joint, the thigh will move upward (Thomas’s sign of flexion contracture of the hip).6

**Passive rotations**

The hip and knee are bent to 90° in order to examine rotation movements (Fig. 45.3). The contralateral hand is used to stabilize the femur at the knee, while the other hand, placed at the distal end of the lower leg, performs medial and lateral rotation movements. At the end of range, a capsular elastic end-feel should be found. The average range of passive lateral rotation is 60°, and that of medial rotation is 45°. In advanced arthrosis or arthritis, the end-feel is hard. However, a soft end-feel replaces a hard one when swift erosion of the femoral head occurs in arthrosis.

In gross arthritis or arthrosis, there is 90° limitation of flexion and no range of medial rotation, although lateral rotation is full. In very early arthrosis or arthritis, medial rotation is the first movement to become measurably restricted, soon followed by slight limitation of flexion. In arthrosis or arthritis, medial rotation is the most painful passive movement. In bursitis or an impacted loose body in a joint that is not yet arthrotic, the end-feel is soft. Usually, in these last two disorders, lateral rotation hurts and is the only clinical finding.

**Passive adduction**

This is tested after raising the other leg, so as to get it out of the way (Fig. 45.4a). The range of movement is 30° on average. In a normal joint, the end-feel is elastic, caused by stretching of the capsule and muscles that lie on the outer side of the hip. When movement is painful at the outer side of the hip, a lesion of the iliotibial tract should be considered. If some resisted movements are also painful, gluteal bursitis is probably the cause.

**Passive abduction**

The ipsilateral hand is placed at the medial and dorsal side of the thigh, as far distal as possible. The knee is put into 90° flexion, which eliminates the influence on the movement of the biarticular part of the adductors, i.e. the semitendinosus, semimembranosus and gracilis. The other hand stabilizes the pelvis (Fig. 45.4b).

On full passive abduction, the structures on the medial side of the thigh are stretched, while on the outer side the bursae may become compressed between the greater trochanter and the ilium. In arthritis and arthrosis, movement is restricted because of muscle spasm and bone-to-bone contact, respectively.

**Resisted movements**

Four resisted movements are then tested: resisted flexion, extension, adduction and abduction. Because muscle lesions in the buttock are very rare, pain on resisted abduction or extension usually results from compression of a nearby tender bursa. Muscle sprains in the thigh do occur and are mainly found in young adults as the result of sports injury.
The Hip and Buttock

Resisted flexion
This is performed with the hip joint flexed to 90°. Both hands are placed at the anterior and distal end of the thigh so as to exert counterpressure, while the patient attempts to flex the hip. The lower leg is supported in 90° of flexion at the knee. To stabilize the ilium, the examiner places one knee against the tuberosity of the ischium (Fig. 45.5a). Pain and weakness are noted and again carefully compared with the other hip. This test gives a positive result in the following circumstances:

- **If pain alone is provoked**, the possible lesions are: strain in the psoas, sartorius or rectus femoris muscle; obturator hernia is another possibility.
- **Painful weakness** is found in avulsion fracture of the lesser trochanter, abdominal neoplasm infiltrating the psoas muscle or metastasis in the upper femur.

- **Painless weakness** is the result of paresis of the psoas muscle, usually the consequence of a second lumbar root palsy but rarely a third. If the palsy is bilateral, neoplasm at the second lumbar level should always be suspected.

Resisted extension
This tests the gluteus maximus and the hamstrings. The hip joint is slightly flexed and the knee joint remains extended. The examiner places both hands at the heel of the foot and resists extension (Fig. 45.5b).

Pain and weakness are noted:

- **Pain** usually results from a hamstring lesion but gluteal bursitis or sacroiliac strain is also a possibility.
- **Weakness** indicates a lesion of the first sacral root.
Clinical examination of the hip and buttock

Consequence of stress placed on strained or inflamed sacroiliac ligaments.

- Weakness is found in a palsy of the fifth lumbar root from a disc herniation at the same level. It may also be the result of anatomical changes, as in congenital dislocation of the hip or coxa vara; in such circumstances the muscle’s origin lies closer to its insertion, which makes the contraction less efficient.

Prone

Passive movements

There are two passive movements.

Passive extension

The ipsilateral hand is placed over the mid-buttock. The other hand grasps the thigh just below the patella. The test is performed by simultaneous movement of both hands in opposite directions. The knee should stay extended, to prevent tension on the rectus femoris. By pressing the pelvis firmly on to the couch, the examiner prevents any stress from reaching the sacroiliac and the lumbar joints (Fig. 45.7). The average range of movement is 30°. The normal end-feel is capsular-elastic. Extension is one of the movements that become restricted in arthritis or arthrosis.

Passive medial rotation

Both hips are examined together, even though a separate assessment will have been made in the supine position. The examiner resists the abduction movement at the ankles (Fig. 45.6b). This test primarily activates the gluteus medius, gluteus minimus and tensor fasciae latae.

- Pain is usually the result of the compression of underlying structures, such as an inflamed gluteal bursa, or is the consequence of stress placed on strained or inflamed sacroiliac ligaments.

- Weakness is found in a palsy of the fifth lumbar root from a disc herniation at the same level. It may also be the result of anatomical changes, as in congenital dislocation of the hip or coxa vara; in such circumstances the muscle’s origin lies closer to its insertion, which makes the contraction less efficient.

Resisted movements

There are four resisted movements.

Resisted adduction

The examiner places the clenched fist between the patient’s knees and asks the patient to squeeze (Fig. 45.6a).

- Pain is usually the result of an adductor longus lesion. Fracture, neoplastic invasion of the pubic bone and a sacroiliac lesion are other possibilities.

Resisted abduction

The examiner resists the abduction movement at the ankles (Fig. 45.6b). This test primarily activates the gluteus medius, gluteus minimus and tensor fasciae latae.

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The examiner places the clenched fist between the patient’s knees and asks the patient to squeeze (Fig. 45.6a).

- Pain is usually the result of an adductor longus lesion. Fracture, neoplastic invasion of the pubic bone and a sacroiliac lesion are other possibilities.

Resisted abduction

The hip joints are placed in a slightly abducted position. The examiner resists the abduction movement at the ankles (Fig. 45.6b). This test primarily activates the gluteus medius, gluteus minimus and tensor fasciae latae.

- Pain is usually the result of the compression of underlying structures, such as an inflamed gluteal bursa, or is the consequence of stress placed on strained or inflamed sacroiliac ligaments.

- Weakness is found in a palsy of the fifth lumbar root from a disc herniation at the same level. It may also be the result of anatomical changes, as in congenital dislocation of the hip or coxa vara; in such circumstances the muscle’s origin lies closer to its insertion, which makes the contraction less efficient.

Prone

Passive movements

There are two passive movements.

Passive extension

The ipsilateral hand is placed over the mid-buttock. The other hand grasps the thigh just below the patella. The test is performed by simultaneous movement of both hands in opposite directions. The knee should stay extended, to prevent tension on the rectus femoris. By pressing the pelvis firmly on to the couch, the examiner prevents any stress from reaching the sacroiliac and the lumbar joints (Fig. 45.7). The average range of movement is 30°. The normal end-feel is capsular-elastic. Extension is one of the movements that become restricted in arthritis or arthrosis.

Passive medial rotation

Both hips are examined together, even though a separate assessment will have been made in the supine position. The examiner resists the abduction movement at the ankles (Fig. 45.6b). This test primarily activates the gluteus medius, gluteus minimus and tensor fasciae latae.

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- Weakness is found in a palsy of the fifth lumbar root from a disc herniation at the same level. It may also be the result of anatomical changes, as in congenital dislocation of the hip or coxa vara; in such circumstances the muscle’s origin lies closer to its insertion, which makes the contraction less efficient.
**Bilateral resisted lateral rotation**
This is performed with the knees flexed to a right angle. With crossed arms, the examiner presses the hands against the inner side of both the patient’s legs at the internal malleoli of the ankle (Fig. 45.9a).

- Pain may be the result of muscle strain, i.e. the quadratus femoris. As already stated, it more commonly results from compression of an inflamed bursa.

**Bilateral resisted medial rotation**
This is performed in the same way but both hands are pressed against the outer malleoli (Fig. 45.9b). This creates tension in the medial part of the hamstrings, tensor fasciae latae and gluteus medius and minimus. However, pain is more often the result of compression of an inflamed bursa.

**Resisted flexion of the knee**
This tests the hamstrings. The knee is positioned in 70° of flexion. One hand fixes the ilium, while the other hand presses against the distal end of the lower leg (Fig. 45.10a).

- **Pain** in the thigh results from a lesion in the semitendinosus, semimembranosus or biceps femoris. Pain at the ischial tuberosity indicates tendinitis of one of these muscles or a lesion of the sacrotuberous ligament.

- **Weakness** is present in first and second sacral root palsy and is usually the result of disc herniation at the fifth lumbar level.

**Resisted extension of the knee**
This tests the quadriceps. The knee is held in 70° of flexion. The ipsilateral hand is used to stabilize the thigh on the couch. The elbow of the other arm is placed at the distal end of the lower leg to resist extension movement (Fig. 45.10b). In order to be able to withstand even the strongest extension, the hand of this arm may grasp the stabilizing arm.

- **Pain** in the thigh is from a lesion in the quadriceps.

- **Weakness** results from a third lumbar root lesion.

**Palpation**
When tendinitis is suspected, points of tenderness are sought. Both sides should be compared. However, it is only when a resisted test is positive that it is worthwhile palpating for the exact site of the lesion.

In bursitis, palpation affords little assistance. It is the response to resisted movements that helps to indicate the bursal relationship with a muscle.
Clinical examination of the hip and buttock

Technical investigations

Interpretation of the results of technical investigations without previous clinical diagnosis may often be misleading. The classic example is asymptomatic osteoarthrosis, easily visible on the X-ray but not causing any pain, or a loose body in an osteoarthrotic joint, where the radiograph shows the arthrosis but not the subluxated piece of cartilage. However, if symptoms and clinical signs warrant, technical investigations become an obligatory part of assessment.

This is especially the case in:
- Hip joint lesions in children
- Suspected aseptic necrosis
- Positive sign of the buttock (see p. 637).

In these circumstances radiography, computed tomography (CT), magnetic resonance imaging (MRI), sonography or arthroscopy will be performed to confirm or exclude a particular diagnosis.

Two diagnostic techniques have become popular during recent decades. Ultrasonography (ultrasound) is an excellent accessory tests

If signs warrant or the history is indicative, accessory tests can be performed.

**Palpation of the femoral arterial pulse** (see p. 516)
The pulse is just inferior to the inguinal ligament, halfway between the anterior superior iliac spine and the pubic symphysis.

**Combined passive flexion/adduction**
This test should be interpreted with care because it includes several structures. It may be a localizing sign both in tendinitis of the rectus femoris and in psoas bursitis. The implication is that the lesion lies in a position where it can be compressed. The test is also painful in arthritis of the hip joint and in sacroiliac conditions.

**Sustained active extension of the hip in the prone position**
This test (Fig. 45.11), continued for several minutes, provokes gluteal pain in claudication due to a block in the common iliac or internal iliac arteries.

**Fig 45.10** • Resisted flexion (a) and extension (b) of the knee.

**Fig 45.11** • Sustained active extension of the hip in the prone position.
The Hip and Buttock

**Box 45.4**

**Summary of examination**

**Preliminary examination**
- Lumbar spine
- Sacroiliac joint

**Basic functional examination**
- Supine
  - Five passive movements
  - Four resisted movements
- Prone
  - Two passive movements
  - Four resisted movements

**Palpation**
- Tendinitis
- Bursitis?

**Accessory tests**
- Palpation of femoral arterial pulse
- Passive flexion/adduction
- Sustained active extension of the hip
- Trendelenburg test

**Technical investigations**

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method to detect intra-articular fluid.\(^8,9\) It may also be a very useful auxiliary method in estimating the degree of tendon and muscle ruptures\(^10\) and in localizing bursitis.\(^11\) However, the method requires a lot of experience, and diagnostic precision depends entirely on the skill of the examiner.

There is general agreement that hip *arthroscopy* is valuable as a diagnostic investigation in patients with catching or transient locking of the hip (loose bodies, synovial tags and lesions of the labrum).\(^12-14\)

Examination of the hip and buttock is summarized in Box 45.4.

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Access the complete reference list online at [www.orthopaedicmedicineonline.com](http://www.orthopaedicmedicineonline.com)
References