

VIDEOS IN CLINICAL MEDICINE
SUMMARY POINTS

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Clinical Examination of the Hip

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The following text summarizes information provided in the video.

OVERVIEW

Hip pain is reported frequently by patients of all ages. Although hip pain is common, the hip joint is complex, which can make it difficult to obtain a relevant patient history and perform a proper physical examination. This print supplement to the related video reviews the steps involved in the assessment of a patient who presents with hip pain. An understanding of the anatomy of the hip is essential when performing a comprehensive physical examination.

ANATOMY

The hip consists of two bones: the femur and the acetabulum. The major anatomical landmarks of the femur are the femoral head, the femoral neck, the greater trochanter, and the lesser trochanter (see Figs. 1 through 4). The primary area of articulation in the hip joint is between the femoral head and the pelvic acetabulum. The acetabular labrum is a fibrocartilaginous structure that lines the outer rim of the acetabulum. It effectively deepens the socket and serves as a suction seal, thereby contributing to the overall stability of the joint. The femoral head is covered by articular cartilage that allows the joint to glide smoothly against the surface of the acetabulum. The hip joint is enclosed by a fibrous capsule that attaches peripherally to the acetabulum and anteriorly to the base of the femoral neck.

The tensor fasciae latae originates in the anterolateral iliac crest. This muscle is confluent with the iliotibial band, which originates at the tendons of the tensor fasciae latae and gluteus maximus and runs along the lateral thigh until it reaches its distal point of insertion at Gerdy's tubercle, which is located on the lateral aspect of the proximal tibia. This dense, tendinous band stabilizes both the hip and the knee joint.

Laterally, the gluteus maximus has points of insertion on the iliotibial band and gluteal tuberosity of the femur. The gluteus maximus is responsible for both extending the hip and rotating the hip laterally. The gluteus medius and minimus, which have points of insertion on the greater trochanter of the hip, abduct the leg and are a common source of lateral hip pain. Posteriorly, the major muscles of the hip include the gluteus maximus, gluteus medius, gluteus minimus, and piriformis, as well as the short external rotators. The hamstrings, which include the semimembranosus, semitendinosus, and biceps femoris, are essential for hip extension and knee flexion. Other relevant muscles include the iliopsoas, sartorius, and rectus femoris. Adductors of the leg include the adductor magnus, adductor brevis, adductor longus, and gracilis.

Three major nerves lie proximate to the hip: the femoral nerve, the obturator nerve,

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Figure 1. Anterior View of the Bones of the Hip.

The femoral head is covered by articular cartilage that allows the joint to glide smoothly over the articular surface of the acetabulum.

and the sciatic nerve. The femoral nerve can be damaged through direct trauma or prolonged pressure to the anterior aspect of the hip, which may cause weakness, numbness, tingling, or pain along the anterior thigh and leg. The obturator nerve can be irritated by hip inflammation, which may cause pain in the medial thigh and knee. Compression of the sciatic nerve causes sciatica, a shooting pain that runs down the back of the gluteal region and the leg. The three major arteries close to the hip are the femoral artery and two of its branches, the medial and lateral circumflex arteries. Disruption of the medial circumflex artery can cause avascular necrosis of the femoral head.

HISTORY

The first step in the assessment of a patient with hip pain is to obtain a focused history. Ask the patient to describe when the pain began, what alleviates the pain, what makes it worse, whether the pain radiates, and what are the characteristics of the pain. Ask the patient to rate the severity of the pain on a scale of 1 to 10, and ask whether certain movements, such as climbing stairs or standing from a seated position, aggravate the symptoms. Also ask whether the patient has had a specific injury or trauma and whether the pain has become chronic over time. Finally, ask whether anything relieves the pain, such as medications, exercise, or rest. An accurate, comprehensive history should consider all the potential sources of hip pain.

It is important to determine the location of the pain and then to attempt to reproduce the pain during the physical examination. Be aware that hip pain may be caused by conditions affecting the back and that lower back pain may be caused by conditions affecting the hip. Be sure to perform pulse palpation and auscultation to check for peripheral-artery disease, which can cause pain at the hip. A full sensory examination and assessment of deep tendon reflexes may also be indicated if you suspect neurologic impairment.

Hip pain can often be classified on the basis of its location as described by the patient—for example, back pain, lateral hip pain, medial hip pain, and posterior hip pain. Hip pain can also derive from areas outside the hip, such as an inguinal hernia or the lumbar spine. (See Table 1 for a comprehensive list of the steps involved in the differential diagnosis of hip pain.)

PHYSICAL EXAMINATION OF THE HIP

A general examination of the hip includes gait analysis, visual inspection, palpation, assessment of range of motion, and the performance of various maneuvers and diagnostic tests. Assess both the affected hip and the unaffected hip for the purpose of comparison. Generally, if a patient presents with bilateral hip pain, one hip is more symptomatic than the other, and so a comparison is still warranted. Perform the examination with the patient first in the standing position and then in the supine, contralateral, decubitus, and prone positions. To facilitate proper visualization, ask the patient to bring or wear shorts to the appointment or to put on a gown. To ensure the safety of patients with a high risk of injury, try to minimize their position changes after you have completed the examination.

Gait Analysis

Begin the examination by observing the patient's gait. Instruct the patient to walk back and forth from one side of the room to the other. Look for signs of discomfort, asymmetry, or an otherwise atypical gait.

There are four common gait abnormalities that result from hip disorders. The first is called a coxalgic gait, meaning that the patient's trunk leans to the affected side because doing so decreases joint forces and lessens pain. Coxalgic pain is most



Figure 2. Tensor Fasciae Latae.

The tensor fasciae latae originates in the anterolateral iliac crest. This muscle is confluent with the iliotibial band, which originates at the tendons of the tensor fasciae latae and gluteus maximus, runs along the lateral thigh, and inserts distally at Gerdy's tubercle, which is located on the lateral aspect of the proximal tibia. This dense, tendinous band stabilizes both the hip and the knee joint.

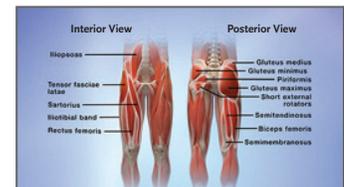


Figure 3. Anterior and Posterior Views of the Hip Muscles.

The gluteus medius and minimus insert on the greater trochanter of the hip. These muscles abduct the leg and are a common source of lateral hip pain.

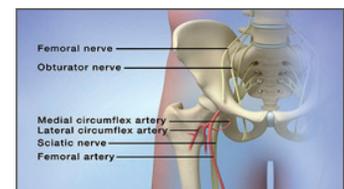


Figure 4. Anterior View of the Arteries and the Nerves of the Hip.

The femoral nerve can be damaged in response to direct trauma or to prolonged pressure on the anterior aspect of the hip, which may cause weakness, numbness, tingling, or pain along the anterior thigh and leg. The obturator nerve can be irritated by hip inflammation, which may result in pain in the medial thigh and the knee. Compression of the sciatic nerve causes sciatica, a shooting pain that runs down the back of the gluteal region and the leg. Disruption of the medial circumflex artery can cause avascular necrosis of the femoral head.

Table 1. Differential Diagnosis of Hip Pain According to Its Characteristics, the Patient History and Risk Factors, and Physical Examination.*

Diagnosis	Characteristics of Pain	History and Risk Factors	Findings on Examination
Anterior groin pain			
Athletic pubalgia	Dull or diffuse pain that radiates to the inner thigh; pain with pressure, Valsalva maneuver, sneezing, coughing, or kicking	Participation in sports such as football, hockey, soccer, and rugby	Pain and tenderness in inguinal canal, pubic tubercle, or both, with possible pain at origin of adductor, with resisted hip flexion, or during sit-ups
Anterolateral hip or groin			
Femoral neck fracture	Deep pain with weight bearing	Older age, osteoporosis, chronic glucocorticoid use, smoking; in women, symptoms of female athlete triad	Acutely painful range of motion, with severe pain on palpation
Femoroacetabular impingement	Deep, referred pain with prolonged sitting or standing	Pain when moving into and out of car	Positive result on FADIR or FABER test
Labral tear	Dull or sharp pain; pain with weight bearing	Mechanical symptoms with range of motion (catching, locking, clicking); possible history of hip dislocations	Trendelenburg or antalgic gait, loss of internal rotation, and positive results on FADIR and FABER tests
Iliopsoas bursitis	Deep pain; may be referred; occasional catching, snapping, or popping, or combination thereof, in anterolateral hip	Participation in ballet dancing or running	Snapping recreated by transitioning from FABER to extension, adduction, and internal rotation or with transition from flexed hip to extension
Osteoarthritis of the hip	Deep, aching pain; stiffness with movement and possible pain with weight bearing and activity	Patients older than 50 years of age; pain with activity that is relieved with rest	Internal rotation <15 degrees and flexion <115 degrees; narrowing of joint space and degenerative changes on radiography
Osteonecrosis of the hip	Severe pain with weight bearing and movement of the hip	Adults with chronic conditions such as lupus, sickle cell disease, HIV, chronic glucocorticoid use, smoking, alcoholism, or history of trauma; often insidious without history of trauma	Positive log-roll test, pain on movement and ambulation, gradual decrease in range of motion
Septic arthritis	Severe pain with weight bearing, ambulation, and movement	Children: most common in those 3 to 8 yr of age, who often present with fever and ill appearance Adults: most common in patients older than 80 yr of age or those who have undergone recent hip surgery (e.g., arthroplasty); also can occur in patients with diabetes or rheumatoid arthritis	Guarding against range of motion; severe pain with passive range of motion; joints warm to the touch
Lateral hip pain			
Snapping hip syndrome	Pain with palpation on lateral hip; radiation of pain down lateral thigh, with snapping or popping	Possible in all age groups	Positive Ober's test
Greater trochanteric bursitis	Pain with palpation of lateral thigh; radiation of pain down lateral thigh, with no snapping or popping sensation	Long-distance runners and middle-aged women	Pain directly over greater trochanter
Greater trochanteric pain syndrome	Pain with pressure and palpation of lateral thigh	Patients commonly present with osteoarthritis of knee, high body-mass index, and low back pain; most common in women	Proximal pain and tenderness in ilio-tibial band; Trendelenburg gait is sensitive and specific for the pain syndrome

Table 1. (Continued.)

Diagnosis	Characteristics of Pain	History and Risk Factors	Findings on Examination
Posterolateral hip pain			
Gluteal muscle tear or avulsion	Pain with palpation of posterolateral hip; radiation of pain down lateral thigh and buttock	Common in middle-aged women	Weakness of hip abduction, pain with resisted external rotation; Trendelenburg gait present
Apophysis avulsion of the iliac crest	Pain with palpation	History of trauma or skeletal immaturity (<25 yr of age)	Ecchymosis over iliac crest, tenderness in area, or both
Posterior hip pain			
Hamstring muscle strain or avulsion	Pain in buttock, pain with palpation of buttock	Eccentric muscle contraction with hip in flexed position and leg extended; common in athletes and middle-aged patients	Tenderness at origin of hamstring muscle group (ischial tuberosity); possible ecchymosis and weakness of leg flexion
Ischiofemoral impingement	Pain in buttock may radiate to posterior thigh; symptoms of sciatica may occur	Pain in groin, buttock, or both that radiates down the affected leg	MRI required for diagnosis
Piriformis syndrome	Pain in buttock with radiation to posterior thigh; symptoms of sciatica	History of trauma to buttocks; pain with sitting and standing	Positive log-roll test, in some instances with tenderness over sciatic notch
Sacroiliac dysfunction	Pain radiating to lower back, buttock, and groin	Most common in women; may occur with pregnancy or in patients with history of minor trauma to region	FABER test elicits pain that is most commonly localized to sacroiliac joint; pain with palpation of sacroiliac joint

* FABER denotes flexion, abduction, external rotation; FADIR flexion, adduction, internal rotation; HIV human immunodeficiency virus; and MRI magnetic resonance imaging.
 The female athlete triad is a combination of osteoporosis, amenorrhea, and disordered eating.
 The term *snapping* refers to a sensation of clicking or snapping of the hip. This snapping can be audible and can also be felt on palpation by the patient or medical provider.

common in patients with osteoarthritis or osteonecrosis. The second gait abnormality is called an antalgic gait. Persons with an antalgic gait spend less time bearing weight on the affected limb in order to decrease the amount of time that force is transferred through the limb and to avoid pain. An antalgic gait can be caused by a variety of conditions that can affect the limb anywhere from the hip to the feet. These conditions include osteoarthritis, infection, and soft-tissue injury. The third gait abnormality is termed the Trendelenburg gait, which is caused by weak hip abductors. Patients with a Trendelenburg gait drop or tilt the pelvis contralateral to the side of the pain. In addition, the patient may lean the trunk toward the affected side in order to regain balance and avoid falling. This gait is common in patients with hip dysplasia, fracture with malunion of the femoral neck, osteonecrosis with collapse of the femoral head, and any condition that shortens the hip abductor lever arm. A fourth gait abnormality, neurologic or asymmetric gait, shortens the stride length in the affected leg. Typically, this gait is caused by a flexion contracture or decreased internal rotation on one side of the body.

Visual Inspection

Perform a visual inspection of the patient from the front, from each side, and from the back, noting scoliosis, misalignment, muscle wasting, arch abnormalities, signs of inflammation, and scars. Patients with muscle imbalances or postural insufficiency may present with the pelvis tilted in an anterior posterior direction or on a lateral axis. Hip tilt is often associated with lower back pain. Skin inflammation

and redness may indicate an infection such as cellulitis. Scars may be a sign of previous surgery or trauma. Muscle atrophy may represent neurologic impairment or injury.

Palpation

Palpate the anatomical structures of the hip. Palpation can help to identify specific areas of injury and narrow the differential diagnosis. With the patient in the supine position, begin by placing your hand on the lateral aspect of each hip joint to assess for warmth and tenderness. A warm joint may indicate infection or acute injury. Palpate the greater trochanter. Pain may indicate bursitis—an inflammation of the trochanteric bursa. The iliotibial band overlies the greater trochanter and can also be a source of irritation and inflammation.

Palpate the anterior superior iliac spine and the anterior inferior iliac spine. Pain at either of these sites may suggest an avulsion of muscular attachments that has led to fracture or acute muscle strain. Palpate the ischial tuberosity. Pain may indicate a hamstring injury or tendinopathy. Palpate the inguinal ligament. Pain here may represent iliopsoas injury or an inguinal hernia. Palpate the iliac crest. Tenderness in this area may result from an oblique avulsion fracture. However, in children, tenderness here is common because the growth plates are active.

After completing this series of palpations, measure the length of the legs from the anterior superior iliac spine to the tip of the medial malleolus to determine whether there is a discrepancy in length. Such discrepancies may be due to a congenital malformation, previous insult to the growth plate, trauma, or environmental causes.

Range of Motion

Examine the active range of motion in each hip. Assess flexion, extension, external rotation, internal rotation, adduction, and abduction. If the patient does not have a full range of motion, provide assistance in reaching a full range of motion. Severe pain during assessment of range of motion may suggest a septic arthritis or severe osteoarthritis. Excessive or obligate external rotation and a shortened leg may suggest a hip fracture or hip dislocation and is most commonly seen in elderly patients. The detection of popping or clicking in the joint may indicate a labral tear, whereas the detection of popping or snapping outside the joint, over the greater trochanter, may indicate iliotibial band syndrome. These symptoms should be replicated, if possible, to confirm a diagnosis of iliotibial band syndrome.

Note any sensation of grinding or crepitus in the patient's joint as you passively move it through its range of motion. Losses in active and passive ranges of motion are commonly associated with femoroacetabular impingement or osteoarthritis. Pain during flexion, adduction, or internal rotation of the hip may represent femoroacetabular impingement, whereas osteoarthritis is associated with grinding and crepitus when the joint is moved. Femoroacetabular impingement is the result of excess bone growth along the anterolateral aspect of the femoral head or the lateral lip of the acetabulum. This excess growth restricts the range of motion and may cause pain when the bones of the hip joint come in contact with and pinch tissues such as the labrum.

In a patient with early signs of hip arthritis, hip abduction and rotation will be limited or painful. The presentation of patients with osteonecrosis of the hip and those with osteoarthritis may be similar, with locking, popping, or painful catching or clicking during an assessment of range of motion. Obtaining a thorough patient history can help to distinguish osteonecrosis from osteoarthritis, since glucocorticoid use and chronic alcohol use are risk factors for osteonecrosis.²

Table 2. Tests for the Diagnosis of Hip Pain.

Test	How to Perform the Test	What Is Diagnosed
Stinchfield resisted hip-flexion test	Have patient resist hip flexion with knee held in extension	Intraarticular condition causing pain
Log-roll test	Have patient lie supine with hip and knee fully extended; passive internal rotation and external rotation of the patient's leg	Increased range of motion can indicate ligamentous laxity; groin pain indicates intra-articular pathology
FADIR test	Passive flexion of hip to 90 degrees with adduction and internal rotation	Anterior rim femoroacetabular impingement syndrome or labral tear
FABER test	Passive flexion abduction and external rotation	Posterior pain indicates pathologic findings of the sacroiliac joint; anterior pain indicates intra-articular hip pathology
Ober's test	Passive adduction of hip from abducted position, with patient in lateral position	Tight tensor fascia latae, gluteus medius, or gluteus maximus
Thomas test	Patient flexes hip in supine position, causing flexion of contralateral hip	Hip contracture or tight iliopsoas

After assessing active and passive range of motion, apply resistance while the patient actively performs each range of motion. This maneuver will test for symmetry and pain. Painful movement against resistance may indicate a muscle strain, tendonitis, or osteoarthritis.

DETERMINATION OF PAIN AND DISCOMFORT

Several tests are often used to determine the source of a patient's pain or discomfort. These tests are described below and listed in Table 2, which provides an abbreviated description of each test and how it is used in diagnosis.

Stinchfield Resisted Hip-Flexion Test

The Stinchfield resisted hip-flexion test helps to identify intraarticular hip disorders. To perform this test, ask the patient to lie in the supine position and to elevate the leg while flexing slightly at the hip and keeping the leg extended. Once the patient has elevated the leg to an angle of 30 to 45 degrees, apply resistance to prevent further elevation. If this maneuver elicits pain, the patient probably has an intra-articular disorder, such as osteoarthritis or femoroacetabular impingement. In addition, a positive Stinchfield test may indicate the presence of other conditions, such as sciatica, athletic pubalgia, or iliopsoas tendonitis.³ Make sure to assess each leg.

Log-Roll Test

The log-roll test is frequently used in patients with trauma to detect injuries such as femoral neck fractures, hip fractures, hip dislocations, and sepsis in native hip joints. It is also used to assess patients for a labral tear, ligamentous instability, and capsular laxity.⁴ To perform this test, have the patient assume the supine position. Then move the patient's leg through the points of maximal internal and external rotation. If you feel clicking or popping, an acetabular labral tear may be present. The presence of an increased range of motion on one side and a normal range of motion on the other side indicates ligamentous or capsular laxity. Note, however, that bilateral laxity can be present in healthy patients.

FADIR Test

The FADIR (which denotes flexion, adduction, and internal rotation) test helps to determine whether there is hip impingement or a labral tear. With the patient in the supine position and with the knee fully flexed, passively flex the patient's hip to 90 degrees while simultaneously adducting and internally rotating the thigh. If the patient reports hip or groin pain during this maneuver, there may be a labral tear.

FABER Test

The FABER (which denotes flexion, abduction, and external rotation) test, also known as Patrick's test, is used to detect intraarticular lesions, iliopsoas strain or bursitis, or sacroiliac disease.⁵ With the patient in the supine position, passively flex the patient's hip to an angle of 90 degrees while simultaneously abducting and externally rotating the hip. If hip or back pain occurs or the range of motion is limited, the patient may have intraarticular hip lesions, iliopsoas strain or bursitis, or sacroiliac disease. Patients with sacroiliac disease may also present with lower back pain.

Ober's Test

Ober's test is used to determine whether the patient has a tight iliotibial band and tensor fascia latae muscle. With the patient lying on the unaffected side and the hip in slight extension, passively abduct the patient's leg and allow it to drop into adduction. If the leg remains in abduction or cannot be fully adducted, there is reason to suspect that the patient has a tight iliotibial band or tensor fascia latae muscle.⁶

Thomas Test

The Thomas test is used to determine whether there is tightness in the hip flexors. With the patient in the supine position, ask the patient to fully flex one hip. Observe the contralateral side. If the contralateral hip flexes and the leg lifts off the table, the patient most likely has a fixed flexion deformity. A fixed flexion deformity may represent contracture of the hip or a tight iliopsoas muscle, either of which will prevent extension of the hip.

COMMON PITFALLS

Common pitfalls of hip examination include incomplete visualization, incomplete assessment of the range of motion, difficulty with palpation of anatomical landmarks in patients with a high body-mass index, and evaluation of only one limb. Evaluation of both limbs is essential for accurate diagnosis.

After a comprehensive history has been obtained and a physical examination has been performed, imaging may be necessary. When a patient presents with hip pain, an anterior-posterior plain film, as well as a lateral view of the pelvis, may be obtained. If a labral tear is suspected, magnetic resonance arthrography is typically warranted. If there are unexplained physical findings or risk factors for hip emergencies such as osteonecrosis of the femoral head, magnetic resonance imaging should be performed.

SUMMARY

An assessment of hip pain involves taking a comprehensive patient history and performing a physical examination. This print supplement and the related video are meant to help health care providers diagnose disorders of the hip. Imaging in consultation with a hip or sports specialist should be arranged, if necessary.

No potential conflict of interest relevant to this article was reported.

Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

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