Evaluation and management of hip pain: An algorithmic approach

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Practice recommendations

- Start by determining whether pain is located in the anterior, lateral, or posterior hip. As the site varies, so does the etiology.
- Besides location, consider sudden vs insidious onset, motions and positions that reproduce pain, predisposing activities, and effect of ambulation or weight bearing.
- Physical examination tests that elucidate range of motion, muscle strength, and pain replication will narrow the diagnostic search.
- Magnetic resonance imaging is usually diagnostic if plain x-rays and conservative therapy are ineffective.
- Conservative measures and selective use of injection therapy are usually effective.

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Given the number of disorders capable of causing hip pain, and the fact that hip pathology can refer pain to other areas, and pathology elsewhere (particularly the lumbar spine) can refer pain to the hip,* a useful starting point in the evaluation is one that begins to narrow the search immediately.

In the work-up of hip pain, the first fact to establish is whether pain is felt in the anterior, lateral, or posterior part of the hip. Each location suggests a distinctive set of possible underlying causes. We provide diagnostic algorithms for all 3 scenarios, to aid in determining the best course for the work-up.

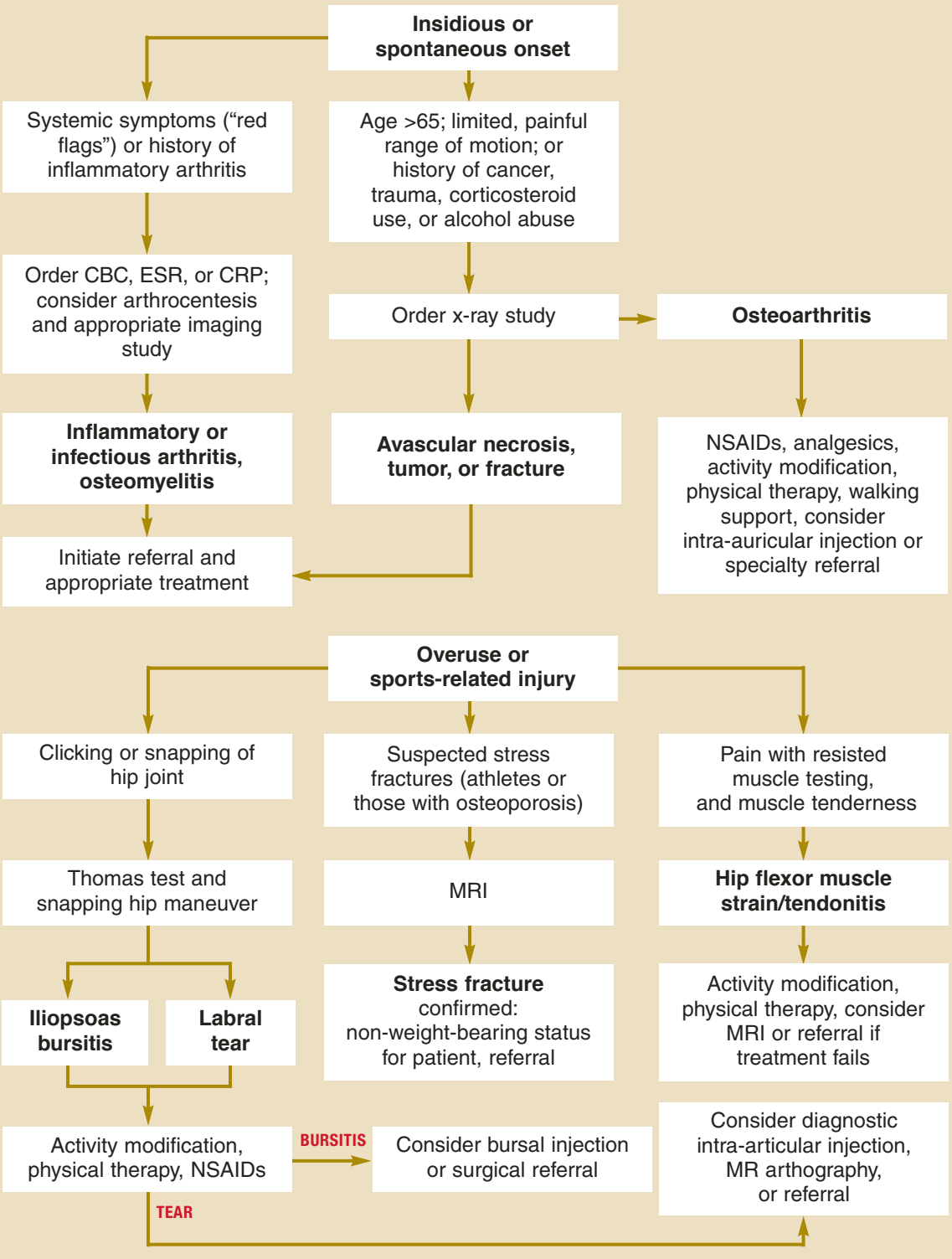
Anterior hip pain

Anterior hip pain (**Figure 1**), which is the most common, usually indicates pathology of the hip joint (ie, degenerative arthritis), hip flexor muscle strains or tendonitis, and iliopsoas bursitis. In a study by Lamberts and colleagues,[5] by far the most common diagnosis of patients with hip complaints seen by their general practitioner was *osteoarthritis*. In a study of subjects older than

**Medial groin pain is often included in the discussion of hip pain, but this topic is beyond the scope of this review.*

FIGURE 1

Evaluating anterior hip pain



CBC, complete blood count; ESR, erythrocyte sedimentation rate; CRP, C-reactive protein; MRI, magnetic resonance imaging; NSAIDs, nonsteroidal anti-inflammatory drugs

40 years who experienced a new episode of hip pain, 44% had evidence of osteoarthritis (level of evidence [LOE]=**1b**).[6]

Iliopsoas bursitis, a less common cause of anterior hip pain, involves inflammation of the bursa between the iliopsoas muscle and the iliopectineal eminence or "pelvic brim" (**Figure 2**).

Stress fractures typically occur in athletes as the structural demands from training exceed bone remodeling (fatigue fractures), and may also occur in the setting of osteoporosis under normal physiologic loads (insufficiency fractures).

Labral tears have recently been recognized in younger athletic patients with unexplained hip joint pain and normal radiographic findings.[7]

Lateral hip pain

Lateral hip pain (**Figure 3**) is usually associated with greater trochanteric pain syndrome, iliotibial band syndrome, or meralgia paresthetica.

Greater trochanteric pain syndrome is a relatively new term that includes greater trochanteric bursitis and gluteus medius pathology.[8,9] Trochanteric bursitis is a common cause of lateral hip pain, especially in older patients. However, a magnetic resonance imaging (MRI) study of 24 women with greater trochanteric pain syndrome (described as chronic pain and tenderness over the lateral aspect of the hip) found that 45.8% had a gluteus medius tear and 62.5% had gluteus medius tendonitis, calling into question how many of these patients actually have bursitis (LOE=**4**).[9]

Iliotibial band syndrome is particularly common in athletes. It is caused by repetitive movement of the iliotibial band over the greater trochanter.

Meralgia paresthetica, an entrapment syndrome of the lateral femoral cutaneous nerve, is another cause of lateral hip pain that occurs more frequently in middle age. Meralgia paresthetica is characterized by hyperesthesia in the anterolateral thigh, although 23% of patients with this disorder also complain of lateral hip pain.[10]

Common problem, sparse data

The family physician in a typical practice can expect to see a patient with hip pain every 1 to 2 weeks, given that this complaint accounts for 0.61% of all visits to family practitioners, or about 1 in every 164 encounters.[1] However, few studies shed light on the prevalence of hip disorders, and no clear consensus exists on this matter or even on terminology. Most information about causes of hip pain is drawn from expert opinion in a range of disciplines, including orthopedics, sports medicine, rheumatology, and family medicine.

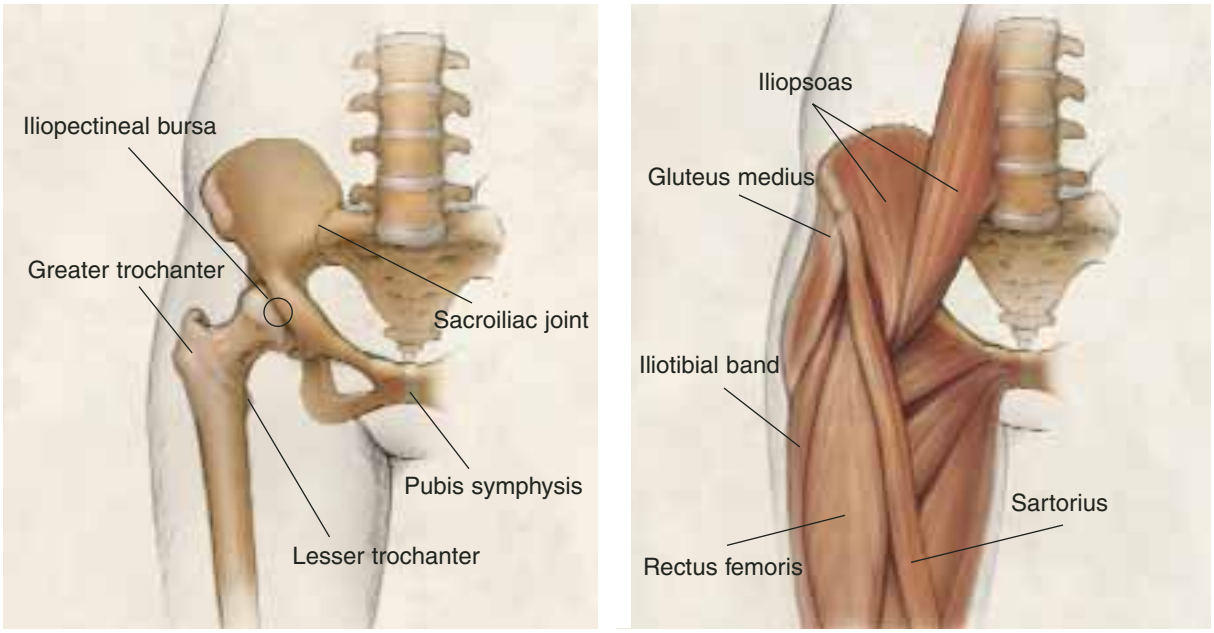
Runners report an average yearly hip or pelvic injury rate of 2% to 11%.[2] In the third National Health and Nutrition Examination Survey (NHANES III), 14.3% of patients aged 60 years and older reported significant hip pain on most days over the previous 6 weeks.[3] Older women were more likely to report hip pain than older men. NHANES III also reported that 18.4% of those who had *not* participated in leisure time physical activity during the previous month reported severe hip pain as opposed to 12.6% of those who did engage in physical activity.

In younger patients, sports injuries about the hip and pelvis are most common in ballet dancers, soccer players, and runners (incidence of 44%, 13%, and 11% respectively).[4]

Posterior hip pain

Posterior hip pain (**Figure 4**) is the least common pain pattern, and it usually suggests a source outside the hip joint. Posterior pain is typically referred from such disorders of the lumbar spine as degenerative disc disease, facet arthropathy, and spinal stenosis. Posterior hip pain is also caused by disorders of the sacroiliac joint, hip extensor and external rotator muscles, or, rarely, aortoiliac vascular occlusive disease.

FIGURE 2 **Hip joint**



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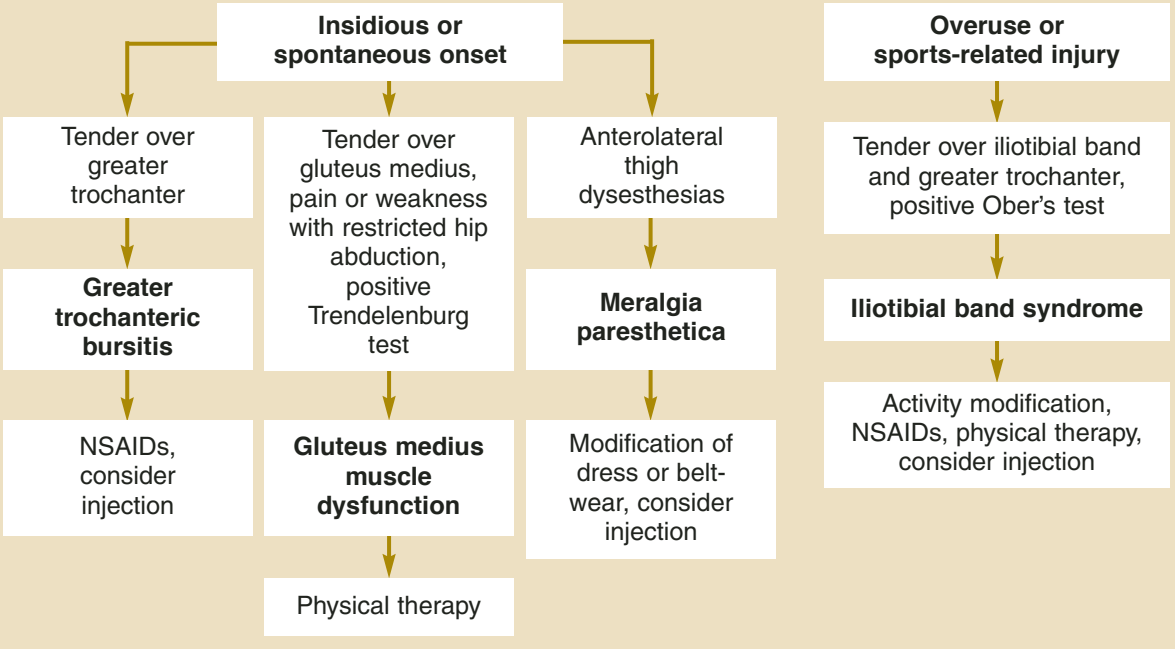
Anatomy of the hip joint and the surrounding musculature.

FIGURE 3

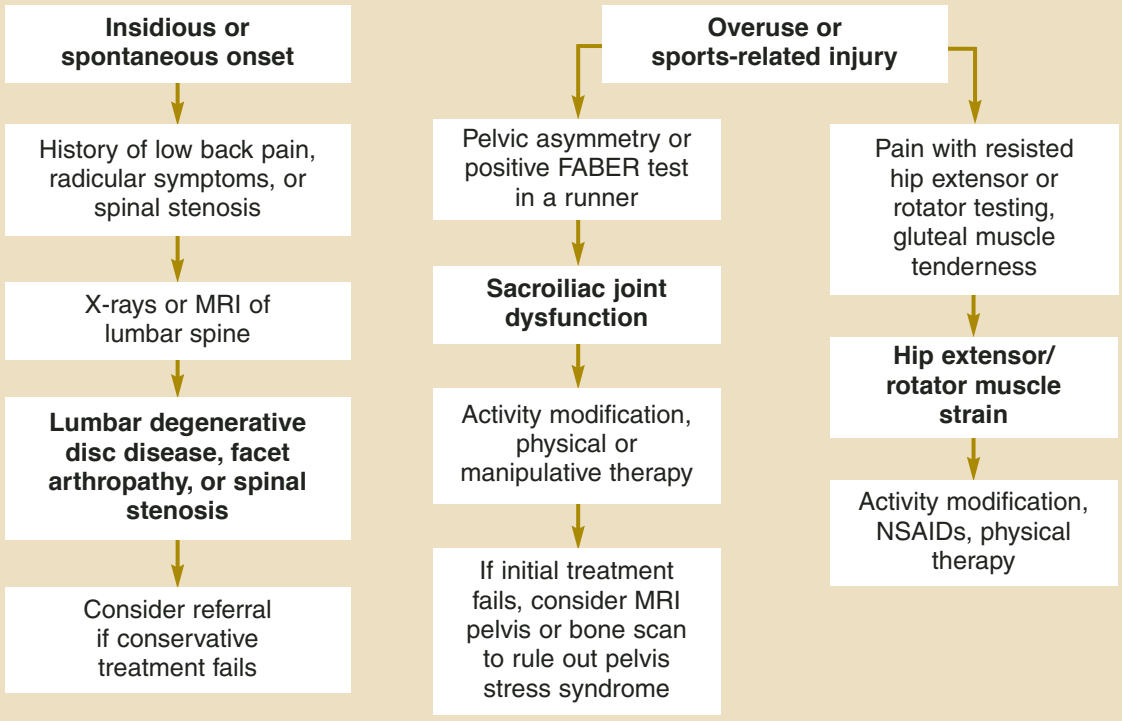
Evaluating lateral hip pain



NSAIDs, nonsteroidal anti-inflammatory drugs

FIGURE 4

Evaluating posterior hip pain



FABER, flexion, abduction, and external rotation; MRI, magnetic resonance imaging; NSAIDs, nonsteroidal anti-inflammatory drugs

INTEGRATING HISTORY AND PHYSICAL EXAMINATION

Little research has been performed to clarify the sensitivity and specificity of most history and physical examination maneuvers used in the diagnosis of hip pain. Therefore, much of the evaluation of hip pain is based on level 5 evidence: expert opinion.

The American Academy of Orthopaedic Surgeons created a clinical guideline on the evaluation of hip pain.[11] Although a useful resource, this guideline focuses primarily on 3 diagnoses—osteoarthritis, inflammatory arthritis, and avascular necrosis—and does not expand upon the many other causes of hip pain that present to a primary care physician. Based on the available literature as well as our experience, we recommend the following approach to a patient with hip pain.

Medical history

After identifying whether the pain is anterior, lateral, or posterior (**Figures 1, 3, and 4**), focus on other characteristics of the pain—sudden vs insidious onset, movements and positions that reproduce the pain, predisposing activities, and the effect of ambulation or weight-bearing activity on the pain (**Table 1**).

In general, osteoarthritis and trochanteric bursitis are more common in older, less active patients, whereas stress fractures, iliopsoas strain or bursitis, and iliotibial band syndrome are more common in athletes. Complaints of a "snapping" sensation may indicate iliopsoas bursitis if the snapping is anterior, or iliotibial band syndrome if the snapping is lateral.

Warning signs for other conditions. With any adult who has acute hip pain, be alert for "red flags" that may indicate a more serious medical

TABLE 1

Integrating the history and physical examination to diagnose hip pain

	Disorder	Presentation and exam findings
Anterior pain	Osteoarthritis	Gradual onset anterior thigh/groin pain worsening with weight-bearing Limited range of motion with pain, especially internal rotation (LOE=**1b**)[12] Abnormal FABER test
	Hip flexor muscle strain/tendonitis	History of overuse or sports injury Pain with resisted muscle testing Tenderness over specific muscle or tendon
	Iliopsoas bursitis	Anterior pain and associated snapping sensation Tenderness with deep palpation over femoral triangle Positive snapping hip maneuver Etiology from overuse, acute trauma, or rheumatoid arthritis
	Hip fracture (proximal femur)	Fall or trauma followed by inability to walk Limb externally rotated, abducted, and shortened Pain with any movement
	Stress fracture	History of overuse or osteoporosis Pain with weight-bearing activity; antalgic gait Limited range of motion, sensitivity 87% (LOE=**4**)[13]
	Inflammatory arthritis	Morning stiffness or associated systemic symptoms Previous history of inflammatory arthritis Limited range of motion and pain with passive motion
	Acetabular labral tear	Activity-related sharp groin/anterior thigh pain, esp. upon hip extension Deep clicking felt, sensitivity 89% (LOE=**4**)[14] Positive Thomas flexion-extension test
	Avascular necrosis of femoral head	Dull ache in groin, thigh, and buttock usually with risk factors (corticosteroid exposure, alcohol abuse) Limited range of movement with pain
Lateral pain	Greater trochanteric bursitis	Female:male 4:1, fourth to sixth decade Spontaneous, insidious onset lateral hip pain Point tenderness over greater trochanter
	Gluteus medius muscle dysfunction	Pain with resisted hip abduction Tender over gluteus medius (cephalad to greater trochanter) Trendelenburg test: sensitivity 72.7%, specificity 76.9% for detecting gluteus medius muscle tear (LOE=**2b**)[9]
	Iliotibial band syndrome	Lateral hip pain or snapping associated with walking, jogging, or cycling Positive Ober's test
	Meralgia paresthetica	Numbness, tingling, and burning pain over anterolateral thigh Aggravated by extension of hip and with walking Pressure over nerve may reproduce dysesthesia in distribution of lateral femoral cutaneous nerve (LOE=**5**)[15]
Posterior pain	Referred pain from lumbar spine	History of low back pain Pain reproduced with isolated lumbar flexion or extension Radicular symptoms or history consistent with spinal stenosis
	Sacroiliac joint dysfunction	Controversial diagnosis Posterior hip or buttocks pain usually in runners Pelvic asymmetry found on exam
	Hip extensor or rotator muscle strain	History of overuse or acute injury Pain with resisted muscle testing Tender over gluteal muscles

LOE, level of evidence. For an explanation of levels of evidence, see page 626.

TABLE 2

Indications for diagnostic imaging studies

Disorder	Test	Level of evidence
Osteoarthritis	AP and lateral hip x-ray studies—weight-bearing[17]	2
Muscle strain/tendonitis	None needed initially; consider MRI if not resolving	5
Greater trochanteric pain syndrome	None needed initially; consider MRI if not resolving[9]	4
Hip fracture (proximal femur)	AP pelvis and cross table lateral x-ray studies	*
Stress fracture	MRI—sensitivity 100%[13]	4
Iliopsoas bursitis	None needed initially; consider MRI if not resolving Can also use iliopsoas bursa imaging[18–20]	4
Iliotibial band syndrome	None needed initially; consider MRI if not resolving	5
Meralgia paresthetica	Usually diagnosed by history. Can use sensory nerve conduction study[21]	4
Inflammatory arthritis	Complete blood count, erythrocyte sedimentation rate or C-reactive protein, arthrocentesis, x-ray study	*
Referred pain from lumbar spine	MRI of lumbar spine	*
Avascular necrosis of femoral head	AP and lateral hip x-rays MRI for staging[22]	4
Acetabular labral tear	MR arthrography—sensitivity 91%, specificity 71%[23–25]	4

*Level of evidence not reported as specific references could not be found.
AP, anteroposterior; MRI, magnetic resonance imaging

condition as the source of pain. Fever, malaise, night sweats, weight loss, night pain, intravenous drug abuse, a history of cancer, or known immunocompromised state should prompt you to consider such conditions as tumor, infection (ie, septic arthritis or osteomyelitis), or an inflammatory arthritis. Consider appropriate laboratory studies such as a complete blood count, erythrocyte sedimentation rate or C-reactive protein; and expedited imaging, diagnostic arthrocentesis, or referral. Fractures must also be excluded if there is a history of significant trauma, fall, or motor vehicle accident.

Physical examination

Begin your examination by observing the patient's gait and general ability to move around the examining room.

Range of motion. Carefully assess range of motion of the hip, comparing the affected side with the normal side to detect subtle limitations or painful movements. Range of motion testing includes passive hip flexion, internal and external rotation, and the flexion, abduction, and external rotation (FABER) test (**Figure 5**).

In the *FABER test,* the patient lies supine; the affected leg is flexed, abducted, and externally

FIGURE 5 **FABER test**

ILLUSTRATION BY SCOTT BODELL

The FABER test is performed with the hip flexed, abducted, and externally rotated as the examiner lowers the leg to the table. A positive test reproduces pain from the hip or sacroiliac joint.

rotated. Lower the leg toward the table. A positive test elicits anterior or posterior pain and indicates hip or sacroiliac joint involvement.

The most predictive finding for osteoarthritis is decreased range of motion with restriction in internal rotation (LOE=**1b**).[12] For those patients with one plane of restricted movement, the sensitivity for osteoarthritis is 100% and specificity is 42%; in 3 planes of restricted movement, sensitivity is 54% and specificity is 88% with a likelihood ratio of 4.4.[12] A positive FABER test has been shown to be 88% sensitive for intra-articular pathology in an athletic population.[16]

Muscle testing. Test muscle strength to assess whether particular muscle groups are the source of pain. Maneuvers include resisted hip flexion, adduction, abduction, external rotation, and extension.

Other tests. With lateral hip pain, findings of weakness or pain while testing hip abduction may point to gluteus medius muscle dysfunction associated with greater trochanteric pain syndrome. The *Trendelenburg test* may also help. The patient stands on the affected leg. A negative test result occurs when the pelvis rises on the opposite side. A positive test result occurs when the pelvis on the opposite side drops and indicates a weak or painful gluteus medius muscle.

With *Ober's test,* the patient lies on his or her side with hips and knees flexed. The upper leg is passively extended then lowered to the table. Lateral hip pain or considerable tightness may indicate iliotibial band syndrome.

With the *Thomas test,* the contralateral hip is flexed, and the symptomatic hip is moved from full flexion to full extension. A deep click palpated may be indicative of a labral tear.

The *snapping hip* maneuver (**Figure 6**) may also be helpful in diagnosing the cause of pain. Loss of sensation to the anterolateral thigh is consistent with meralgia paresthetica.

Palpation. Finally, palpate over specific structures, such as the hip flexor muscles, greater trochanter, iliotibial band, and gluteus medius muscle, to further localize the source of pain. For instance, tenderness may be present over the anterior soft tissues in a hip flexor muscle strain or iliopsoas bursitis, and over the greater trochanter in trochanteric bursitis.

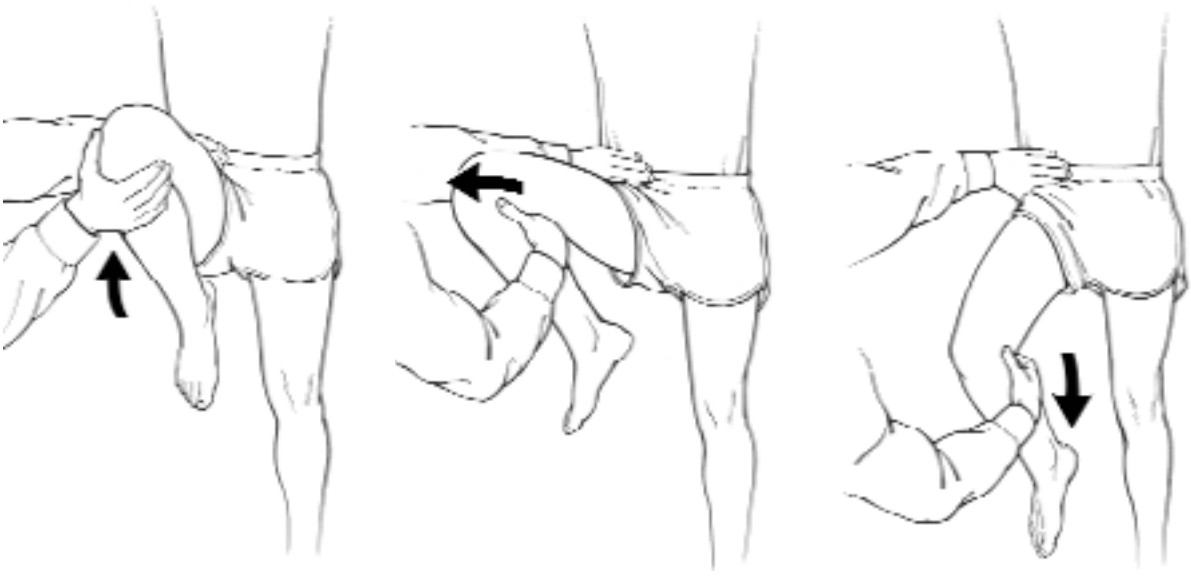
WHEN DIAGNOSTIC IMAGING IS BENEFICIAL

In most cases, a thorough history and physical examination are adequate to establish a diagnosis. In the Lamberts study,[5] only 16% of hip complaints required imaging for further elucidation. **Table 2** summarizes use of imaging studies with different disorders.

X-ray studies

Patients with a history of traumatic injury, osteoporosis, cancer, high-dose corticosteroid exposure, or alcohol abuse are at higher risk of such bony hip pathology as fracture, osteoarthritis, or avascular necrosis. These patients should undergo x-ray studies during their initial evaluation. An anteroposterior

FIGURE 6 **Snapping hip maneuver**



ILLUSTRATIONS BY SCOTT BODELL

The examiner's hand is placed on the inguinal crease as the hip is passively flexed, abducted and externally rotated, then returned to a neutral position. A palpable snap during the last phase of the maneuver is indicative of iliopsoas bursitis.

pelvic radiograph and a lateral radiograph of the hip are appropriate.

Although no specific patient age has been identified as a threshold for ordering x-ray studies, we recommend that all patients older than 65 years with new-onset hip pain undergo such studies.

We also recommend x-ray films for a patient of any age who has chronic severe hip pain.

Magnetic resonance imaging

Advanced imaging may be required when initial conservative therapy is not effective or x-ray findings are unrevealing. Although computed tomography (CT) scan and bone scan have roles in the evaluation of some hip disorders, MRI has emerged as the study of choice in diagnosing hip pathology, especially in athletes.[13]

MRI offers valuable information regarding occult bony and cartilage injury such as stress fractures, avascular necrosis, and osteoarthritis, as well as soft tissue abnormalities such as muscle tears and bursitis. In a retrospective study of patients with suspected hip fracture but negative plain film results, MRI showed occult femoral fractures in 37% of patients, occult pelvic fractures in 23%, and associated soft-tissue abnormalities such as muscle edema and hematoma or joint effusion in 74%.[26]

Other imaging tests

In cases of suspected labral or intra-articular pathology, MR arthrography, anesthetic intra-articular injection and examination under local anesthesia, or diagnostic arthroscopy may be needed.[16] These are relatively new techniques that help diagnose disorders not previously recognized.

TREATMENT

Depending on the presumed cause of pain, treatment options include activity modification, acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs), analgesics, corticosteroid injections, physical therapy, and, if necessary, walking support.

MRI may be required when conservative therapy is not effective or x-rays are unrevealing

Osteoarthritis. When symptoms persist despite conservative treatment for osteoarthritis, fluoroscopically guided intra-articular injection of a corticosteroid—or, more recently, viscosupplementation with hyaluronic acid preparations—may be useful in decreasing pain, and delaying or possibly avoiding hip arthroplasty (LOE=**4**).[27—29]

Greater trochanteric bursitis. Corticosteroid injection is also helpful and easily performed by a family physician for treatment of greater trochanteric bursitis, with 77% of patients improving in 1 week, and 61% with sustained improvement at 26 weeks (LOE=**4**).[30]

Iliopsoas bursitis. This disorder has been shown to respond to a physical therapy program emphasizing hip rotation strengthening (LOE=**4**).[31] However, recalcitrant cases may require intrabursal injection or surgical lengthening of the iliopsoas muscle (LOE=**4**).[32,33]

Meralgia paresthetica. This condition may respond to an injection of corticosteroid adjacent to the anterior superior iliac spine near the emergence of the lateral femoral cutaneous nerve.[10] In cases of suspected sacroiliac joint dysfunction, manipulative therapy was shown to provide short-term improvement.[34]

WHEN TO REFER

When hip pain is refractory to conventional treatment, consider referral to a specialist, such as a sports medicine specialist, physiatrist, rheumatologist, or orthopedic surgeon.

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