

CLINICAL PRACTICE

# Osteoarthritis of the Hip

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*This Journal feature begins with a case vignette highlighting a common clinical problem. Evidence supporting various strategies is then presented, followed by a review of formal guidelines, when they exist. The article ends with the author's clinical recommendations.*

**A 70-year-old man reports a gradual onset of hip pain that has limited his activities for about a year. The pain initially occurred only with walking and was limited to the anterior hip area but now has spread to the side of the hip and is present at rest. He has no history of injury to the hip, back, or lower back and has no pain or morning stiffness in any other joints. He has been taking ibuprofen at a dose of 200 mg once or twice daily, without improvement. How should the patient be evaluated and treated?**

## THE CLINICAL PROBLEM

Osteoarthritis is the most common joint disorder in the United States and is the leading cause of disability in the elderly, with nearly 200,000 total hip replacements performed annually. Radiographic evidence of osteoarthritis of the hip is present in about 5% of the population over the age of 65 years. However, not all patients with radiographic evidence of osteoarthritis have symptoms. The inconsistent relationship between radiographic changes and symptoms may account for discrepant findings in prevalence studies of osteoarthritis of the hip.<sup>1-3</sup>

The term "osteoarthritis" is used to represent a heterogeneous group of joint disorders in patients presenting with joint pain and stiffness. The pathogenesis of osteoarthritis is not completely understood. Osteoarthritis most likely begins with degradation of the articular cartilage in a localized, nonuniform manner.<sup>4</sup> This process is followed by a subsequent thickening of the subchondral bone, new bony outgrowths at joint margins (referred to as osteophytes), and mild-to-moderate synovial inflammation. The initiating events that lead to osteoarthritis are not clearly established but are probably due to abnormal signals that alter the chondrocyte phenotype so that it synthesizes proteins that degrade the matrix and causes the joint to degenerate.<sup>4</sup>

Osteoarthritis of the hip is categorized as primary (idiopathic) or secondary (systemic or localized) disease. Risk factors for primary osteoarthritis of the hip include old age, high bone mass, a genetic predisposition for the disease, increased body-mass index, participation in weight-bearing sports (e.g., running at an elite level), and occupations that require prolonged standing, lifting, or moving of heavy objects.<sup>5-9</sup> Secondary causes (systemic) include hemochromatosis, hyperparathyroidism, hypothyroidism, acromegaly, hyperlaxity syndromes, Paget's disease, gout, and chondrocalcinosis.<sup>10</sup> Localized risk factors include joint injury, developmental deformities (e.g., slipped capital femoral epiphysis), Legg–Calvé–Perthes disease, acetabular dysplasia, osteonecrosis, and rheumatoid or septic arthritis as a result of cartilage damage.<sup>1,10</sup> Polymorphisms and signaling pathways involved with the development and metabolism of bone and cartilage have also been linked to the risk of osteoarthritis.<sup>11-14</sup>

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## STRATEGIES AND EVIDENCE

## DIAGNOSIS

*Medical History and Physical Examination*

The pain that is associated with osteoarthritis of the hip is usually related to activity (Table 1). Patients typically report a gradual onset of hip pain, which increases with joint use and is relieved, although incompletely, with rest. As the disease becomes more severe, morning stiffness and pain (lasting up to 30 minutes) and pain at rest or at night are common. However, hip pain at night may instead reflect inflammatory arthritis, infection, tumors, or crystal diseases.<sup>16</sup>

Physical examination should rule out other causes of hip pain (Table 2). An assessment of the range of motion of the knee joint and lower lumbar spine will help determine whether hip pain is referred from these other joint areas.<sup>15,18</sup> The strongest clinical indicator of osteoarthritis of the hip is pain, exacerbated by internal or external rotation of the hip while the knee is in full extension. Trochanteric bursitis and damage to the sciatic nerve can cause pain similar to that of osteoarthritis of the hip but may be distinguished by the presence of associated tenderness over the greater trochanter (for trochanteric bursitis) and pain in the posterior hip or buttocks (for sciatic-nerve damage associated with lumbar radiculopathy) (Table 2). Anterior or inguinal pain and tenderness generally indicate true involvement of the hip joint. In about 20% of patients with osteoarthritis of the hip, the condition is bilateral; both hip joints should be examined.<sup>16,18</sup>

The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)<sup>19</sup> is a validated instrument for the assessment of pain, stiffness, and physical function in patients with osteoarthritis of the knee or hip. Although this index is a useful research tool for evaluating clinically relevant changes in health status after treatment, it is not routinely used in clinical practice.

**Table 1. Criteria for the Diagnosis of Osteoarthritis of the Hip.\***

<p>Hip pain and at least 2 of the following:</p> <ul style="list-style-type: none"> <li>An erythrocyte sedimentation rate of &lt;20 mm/hr</li> <li>Radiographic evidence of femoral or acetabular osteophytes</li> <li>Radiographic evidence of joint-space narrowing (superior, axial, or medial)</li> </ul>
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\* Criteria are based on the recommendations of the American College of Rheumatology, including both clinical and radiographic information.<sup>15</sup>

*Laboratory Tests*

No blood tests are routinely obtained in the work-up for a patient with chronic hip pain unless the medical history and physical examination suggest inflammatory arthritis. Extraction and examination of synovial fluid from the hip joint is not routine and requires guidance by means of either ultrasonography or fluoroscopy. If the procedure is performed for suspected inflammatory arthritis, a white-cell count below 1000 per cubic millimeter in the synovial fluid is consistent with osteoarthritis, whereas higher white-cell counts (above 2000 per cubic millimeter) suggest inflammatory arthritis. The presence of crystals in the synovial fluid supports a diagnosis of gout or pseudogout.<sup>16,18</sup>

Pelvic radiography that is performed while the patient is standing is used to confirm the diagnosis of osteoarthritis, particularly if hip pain is moderate to severe, related to activity, or present at night. Although these findings are all consistent with osteoarthritis, they may indicate other conditions, including inflammatory arthritis and cancer. Moderate loss of joint space (i.e., an articular width of less than 2 mm), osteophyte formation, and sclerosis at the joint margins are consistent with osteoarthritis of the hip (Fig. 1).<sup>15,20,21</sup> Magnetic resonance imaging can reveal early changes in cartilage and bone that are consistent with osteoarthritis but is not indicated for patients with chronic hip pain unless evaluation raises suspicion regarding a worrisome cause.<sup>16,18</sup>

## TREATMENT

Therapy for osteoarthritis of the hip has two major objectives: to relieve pain and to preserve function. Few randomized trials have evaluated pharmacologic and nonpharmacologic treatments specifically in patients with osteoarthritis of the hip.<sup>20</sup>

*Lifestyle Interventions*

Self-help education classes inform patients about the disease and how exercise and other lifestyle modifications can result in improvements in pain and function (Table 3). However, in controlled trials, such improvements have tended to be modest.<sup>22,23</sup> Educational materials may be useful in informing patients about how to deal with pain and disability. Periodic telephone-support interventions by lay personnel may also promote self-care in patients with osteoarthritis.<sup>24</sup>

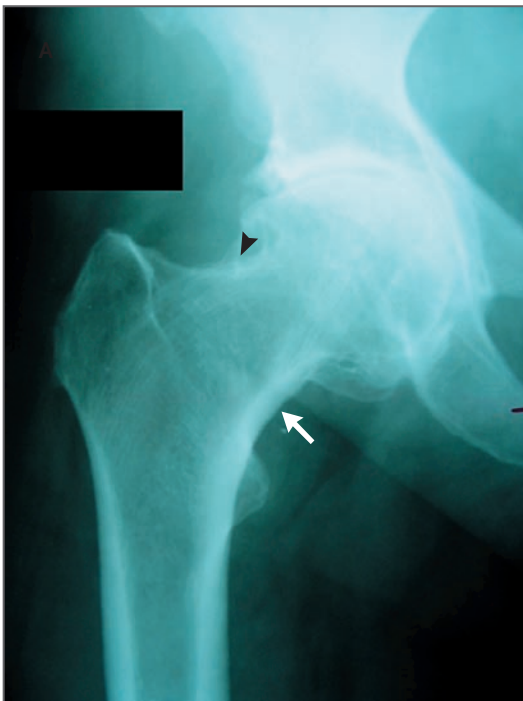
Exercise interventions have proved effective for osteoarthritis of the knee but have been less well

**Table 2. Features That Distinguish Other Causes of Chronic Hip Pain from Osteoarthritis.\***

Condition	History	Features of Physical Examination	Laboratory or Radiographic Features
Trochanteric bursitis	Lateral hip pain aggravated by direct pressure; intolerance of sleeping on affected side	Point tenderness over trochanteric bursa, about 2.5 cm posterior and superior to the greater trochanter	None
Meralgia paresthetica (lateral femoral cutaneous-nerve entrapment)	Localized area of pain on lateral aspect of hip that can range from numbness and tingling to burning pain	Not affected by direct pressure, hip movement, or lower back movement	None
Lumbar radiculopathy	Lateral or posterior hip pain that can radiate down the leg and into the foot with or without associated foot numbness (especially at the L4–L5 level); commonly with low back pain; possible numbness and weakness in the lower leg	Straight leg raise eliciting pain in the leg, buttock, or back at 60 degrees or less of leg elevation; if test is positive, suggestive of L5 or S1 nerve-root irritation; possibly with reduced strength and sensation and impaired reflexes in the lower leg†	Narrowing of intervertebral disk spaces, disk herniation, and nerve-root swelling or impingement, as seen on MRI of lower lumbar spine
Lumbar spinal stenosis	Lateral and posterior hip pain that may radiate to the lower leg or groin, exacerbated by walking or standing and relieved by sitting and leaning forward or lying down; back pain characteristic; possibly with numbness and weakness in the lower leg, especially after ambulation	Usually normal; reflexes of ankle or knee may be impaired; muscle weakness in the lower leg, especially after ambulation	Narrowing of the intraspinal canal, as seen on MRI or CT of lumbar spine
Chronic inflammatory arthritis (including rheumatoid arthritis and spondyloarthropathies)	Prominent morning stiffness, possibly with pain in other joints and other systemic manifestations of disease	Swelling and tenderness in other joints	Increased erythrocyte sedimentation rate or level of C-reactive protein; inflammatory synovial fluid (>2000 white cells per cubic millimeter)
Osteonecrosis	Anterior groin pain with joint use that can lead to thigh and buttock pain; frequent pain on walking and at rest; often with a history of corticosteroid use	Typically with pain on range of motion	Normal radiographic findings in early stages of disease, possibly with visible areas of femoral necrosis on MRI before changes in femoral head are visible on radiography
Iliotibial band syndrome	Lateral hip pain (aching or burning) that radiates down the side of the leg and is exacerbated by running or walking	Pain and tenderness along the iliotibial band with the patient lying with the involved hip up and the involved leg lowered and then moved forward and downward	None
Metastatic cancer of the femur	Lateral hip pain aggravated by direct pressure or weight bearing, possibly with nocturnal or continuous pain; often associated with a known primary cancer	Possible tenderness on direct palpation	Metastatic bone involvement on radiography of hip
Gout or pseudogout	Episodes of acute pain with history of similar episodes in other joints	Tenderness or swelling in other joints	Crystals in inflammatory synovial fluid; possible evidence of crystal deposition within the joint on radiography

\* Data are from Anderson.<sup>17</sup> Hip pain is considered to be chronic if it lasts for more than 6 weeks. MRI denotes magnetic resonance imaging, and CT computed tomography.

† The test of straight-leg elevation has an approximate sensitivity of 80% and a specificity of about 40% (indicating many false positive tests).



**Figure 1. Radiograph Showing Osteoarthritis of the Hip in an Elderly Woman.**

In this representative radiograph, large lateral and inferior femoral osteophytes are visible (arrow), with moderately severe narrowing of the medial joint space and subchondral sclerosis at both the femoral head and acetabular rim. Mild-to-moderate buttressing can be seen along the medial side of the femoral neck (arrowhead). Patients with more severe osteoarthritis of the hip may also have juxta-articular bone cysts and deformity of the femoral head.

studied for the treatment of osteoarthritis of the hip.<sup>25</sup> In a randomized, controlled trial involving patients with osteoarthritis of the knee or hip, improvements in pain and function were noted in more than 70% of patients who were assigned to aquatic therapy for 6 weeks, as compared with 17% of control subjects who received standard care.<sup>26</sup>

Case-control studies have shown a significant association between increased weight and osteoarthritis of the hip.<sup>27</sup> Although data from randomized trials of weight loss for this condition are lacking, it is reasonable to encourage weight loss in overweight or obese patients with osteoarthritis of the hip.

Acupuncture may also have a benefit for this disease. In a randomized, controlled trial involving patients with osteoarthritis of the hip or knee, acupuncture significantly reduced pain and im-

proved quality-of-life scores by 30 to 50% for the 3-month treatment period, as compared with the outcomes in an untreated control group; the benefit was maintained after 3 months of follow-up.<sup>28</sup>

Patients with osteoarthritis of the hip report an improvement in balance when walking with a cane, although this benefit has not been carefully studied. In addition, the use of insoles has been suggested to limit disease progression by reducing forces across the hip joint; however, supporting data are lacking.<sup>20</sup>

#### *Pharmacologic Therapy*

Acetaminophen is widely used for osteoarthritis of the hip. In a 12-week, placebo-controlled trial involving patients with osteoarthritis of the knee and hip, acetaminophen (at a dose of up to 3900 mg in an extended-release formulation) significantly reduced pain and improved function and patients' global assessments, as compared with placebo.<sup>29</sup> In an analysis of pooled data from five placebo-controlled trials of acetaminophen, reductions in pain were statistically significant but clinically modest, as compared with placebo.<sup>30</sup> When used at the recommended dose of up to 4 g per day, acetaminophen is generally considered to be safe (Table 4).<sup>31-36</sup>

Nonsteroidal antiinflammatory drugs (NSAIDs), at the lowest effective dose, should be added or substituted in patients who have an inadequate response to acetaminophen or nonacetylated salicylate drugs. Several placebo-controlled trials involving patients with osteoarthritis of the knee and hip have shown that NSAIDs are efficacious for pain relief.<sup>20,37</sup> In an analysis of pooled data from 10 trials, the use of NSAIDs resulted in greater pain reduction but more gastrointestinal side effects than did the use of acetaminophen.<sup>30</sup> The risk of such side effects may be reduced by coadministration of a gastroprotective agent.<sup>31,37</sup> Proton-pump inhibitors are considered to be more effective than histamine-receptor antagonists in reducing the risk of peptic ulcers in patients taking NSAIDs. In a recent observational study involving patients receiving NSAIDs,<sup>38</sup> there was a reduction of 82% in the risk of peptic-ulcer bleeding among those who also received a proton-pump inhibitor, as compared with those who did not. Cyclooxygenase-2 inhibitors have been used as an alternative to NSAIDs with the goal of reducing the risks of serious gastrointestinal side effects, but reports of increased cardiovascular risks as-

**Table 3. Nonpharmacologic Treatment for Osteoarthritis of the Hip.**

Treatment	Comments
Education	Modest improvement in function (data from controlled trials); educational materials, including pamphlets and videos, available through the Arthritis Foundation ( <a href="http://www.arthritis.org">www.arthritis.org</a> )
Physical therapy (aquatic or land-based)	Improvement in pain and function (limited data from controlled trials); less pain when therapy is conducted in water
Unloading joint	
Cane	Improvement in balance and self-confidence, with the cane held on the contralateral side to the affected hip and the hand placed at the level of the greater trochanter
Insoles	Possible reduction in pain and disease progression associated with reducing forces across the joint
Weight loss	Recommended on the basis of the recognized association between obesity and osteoarthritis of the hip
Acupuncture	Improvement in pain (limited data from controlled trials)

sociated with the use of these agents have curbed enthusiasm for this option.<sup>32,39</sup>

Opioid analgesics can be useful alternatives in patients with osteoarthritis of the hip who have inadequate pain relief with NSAIDs and acetaminophen. In a randomized, controlled trial,<sup>40</sup> controlled-release codeine taken every 12 hours was significantly more effective than placebo in reducing hip pain and improving function, but adverse effects included nausea, constipation, lightheadedness, dizziness, and sedation. In a meta-analysis of 12 randomized, controlled trials involving subjects with hip and knee osteoarthritis, tramadol, an atypical opioid that activates opioid receptors and inhibitory pain systems, reduced pain and improved function, as compared with placebo, but the effect was modest.<sup>41</sup> Opioid analgesics should be prescribed only when nonopioid alternatives are ineffective or contraindicated.

Injection of hyaluronic acid into the hip joint has been used for the treatment of osteoarthritis, but data that support its use are limited, and this preparation is not approved in the United States for treatment of osteoarthritis of the hip. Although some studies have suggested efficacy, most have been uncontrolled, with short-term follow-up.<sup>42</sup> In a recent randomized trial, injections of hyaluronic acid did not significantly reduce pain on walking (assessed by means of a visual-analogue scale), as compared with placebo injections.<sup>43</sup> Intraarticular corticosteroid injections have had only a modest effect with respect to pain reduction in patients with osteoarthritis of the hip in randomized trials, with the effect lasting less than

3 months.<sup>44,45</sup> The technical difficulty of the injection procedure (which involves the use of ultrasonographic or fluoroscopic guidance) and the modest efficacy limit the use of these approaches in practice.

Glucosamine and chondroitin sulfate are widely used for the treatment of osteoarthritis.<sup>46,47</sup> Some controlled trials have shown that these agents are efficacious for pain relief in patients with osteoarthritis of the hip or knee.<sup>46</sup> However, in a recent, large trial sponsored by the National Institutes of Health, involving patients with osteoarthritis of the knee,<sup>48</sup> the use of glucosamine hydrochloride and chondroitin sulfate, either alone or in combination, was not superior to that of placebo in an intention-to-treat analysis; this trial did not assess osteoarthritis of the hip. Evidence of a structure-modifying effect of these oral supplements is lacking, and the mechanism by which they might work is unclear.

Diacerein, an anthraquinone that inhibits the production and activity of interleukin-1 and the secretion of metalloproteinases, is not approved for use in the United States but is prescribed elsewhere for the treatment of osteoarthritis. Data regarding efficacy have been inconsistent. For example, diacerein (at a dose of 50 mg twice a day) modestly reduced pain in patients with osteoarthritis of the hip in one placebo-controlled, randomized trial<sup>49</sup> but not in another.<sup>50</sup> Over a follow-up period of 3 years, diacerein slowed radiographic progression of osteoarthritis of the hip but not of the knee.<sup>50,51</sup> Diarrhea and rash were common side effects.

**Table 4. Pharmacologic Treatment of Osteoarthritis of the Hip.\***

Treatment	Dose	Comments
Acetaminophen	Up to 4 g a day	Relative contraindications: alcohol use and liver disease; with long-term use, need to monitor clotting measures in patients taking anticoagulant agents
NSAID		
Naproxen and ibuprofen	Naproxen, 200–500 mg twice a day; ibuprofen, 200–800 mg up to 4 times a day	Should be taken with food, with the daily dose lowered if gastrointestinal discomfort arises; concurrent use of a gastrointestinal protective agent is recommended in high-risk patients; possible side effects: renal insufficiency, peripheral edema, and cardiovascular events
Cyclooxygenase-2 inhibitor		
Celecoxib	100–200 mg a day	Associated with an increased risk of cardiovascular events; possible renal insufficiency and edema; lower risk of gastrointestinal side effects than with standard NSAIDs but greater risk than placebo
Opioid analgesic		
Hydrocodone	1–2 tablets up to 3 times a day, as needed	May cause nausea, constipation, lightheadedness; should be prescribed only when alternative therapies are ineffective or their use is contraindicated owing to potential side effects
Tramadol	50 mg every 6 hr, up to 300 mg a day (immediate release)	Should reduce dose by 50% in patients with renal insufficiency; extended-release formulation contraindicated in patients with substantial renal or hepatic impairment; may cause flushing, headache, dizziness, insomnia, muscle weakness, and constipation
Glucosamine and chondroitin†	Glucosamine, up to 1500 mg a day; chondroitin, up to 1200 mg a day	Limited data on efficacy; possible gastrointestinal side effects (e.g., gas, diarrhea); should be taken with food

\* Specific agents listed in the table are examples and not an exhaustive list. Patients are at higher risk for gastrointestinal side effects if they are over the age of 60 years, are taking glucocorticoids, have a history of peptic ulcer disease, or are in poor health. The treatment plan must be individualized; other coexisting medical conditions may affect treatment choices. NSAID denotes nonsteroidal antiinflammatory drug.

† Diacerein is used, in addition to these agents, outside the United States to treat painful osteoarthritis, but its efficacy is uncertain.

### *Surgical Approaches*

Total hip replacement is an effective treatment for reducing pain and disability and should be considered in patients with osteoarthritis that causes chronic discomfort and substantial functional impairment.<sup>52</sup> The optimal time for joint-replacement surgery is not known. Although surgery has typically been deferred until late in the course of arthritis, data from a prospective cohort study have indicated that patients with higher functional status before surgery were more likely to function independently 2 years after the procedure than were those with lower functional status before surgery. These findings suggest a potential benefit of surgery earlier in the disease course, before there is substantive functional decline.<sup>53</sup>

All total hip arthroplasties consist of a femoral

and acetabular component and a bearing surface (the area where the two joint surfaces are in contact). The available systems use a separate femoral stem, femoral head, acetabular liner, and acetabular shell. Fixation is achieved with cement or through bony ingrowth into or onto the porous implant surface.<sup>33</sup> Although earlier population-based data suggested a failure rate of 1% a year over a period of 10 years, advances in prostheses and fixation techniques may result in a substantially longer life span for the replacement, although more data are needed.<sup>33</sup> Advances in instrumentation have allowed for smaller surgical incisions, with lower complication rates, more prompt mobility, and shorter hospital stays, as compared with earlier surgical approaches.<sup>33,52</sup> Patients undergoing joint replacement may have

better outcomes and fewer complications if surgeons and hospitals perform an increased volume of arthroplasties annually.<sup>54</sup> A rehabilitation program that may continue for several months, depending on individual needs, is indicated postoperatively for patients to regain reasonable use of the involved hip joint. Maximal reduction in pain and improvement in function after a total joint replacement can take up to 12 months.<sup>55</sup>

Resurfacing arthroplasty (i.e., resurfacing of the arthritic femoral head and acetabular bearing surface) has been used as an alternative to total hip replacement. Improvements in this technique, such as the use of metal-on-metal bearings, rather than the earlier use of a cemented polyethylene cup in the acetabulum, may reduce the risk of failure, but data from long-term studies are lacking.<sup>56</sup>

Osteotomy (surgery to realign the femur or pelvis) is used to shift weight from a damaged bone surface to a less damaged or normal one. In patients who have moderate-to-severe hip dysplasia but little osteoarthritis and good range of motion, osteotomies and joint-preserving surgical procedures appear to be useful when total hip replacement is not yet justified. Case series suggest that osteotomies may prevent the development of hip osteoarthritis, but more outcome data are needed.<sup>57</sup>

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#### AREAS OF UNCERTAINTY

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A better understanding of the epidemiology and progression of osteoarthritis of the hip is required to facilitate identification of high-risk patients who might benefit from interventions to alter the course of the disease. The majority of intervention trials in osteoarthritis have involved patients with osteoarthritis of the knee; more randomized trials are needed to assess the efficacy of lifestyle and pharmacologic interventions specifically for patients with osteoarthritis of the hip. The optimal time to perform total hip replacement in patients with osteoarthritis is uncertain. Disease-modifying agents are under investigation for osteoarthritis, but none are currently approved for this indication.

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#### GUIDELINES

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Guidelines for the treatment of osteoarthritis of the hip have been published by the American College

of Rheumatology and the European League against Rheumatism.<sup>20,24,34</sup> Guidelines for the use of opioids for the management of chronic noncancer pain are published by the American Pain Society.<sup>35</sup> Recommendations in this review are consistent with those guidelines.

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#### CONCLUSIONS AND RECOMMENDATIONS

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Hip pain that develops gradually and is initially associated primarily with weight-bearing activity, as described by the patient in the vignette, is characteristic of osteoarthritis. A physical examination should be performed to rule out other causes of hip pain, and radiography should be performed to confirm the diagnosis. I would initially recommend treatment with acetaminophen (up to 4 g daily) in lieu of ibuprofen. If his hip pain and function do not improve with this treatment, I would recommend the initiation of treatment with an NSAID at the lowest effective dose. Given the patient's age, I would add a proton-pump inhibitor to reduce the risk of gastrointestinal side effects. If the pain is not relieved with these medications and awakens him at night, I would consider the use of a narcotic such as codeine or tramadol.

The patient should be referred to an arthritis-education class in his community and to an exercise program of water aerobics or to a physical therapist at a frequency of twice a week for at least 2 months to improve muscle strength in his legs and the range of hip motion. A physical therapist should also evaluate him for the presence of an inequality in leg length and provide him with a shoe lift if necessary. Although data from randomized trials are lacking, I would encourage weight reduction if the patient is overweight and would suggest that he use a cane while walking, since it might improve his sense of balance and confidence in performing his daily activities.

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