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Walk patients through total hip arthroplasty

BY SHARON E. HOHLER, BSN, RN, CNOR

Abstract: Osteoarthritis is the most common cause for hip pain. Total hip arthroplasty (THA) can relieve pain and enhance mobility and quality of life for patients with arthritic hip pain. The focus of this article is THA in patients with osteoarthritis using Mr. H's case as an illustration. It reviews indications and contraindications for THA and other treatment options as well as nursing care for patients undergoing THA.

Keywords: hip dislocation, hip implants, minimally invasive surgery, osteoarthritis, total hip arthroplasty, venous thromboembolism

Mr. H had worked as an OR nurse for 35 years and was anticipating retirement when his right hip began to hurt. At first he experienced muscle spasms in his hip at the end of a long day. The pain continued to worsen into a dull achy pain centered in his right groin. Mr. H started taking ibuprofen for the pain and kept going for months, but eventually his hip pain began limiting his lifestyle. He began to consider the need for a total hip arthroplasty.

MORE THAN 300,000 total hip arthroplasty (THA) procedures are performed in the US annually.[1] A normal hip gives people the ability to walk, run, and move freely and without pain (see *Normal hip anatomy*).

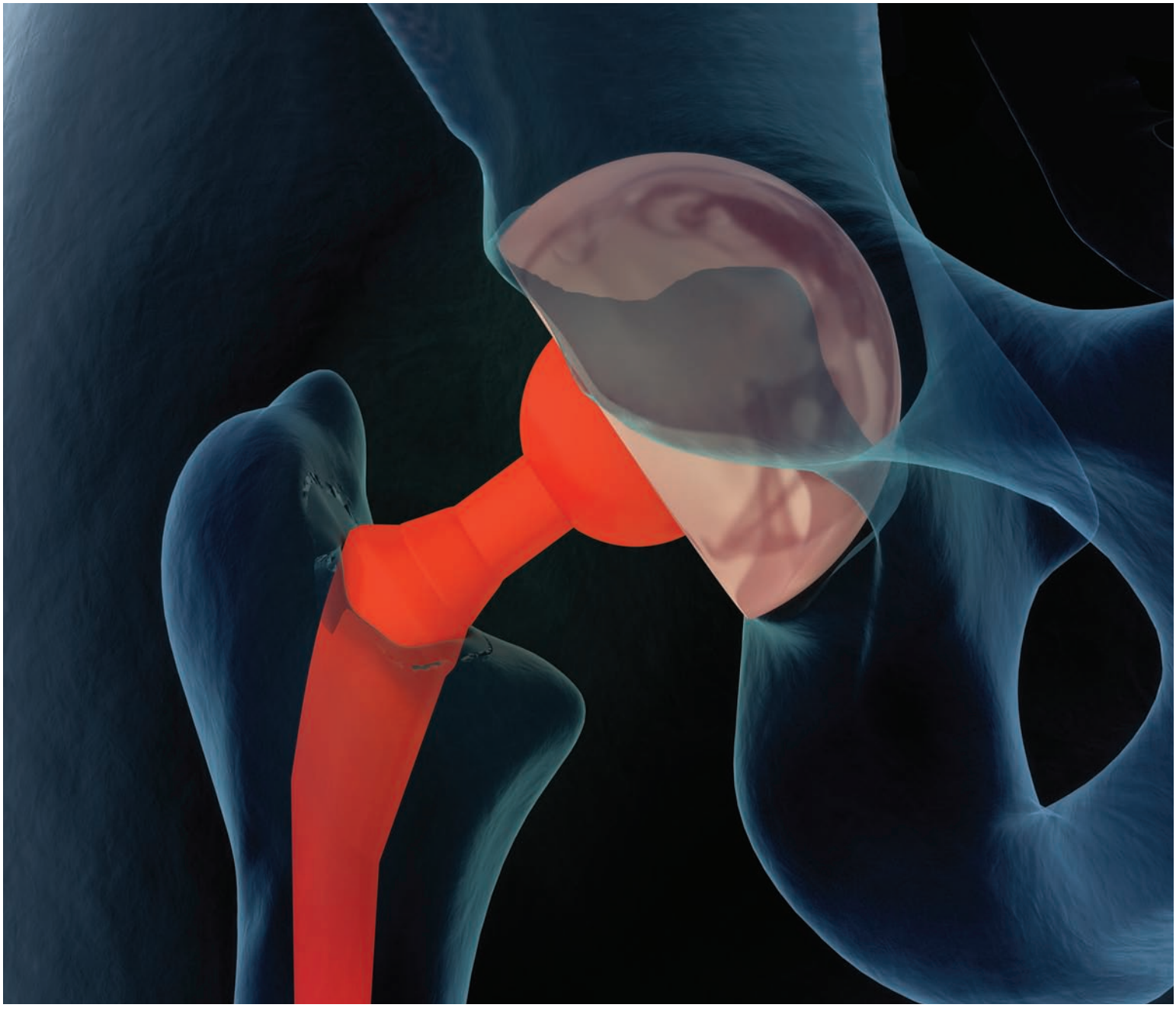
Osteoarthritis (OA) is the most common cause for hip pain.[2] (See *Osteoarthritis of the hip joint*.) THA can relieve pain and enhance mobility and quality of life for patients with arthritic hip pain.

The focus of this article is THA in patients with OA using Mr. H's case as an illustration. It reviews indications and contraindications for THA and other treatment options as well as nursing care for patients undergoing THA.

ANATOMY INSIDER / SHUTTERSTOCK

Indications and contraindications

THA is indicated for patients with a deteriorated hip joint who have persistent debilitating pain and loss of mobility despite conservative therapies or previous surgeries. It may be indicated even in the absence of pain if the loss of mobility is debilitating.[2] Any active infection is a contraindication for THA because an infected prosthesis is a devastating



complication. Other contraindications include skeletal immaturity, paraplegia or quadriplegia, and irreversible muscle weakness in the absence of pain.[2]

Clinical manifestations

Patients with a deteriorated hip joint typically present with pain in the groin or anterior hip, which may radiate toward the knee. Some patients report pain in the anterior buttock. Pain usually occurs with hip movement and is exacerbated by weight bearing, although it can also be present at rest. Patients may complain of pain while walking and climbing stairs and have trouble sleeping and putting on their shoes and socks.[2]

Initially, Mr. H experienced nonspecific right hip pain, which gradually localized to his right groin with radiation to his right knee. He noticed the pain worsened during long, physically hard workdays. Because the hip pain increased significantly when he was fatigued, he found himself limping after his 12-hour shifts.

As the pain and disability increased, Mr. H made an appointment with an orthopedic surgeon for an evaluation. On a weight-bearing anteroposterior (AP) pelvis X-ray, the surgeon found marked joint space narrowing, sclerosis of the joint space margins, and periarticular osteophyte formation consistent with OA of the right hip. Based on the X-ray, Mr. H's history, and physical assessment findings, the surgeon considered him a good candidate for THA.

The surgeon discussed multiple treatment options with Mr. H, ranging from medical management to THA. During this discussion, Mr. H said he wanted to work another 18 months and retire from his active nursing job before he had THA, so they agreed upon a conservative treatment plan to manage his discomfort and disability for the present with reevaluation in 18 months or sooner if needed.

Medical management

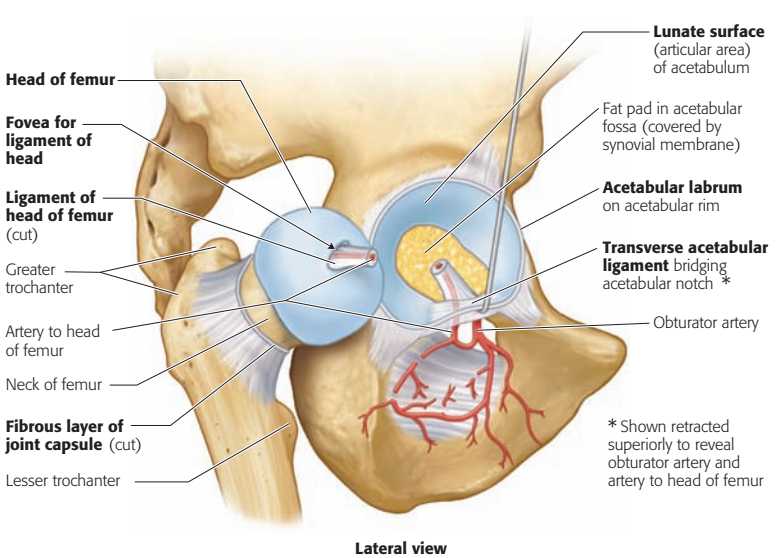
Conservative measures for Mr. H included a weight loss plan, pain management, and physical therapy. Although Mr. H was an otherwise healthy, active nurse, he agreed that he needed to lose 20 lb (9.07 kg) to ease the stress on his hips. Mr. H joined the gym and worked with a

Normal hip anatomy

Joints (articulations) are unions or junctions between two or more bones or rigid parts of the skeleton. Joints exhibit a variety of forms and functions. Some joints have no movement, such as the epiphyseal plates between the epiphysis and diaphysis of a growing long bone; others allow only slight movement, such as teeth within their sockets; and some are freely movable, such as the glenohumeral (shoulder) joint.

Ball and socket joints allow movement in multiple axes and planes: flexion and extension, abduction and adduction, medial and lateral rotation, and circumduction; thus ball and socket joints are multiaxial joints. In these highly mobile joints, the spheroidal surface of one bone moves within the socket of another. The hip joint is a ball and socket joint in which the spherical head of the femur rotates within the socket formed by the acetabulum of the hip bone.

The joint shown below was disarticulated by cutting the ligament of the head of the femur and retracting the head from the acetabulum. The transverse acetabular ligament is retracted superiorly to show the obturator canal, which transmits the obturator nerve and vessels passing from the pelvic cavity to the medial thigh.



Lateral view

Source: Lippincott's CoursePoint for: Moore KL, Dalley AF, Agur AMR. *Clinically Oriented Anatomy*. 7th ed. Baltimore, MD: Lippincott Williams & Wilkins/Wolters Kluwer; 2014.

trainer/physical therapist to reduce pain and improve function.[3] The American Academy of Orthopaedic Surgeons (AAOS) recommends leg and hip strengthening and range-of-motion and flexibility exercises for nonsurgical treatment of hip arthritis.[4]

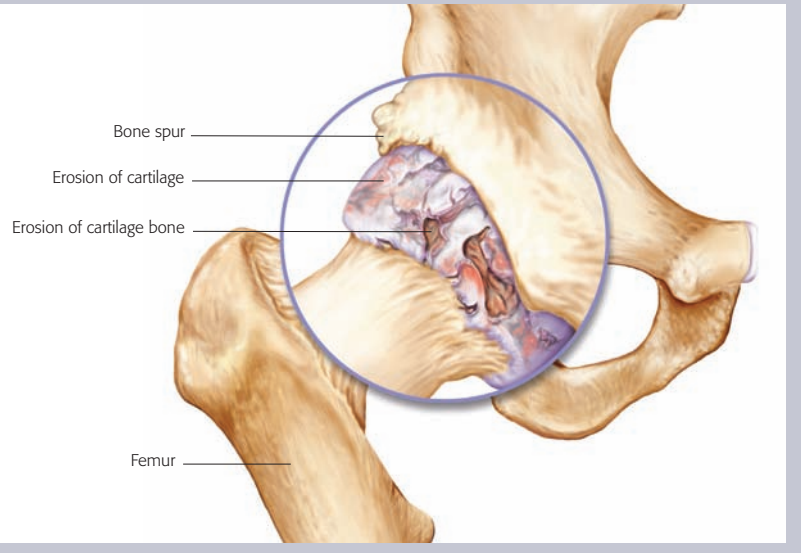
Lifestyle modifications such as minimizing stair climbing helped Mr. H to decrease stress on his hips. He and his wife moved their master bedroom to the main floor of their house so he could limit stair climbing at home. At work he began using the elevators instead of the stairs. With the help of his trainer/physical therapist, he changed from high-impact to low-impact activities; for example, he learned to play golf and added swimming at the gym to his exercise routine.[4]

Mr. H was able to engage in normal activities without the use of a cane or other assistive device, but he continued to experience hip pain. The surgeon recommended nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen to help him cope. The AAOS states that for patients with OA, the use of NSAIDs for short-term improvement in pain and/or function is strongly supported by the evidence (unless contraindicated).[2,5]

After a few months of conservative treatment, Mr. H had lost 18 lb (8.16 kg) and he was experiencing less hip pain. Able to perform his job, he continued working until he was ready to retire. A few months after his retirement, however, he began experiencing increased hip pain and told the surgeon that he was ready for surgery.

Comparing current X-rays to the previous films, the surgeon noted increased deterioration of the hip joint and scheduled Mr. H for right THA.

Osteoarthritis of the hip joint



Source: Lippincott's CoursePoint for: Moore KL, Dalley AF, Agur AMR. *Clinically Oriented Anatomy*. 7th ed. Baltimore, MD: Lippincott Williams & Wilkins/Wolters Kluwer; 2014.

Preoperative evaluation

Before surgery, baseline lab work includes a complete blood cell count, protime, international normalized ratio, activated partial thromboplastin time, and basic chemistries. Preoperative X-rays include a weight-bearing AP view of the pelvis and AP and lateral views of the affected hip. An ECG may be indicated, and a urinalysis may be ordered to rule out a urinary tract infection. Any local or systemic infection must be identified and treated before surgery. MRI may be indicated for patients with certain pathologies, such as osteonecrosis.[2]

Because THA for OA is usually done on an elective basis, any preexisting comorbidities such as hypertension and diabetes should be stabilized before surgery. Patients should also have healthy, intact skin.

Mr. H's lab results were all within normal limits and his ECG showed normal sinus rhythm without signs of ischemia or infarction. When he arrived the day of surgery, he was in optimal health.

Surgical materials and techniques

A wide variety of materials and techniques have been developed since the early days of THA (see *Hip implants, past and present*). Most THA implants are modular with four separate parts: a femoral stem, femoral head, acetabular liner, and acetabular shell. Fixation can be achieved with or without cement between the implant and host bone. Implants that are not cemented have a porous surface that encourages the patient's bone to grow into it, securing the implant.[2]

The three commonly used surgical approaches are the posterolateral, direct lateral, and anterior approach. (See *Three approaches to THA*.) All three approaches can provide a stable functional hip when the procedure is performed by a skilled

surgeon. According to the AAOS, no clinically significant differences in patient outcomes are related to the surgical approach.[2,6]

Minimally invasive techniques are becoming increasingly popular. With traditional THA, the surgical incision is 15 to 30 cm (6 to 12 in). Using any of the standard approaches, the surgeon performing a minimally invasive procedure can reduce the length of the incision to 10 cm (4 in) or even less with a two-incision technique. Potential advantages are shorter duration of surgery, less blood loss, faster rehabilitation, and reduced costs. Regardless of the size of the incision, the same hip prostheses are inserted.[2]

Through the use of cameras, computers, and other medical technologies, surgical navigation lets surgeons track the movement of bone and instruments in real time.[7] For THA, this offers the potential benefits of shorter incisions and improved implant positioning but may increase operative time and expense. No long-term studies comparing outcomes of traditional surgery versus minimally invasive procedures and/or surgical navigation are yet available.[2]

Patients undergoing THA may receive general anesthesia or neuraxial anesthesia, such as spinal or epidural anesthesia, or a combination of agents. The choice is based on the patient's health status, anticipated duration of surgery, and the preferences of patient, anesthesiologist, and surgeon.[2]

For most patients, tranexamic acid (TXA) is the treatment of choice to reduce blood loss during THA. An antifibrinolytic agent, TXA reduces blood loss, improves postoperative hemoglobin levels, and decreases transfusion rates.[2] A large retrospective analysis of over 800,000 patients who underwent total hip or knee arthroplasty found that the use of TXA was associated with up to a 69% reduction in the need for allogeneic or autologous blood transfusions.[8]

After surgery, pain control is achieved via a multimodal approach to reduce the need for opioids. Options include acetaminophen, NSAIDs, glucocorticoids, and regional anesthesia techniques. Patients who received epidural or combined spinal epidural anesthesia for surgery may have continuous epidural analgesia postoperatively.[2]

Preventing complications

After THA, patients are typically hospitalized for 1 to 2 days, although some orthopedic practices now offer THA as a same-day outpatient procedure. A same-day procedure must be preceded with comprehensive patient and caregiver education to achieve the best outcomes.

In the perioperative period, patients should be kept normothermic and normoglycemic.[9,10] In addition, provide nursing care to prevent the following major acute postoperative complications.

Hip implants, past and present

Scientists and metallurgists working with metals such as chrome-cobalt and titanium and plastic (polyethylene) developed the first total hip implants.[14] Sir John Charnley, recognized as the father of modern total hip arthroplasty, was knighted in Britain for his contributions in the 1960s.[15] Sir Charnley inserted total hip stems made from chrome-cobalt and a plastic acetabular cup, and glued them in place with methylmethacrylate cement developed by dentists.[16]

Since Sir Charnley's time, orthopedic surgeons' choices of implant materials and practices have expanded. Implant materials now include metals such as titanium and trabecular metal. High-quality plastic (polyethylene) has been improved upon by infusing it with vitamin E or high doses of electron-beam radiation to improve the plastic and lengthen the implant's life. Ceramic femoral head implants have joined the metal implants with the promise of smoother movement of the hip joint.[14]

Some femoral stem implants have a smooth finish that surgeons cement into the hip with methylmethacrylate cement as Sir Charnley did. Some femoral stem implants have rough porous finish that the patient's bone will grow into, achieving a secure attachment without cement.[14]

The two-piece acetabular component involves a porous metal cup, which the patient's bone grows into, and a plastic liner. The cup is secured by a snug fit, screws, or methylmethacrylate. The plastic liner attaches into the metal cup but can be exchanged if it becomes worn.[14]

The movement of the new hip joint happens at the acetabular liner/femoral head implant interface. These are not attached to each other but articulate to give movement.

A continuing concern with total joint arthroplasty is the longevity of the implants and whether a revision surgery will be needed in the future. How long will the implants last? The plastic liners can shear off tiny pieces of plastic, causing problems that require a revision. Progress has been made with the metals, plastics, and ceramics used in total joints but no surgeon can guarantee that a patient will not someday need a revision surgery.[14]

• *Venous thromboembolism (VTE).* Patients undergoing THA face an increased risk of VTE, a potentially fatal complication. While the exact cause of this elevated risk is uncertain, contributing factors may include blood stasis from interoperative positioning of body and limb, and operative injury to tissues such as the intimal layer of blood vessels.[2]

VTE prophylaxis includes both mechanical methods, such as intermittent pneumatic compression and early ambulation, and pharmacologic methods, such as low molecular weight heparin. Patients often ambulate on the operative day to reduce the risk of VTE and regain function. While the AAOS endorses the use of anticoagulation after THA and many surgeons send patients home on oral anticoagulant therapy, the American College of Chest Physicians gives its strongest endorsement to aspirin as an effective prophylactic agent for prevention of VTE after THA.[11] Teach patients to report any signs and symptoms of VTE, such as unilateral leg edema, difficulty breathing, rapid heart rate, chest pain, and cough.

• *Infection.* The major risk factor associated with prosthetic hip infection is superficial infection of the surgical site. Factors associated with a lower infection risk include washing with chlorhexidine 24 to 48 hours before surgery, shorter duration of surgery, prophylactic antibiotic therapy administered within 60 minutes of incision, *Staphylococcus aureus* decolonization, and use of antibiotic-impregnated methylmethacrylate fixation cement.[2]

Patient teaching should include wound and dressing care based on the surgeon's routine and the specific dressing or wound closure. Because infection of the prosthetic hip can be devastating, teach the patient to immediately report any signs and symptoms of infection, such as the acute onset of wound drainage, implant site erythema, induration or edema, joint pain, joint effusion, or fever.

• *Hip dislocation.* Dislocation of the prosthetic hip, while less common with modern techniques and implants, is a medical emergency requiring reduction of the hip and other treatment. The leg may shorten and rotate, and weight bearing is usually impossible. The patient may feel a popping sensation and immediate pain. Patient factors associated with hip dislocation are female gender, advanced age, and history of prior hip surgery. Teach the patient to observe hip precautions as directed by the surgeon; these include not bending at the waist and not crossing the legs during the recovery period.[12] Instruct the patient to call 911 if he or she experiences any signs or symptoms of hip dislocation.

The AAOS recommends physical therapy both preoperatively and postoperatively to help patients regain function.[13] A graduated walking program and outpatient physical therapy help patients build strength and restore hip movement.

Mr. H's outcome

Mr. H's THA was successful. He was able to walk the evening of surgery with help and participate in physical therapy before he was discharged home. Assisted by his wife and therapists, he gained strength and healed well. Within a few weeks, he was back to the golf course. ■

Three approaches to THA[2,18,19]

Three surgical approaches are commonly used to perform THA.

• For the ***posterolateral approach***, the surgeon enters the joint posteriorly via the gluteus maximus muscle with the patient placed in a lateral position. The hip abductor muscles (gluteus medius and minimus) are left intact.

• To access the hip via the ***direct lateral approach***, the surgeon splits the anterior portion of the abductors. For this approach, the patient may be positioned lateral, supine, or semilateral.

• With the ***anterior approach***, also called the anterior supine approach, the hip is exposed through one incision in the groin without detaching surrounding muscles. For this approach, the patient is supine on a special operating table and fluoroscopy may be required.

Because the posterolateral approach disrupts the hip's posterior soft tissue, it may carry a higher dislocation risk compared with the direct lateral approach. However, the anterior approach may carry the lowest dislocation risk because the muscles around the hip are not detached. In addition, some evidence suggests patients' initial recovery may be more rapid with the anterior approach, although long-term results are similar for all three approaches; the AAOS finds no clinically significant differences related to surgical approach.[2,6]

Coming soon: 3-D implants

For patients with osteoarthritis, researchers are developing a living hip replacement from stem cells by reprogramming stem cells to grow into new cartilage on a 3-D template shaped like the ball of a hip joint.[17]

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