Chronic hip pain in adults: Current knowledge and future prospective

Vanita Ahuja, Deepak Thapa, Sofia Patial, Anjuman Chander, Anupam Ahuja
Department of Anaesthesia and Intensive Care, Government Medical College and Hospital, Chandigarh, 1Consultant Orthopaedics, Orthomax Hospital, Panchkula, Haryana, India

Abstract

Chronic hip pain is distressing to the patient as it not only impairs the daily activities of life but also affects the quality of life. Chronic hip pain is difficult to diagnose as patients often present with associated chronic lumbar spine and/or knee joint pain. Moreover, nonorthopaedic causes may also present as chronic hip pain. The accurate diagnosis of chronic hip pain starts with a detailed history of the patient and thorough knowledge of anatomy of the hip joint. Various physical tests are performed to look for the causes of hip pain and investigations to confirm the diagnosis. Management of chronic hip pain should be mechanistic-based multimodal therapy targeting the pain pathway. This narrative review will describe relevant anatomy, causes, assessment, investigation, and management of chronic hip pain. The focus will be on current evidence-based management of hip osteoarthritis, greater trochanteric pain syndrome, meralgia paresthetica, and piriformis syndrome. Recently, there is emphasis on the role of ultrasound in interventional pain procedures. The use of fluoroscopic-guided radiofrequency in periarticular branches of hip joint has reported to provide pain relief of up to 36 months. However, the current evidence for use of platelet-rich plasma in chronic hip osteoarthritis pain is inconclusive. Further research is required in the management of chronic hip pain regarding comparison of fluoroscopic- and ultrasound-guided procedures, role of platelet-rich plasma, and radiofrequency procedures with long-term follow-up of patients.

Keywords: Chronic pain, greater trochanteric pain syndrome, hip joint, meralgia paresthetica, osteoarthritis, piriformis syndrome, radiofrequency ablation

Introduction

The prevalence of hip pain in the general population is 10%, and it increases with age. In a published study, 14.3% of adults reported significant hip pain on most days over the previous 6 weeks. Hip pain is associated with impairment of simple movements such as sitting and standing which can precipitate chronic pain resulting in impaired functional outcomes and poorer quality of life. The diagnosis of hip pain can be challenging at times due to referred pain from spine or knee, trauma, tumor, abdomen, hernial sites, joint arthropathies, muscular, and neuropathies.

A search of the existing published literature revealed extensive narrative reviews on knee joint osteoarthritis (OA) but not on comprehensive chronic hip pain management. In this narrative review, we searched review articles, randomized controlled trial, and case series from 2000 to 2019 using keywords “hip joint; chronic pain; radiofrequency ablation; osteoarthritis; meralgia paresthetica; piriformis syndrome; greater trochanteric pain syndrome” in PubMed and EMBASE, and relevant

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articles were included. This narrative review focuses on the
pathophysiology, assessment, investigations, and published
current evidence-based management of individual conditions
causing chronic hip pain, relevant to anesthesiologist and
pain physicians.

Relevant anatomy of hip joint
The hip joint is a ball-and-socket synovial joint which transfers
the weight between the upper and lower parts of the body and
allows movement in the multiaxial plane. This shallow
joint is provided depth and stability by the labrum which is
a fibrocartilage covering the acetabular rim. The hyaline
cartilage covers the articular surfaces and dissipates the
shear and compressive forces during hip motion. Hip joint
is supported anteriorly by iliofemoral and pubofemoral
ligaments and posteriorly by ischiofemoral ligament. The
hip joint is surrounded by a large number of muscle groups
which help in a wide range of motion. The trochanteric, iliopsoas, gluteus medius, and ischiogluteal bursa
act as cushion between the bone and the tendons around the
hip joint. Articular branches of nerve to quadratus femoris, obturator, femoral, sciatic, nerves supplying the adjacent
muscles, and superior and inferior gluteal supply the hip
joint. Due to multiple nerves innervating the hip, it is
difficult to distinguish between the primary hip and radicular
lumbar pain.

Causes of hip pain
Hip pain can be broadly differentiated into either
orthopaedic (intraarticular and extraarticular) and
nonorthopaedic causes as mentioned in Table 1. History
related to duration, site, severity, characteristic of pain, history
of trauma, steroid use, and any referred pain should be
asked. In prepubescent and adolescent patients, congenital
malformations of the femoroacetabular joint, avulsion fractures,
and apophyseal or epiphyseal injuries are common. In young
skeletonally mature patients, hip pain occurs due to
musculotendinous strain, ligamentous sprain, contusion,
or bursitis. In older adults, degenerative OA and fractures
should be considered first. Hip pain can be assessed using
different tools such as numeric rating scale, visual analog
scale, McGill pain questionnaire, pain quality assessment
scale, and Massachusetts general hospital pain center’s
pain assessment form. Red flag signs should always be
ruled out which includes sudden onset of severe pain due
to hip fracture, infectious arthritis, osteomyelitis, history of
malignancy, avascular necrosis, and unexplained chronic pain.
Furthermore, a multidisciplinary team approach should be
adopted with surgical, physician, pain specialist, psychologist,
nursing, and caregivers as major stakeholders.

Examination of hip joint
The examination of hip pain is guided by look, feel, range
of hip movement, neurovascular evaluation, and physical
examination test. Look for any Trendelenburg gait in
which there is excessive drop of the contralateral side of pelvis
while walking due to weakness of gluteus medius and minimus
muscles. Patients with hip OA and slipped capital femoral
epiphysis have demonstrated this type of gait dysfunction.
Waddling gait occurs due to congenital hip disorders, spinal
muscle dystrophy, or myopathy. Antalgic gait is an adopted
limp to avoid pain due to injury in the legs. In spastic gait,
a patient walks in a crisscross manner, seen in intoxication,
brain injury, stroke, and polyneuropathy. In steppage gait,
foot hangs with the toes pointing down and scraping the
ground while walking, which is seen in patients suffering
from multiple sclerosis, peripheral neuropathy, and spinal
cord injury. Patients with an intraarticular source of pain
can often show this using the C-sign, deep pointer sign, or
coordinate fingers.

Table 1: Causes of hip pain

| Extraarticular hip causes | Intrarticular hip causes | Other causes |
|--------------------------|-------------------------|-------------|
| Nerves                   | Bones                   | Inguinal hernia |
| Meralgia paresthetica    | Femoroacetabular impingement | Gynecological causes |
| Sciatica                 | Osteoarthritis          | Gonadal tumors |
| Obturator nerve irritation | Rheumatoid arthritis    | Inginal lymphadenopathy |
| Piriformis syndrome      | Septic arthritis        | Skin conditions |
|                         | Vascular necrosis       | Vascular claudication |
|                         | Perthes disease         | Fibromyalgia |
|                         | Development dysplasia of hip |
|                         | Fracture                |
| Muscles                  | Soft Tissue             |
| Gluteus muscle tear      | Labral tear             |
| Abductor muscle injury   | Chondral defect         |
| Tendons                  | Ligamentum teres injury |
| Snapping hip             |                           |
| Trochanteric bursitis    |                           |
| Ligaments                |                           |
| Inguinal ligament strain |                           |
| Joint capsule            |                           |
| Referred pain            |                           |
| Lumbar spine             |                           |
| Knee                     |                           |

Figure 1: Different movements of the hip joint and the involved muscles
The normal range of hip movement is 100° flexion, 30° extension, 40° abduction, and 20° adduction. With hip in flexed position, the internal and external rotation of hip joint is 45°. The range of movement is also restricted in various pathologies of hip joint.

Physical examination of hip can be assessed systematically as starting from leg length difference, contracture of musculature, and intra- and extraarticular hip pathologies as enumerated in Table 2.\[13-29\]

(a) Leg length difference: Galeazzi test and leg length difference test are commonly performed for leg length difference.\[13,14\] On measuring the distance from anterior superior iliac spine medial malleolus on each side, if the measured difference is more than 1.5 cm, it is considered abnormal.\[15\]

(b) Contracture of musculature: Noble test and Ober test are done for iliobibial tract. Different tests are done to identify hamstring tightness and adductor contracture test\[17-20\] as mentioned in Table 3

(c) For intraarticular hip pain, a patient is made lie flat on the table. One limb is elevated with knee in extension and hip in flexion. A downward resistance is applied at the level of thigh at 30°–45° (Stinchfield test). If there is any intraarticular cause of hip pain, then the patient will complain of pain in the hip.\[22\]

(d) For iliopsoas bursitis, bilateral isometric resisted hip adduction produces groin pain. In trochanteric bursitis, positive resisted abduction release produces pain at the same site. In iliopsoas bursitis pain, a snapping hip manoeuvre produces pain. The patient is made to lie supine with the hip to be examined flexed, then abducted, and externally rotated. The examiner’s hand is kept at the inguinal crease. Then the hip is returned to neutral position. A palpable snap during the last phase of the manoeuvre is indicative of iliopsoas bursitis. The other tests for hip examination are summarized in Table 3.\[24-27\]

(e) In piriformis test (FAIR test),\[28\] The manoeuvre produces pain in hip if piriformis muscle is tight. If sciatic nerve is pinched in piriformis muscle, then the patient experiences sciatica-type pain in the hip and leg.\[29\]

(f) The test for hip dislocation is Drehmann sign.\[30\] The Anvil test is done to differentiate hip pain from spine disorders.\[31\]

(g) Sensory, motor, reflexes, and neurovascular examination should be done of the lower leg. Details will be beyond the scope of this article.

**Table 2: Differential diagnosis of hip pain according to site of pain\[7-10\]**

| Anterior pain | Posterior pain | Lateral pain |
|---------------|----------------|--------------|
| Osteoarthritis | Piriformis syndrome | Meralgia |
| Iliopsoas bursitis | Sacroiliac joint | Paresthesia |
| Proximal femur fracture | Dysfunction | Greater trochanter |
| Hip flexor muscle strain | Referred pain from | Bursitis |
| Inflammatory arthritis | Lumbar spine | Iliotibial band |
| Avascular necrosis of femoral head | Hip extensor or | Syndrome |
| Acetabular labral tear | Rotator muscle strain | Gluteus medius |
| Muscle dysfunction | | Muscle dysfunction |

**Investigations**

Blood investigations such as complete blood counts and erythrocyte sedimentation rate can differentiate infective versus inflammatory cause of hip pain. X-ray of the hip joint should be performed if there is any suspicion of acute fracture, dislocation, or stress fracture. Ultrasonography is a useful technique for evaluating individual tendons, identifying joint effusions, confirming suspected bursitis, and functional causes of hip pain. Conventional magnetic resonance imaging (MRI) of the hip can detect many soft tissue abnormalities and is the preferred imaging modality. Conventional MRI has a sensitivity of 30% and an accuracy of 36% for diagnosing hip labral tears, whereas magnetic resonance arthrography provides added sensitivity of 90% and accuracy of 91% for the detection of labral tears.\[32\]

**Management of chronic hip pain**

Chronic pain involves nociceptive or and neuropathic pain. Nociceptive pain originates from the bone, synovium, and other tissues. In nociceptive pain, initially there is only peripheral sensitization and pain can be controlled with systemic or topical drugs as they decrease the release of peripheral inflammatory mediators.\[33\] Neuropathic pain is due to injury in the path of somatosensory nervous system. For example, in piriformis syndrome, there is stretching of nerves or due to lumbar disc prolapse there is radiculopathy. In chronic conditions such as OA or RA, neural sensitization will not be confined only to the periphery. Due to persistent tissue inflammation around the nerve, pain mediators are released which increase the excitability of pain pathways, and hence lead to neuroplasticity pain.\[33\] Referred pain and pain away from the original site can be neuroplasticity in origin. The increased excitability of spinal neurons in this condition leads to enhanced pain perception at the site of injury. In chronic
### Physical examination tests for hip pain

| Test                                      | Performance                                                                 | Assessment                                                                                          |
|-------------------------------------------|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| **Galeazzi test** [13,14]                 | Patient is supine with knees flexed at 90° and the sole of feet lie flat on the examination table. Normally both | When one knee is higher than the other, either tibia of the same side is longer or contralateral tibia is shorter. When one knee projects farther forward than the other, either that femur is longer or the contralateral femur is shorter. |
| Actual or functional leg length difference test [13,15] | Patient is standing with shims of varying thickness (0.5, 1, and 2 cm) placed in/under shortened leg until pelvic obliquity is fully compensated. | This will give the estimate of leg length difference. In cases where shims cannot compensate for pelvic obliquity, patient is having a fixed deformity of one or more joints leading to functional leg length difference. This can be a result of flexion or adduction contracture in hip. The pelvic dips towards normal side; the normal leg appears lengthened and affected leg shortened. |
| **Noble compression test** [16-20]        | Palpable snapping, rubbing, crepitus or localized pain along the distal iliobibial tract (ITB) suggests a iliobibial tract frictional tendinitis. Pain in the posterior aspect of thigh indicates hamstring contracture. |
| **Ober test** [12]                        | If the leg fails to touch the floor then Iliotibial band shortening is present. |
| **Fingertip test** [14]                   | Inability to touch the toes of feet and hand in the general area of foot and complains of “pulling” pain in posterior thigh indicates hamstring contracture. |
| **Log Roll (Freiberg) test** [13,14]      | A click reproduced during the test is suggestive of labral tear, while increased external rotation range of movement may indicate iliofemoral ligament laxity. |
| **FABER test (Patrick test)** [13,15]     | Pain produced in groin indicates hip pain and if produced in gluteal region indicates sacroiliac pathology. |
| **Supine test** [29]                      | Positive test is 2 cm drop of the contralateral side of pelvis once the leg is lifted. Sensitivity (SN) 55%, specificity (SP) 70% |
| **Impingement/FADIR test** [25-27]        | Positive test is reproduction of concordant pain, locking, clicking and catching pain. |
| **Thomas test** [27]                      | If iliopsoas contracture is present then, the extended leg will not reach a full extension position on the table. |
| **SLR test** [11,13]                      | Positive test is reproduction of pain in from hip to ankle in lumbosacral radiculopathy. Both SLR and cross SLR put strain on lumbosacral nerve roots. Pain restricted to posterior aspect of thigh indicates tension on hamstrings. |
| **Piriformis test** (FAIR test) [28-29]   | If sciatic nerve is pinched in piriformis muscle than patient experiences sciatica type pain in hip and leg. [29] |

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**Management of individual chronic hip pain conditions**

1. **OA hip**
   - OA of the hip is the second most common joint after knee affecting women twice as common as men. The...
common risk factors are genetic, dysplasia of hip, hip joint laxity, increased body mass index, and manual labour. These factors cause increase in wear and tear, instability, malalignment, microtrauma, and structural damage of hip joint.[34]

Patients with hip OA present with groin pain, which is initially intermittent, worse at the end of the day, and activity-related. The most popular score for OA is Kellgren–Lawrence system based on the assessment of the presence of osteophytes, joint space narrowing, subchondral sclerosis, and deformity of femoral head and acetabulum. Computed tomography (CT)-based scoring is accurate and involves assignment of score to osteophytes, subchondral cyst, and joint space narrowing for determining severity of OA. MRI helps in diagnosing cartilage and labrum pathology.[35]

In evidence-based medicine, Level A evidence means a strong recommendation and should be followed. Level B evidence is a recommendation, but the clinician should be alert to new information and sensitive to patient preferences. Level C evidence signifies an option and the clinician should be flexible in their decision-making. Level D evidence lacks a sufficient data and its significance is very less.[36]

Evidence-based clinical practice guidelines for the management of OA hip are formulated by the American Academy of Orthopedic Surgeons,[37] American College of Rheumatology,[38] National Institute for Health and Care Excellence (NICE),[39] and Royal Australian College of General Practitioners (RACGP).[40]

(i) Strong evidence (Level A) supports the use of nonsteroidal anti-inflammatory drugs (NSAIDs) to improve the short-term pain, function, or both in patients with symptomatic OA hip.[37,38]

(ii) Moderate strength evidence (Level B) does not support the use of glucosamine sulfate because it did not show any added benefits than placebo for improving function, reducing stiffness, and decreasing pain for patients with symptomatic OA hip.[37]

(iii) Strong evidence (Level A) supports the use of intraarticular corticosteroids to improve function and reduce pain in the short-term for patients with symptomatic OA hip.[37] Indications of intraarticular hip joint corticosteroid injection are 1) to determine whether hip pain is secondary to hip versus spine pathology, 2) to determine intraarticular versus extraarticular pathology, 3) likelihood of achieving pain relief with hip arthroplasty, 4) whether surgery is contraindicated, and 5) in young patients in whom there is concern for the longevity of implant. One should be cautious while giving intraarticular steroid injections as rapid destructive OA is one of its complications.[41]

(iv) Ultrasound-guided hip joint injection: The patient lies in supine position with linear transducer placed in longitudinal oblique plane along the axis of the femoral neck to examine the anterior recess. The femoral head is identified and the probe is positioned to obtain an axial view through the head. Then slide the probe distally toward the junction of the femoral neck and head. The needle is inserted from the lateral side along the long axis of the probe [Figure 3]. When the needle as bone contact, it will lie within the joint on the anterolateral aspect of head–neck junction. Under strict asepsis, 4–5 mL of mixture of steroid and local anesthetic is injected at the anterior recess in the axial plane.[42]

(v) Strong evidence (Level A) does not support the use of intraarticular hyaluronic acid because it does not perform better than placebo for function, stiffness, and pain in patients with symptomatic OA hip.[37]

(vi) Strong evidence (Level A) supports the use of physical therapy as a treatment to improve function and reduce pain for patients with OA of the hip with mild to moderate symptoms.[37,38] It is strongly recommended to perform aerobic and stretching exercises, lose weight if obese, and to receive psychosocial interventions.[37,38]

(vii) Duloxetine could be considered for some people with knee and/or hip OA when other forms of pain relief are inadequate.[40] There is a strong recommendation against the use of the oral and transdermal opioids, viscosupplementation injection for hip OA, doxycycline, strontium ranelate, interleukin-1 inhibitors, and stem-cell therapy. Due to a lack of high-quality evidence, no recommendation can be made for the injections of platelet-rich plasma (PRP), NSAIDs cream applied locally, capsaicin, collagen, and methylsulfonylmethane.[40]
A moderate quality evidence was reported favoring tramadol alone or in combination with acetaminophen versus placebo but had no important benefit on mean pain or function in people with OA, although slightly more people in the tramadol group report an important improvement (defined as 20% or more). Patients with advanced symptoms and pathology not responding to conventional treatment should be referred for arthroplasty. But total hip arthroplasty is also associated with concerning failure rate (5%–15%),[41,44] significant cost, and persistent postsurgical pain (7%–28%).[45,46] Nerves supplying the hip joint like articular branches of the obturator nerve, articular branches of the femoral nerve, articular branches of the sciatic nerve, and superior gluteal nerve can be ablated with radiofrequency. Ablation of sensory nerves by preserving motor branches can improve the success rate and decrease the complications.\(^{(x)}\)

**Fluoroscopic-guided ablation of articular branches of hip joint:** Initially, a diagnostic block of 0.5–3 mL of local anesthetic is administered under fluoroscopic guidance. For articular branches of the obturator nerve, the target is the point immediately inferior to the “teardrop” silhouette, formed by the junction of the pubic and ischial bones. For articular branches of the femoral nerve, the target point is immediately inferior and medial to the anterior inferior iliac spine [Figure 4]. In narrative review, 14 publications reported high success rate in relieving chronic hip pain at 8 days to 36 months after the procedures, but none of the publications was randomized controlled trials.\(^{(x)}\)

### 2. Greater trochanteric pain syndrome

The term “greater trochanteric pain syndrome” encompasses gluteal medius and minimus tendinopathy/ tears, trochanteric bursitis, and external coxa saltans. Bursitis occurs in 4%–46% and gluteal tendinopathy in 18%–50% patients.\(^{(x)}\) The trochanteric bursa is located deep to the iliotibial band and superficial to the hip abductors and is a frequent cause of lateral hip pain. A localized tenderness may be elicited on deep palpation of the lateral aspect of greater trochanter. Pain is elicited with resisted hip abduction and hip extension more during gluteal tendinopathy when compared with trochanteric bursitis. Ultrasound will show increased fluid signal with trochanteric bursa.\(^{[47]}\)

Gluteal tendinopathy presents as chronic activity-related pain and impaired performance of a tendon. X-ray of the hip shows normal study.\(^{[48]}\) Patients are advised to avoid cross leg sitting and lying on either side as it increases friction of tendon and pain.\(^{[48]}\)

Conservative treatment is gold standard for 90% success rate. The initial treatment of trochanteric bursitis is conservative with rest, physical therapy, and NSAIDs.\(^{[47]}\) In gluteal tendinopathy, therapy is directed toward quadriceps strengthening and ilio tibial band stretching. Hip abduction exercises directed toward strengthening and stretching of gluteus medius and minimus should be initiated. For persistent cases, a corticosteroid injection should be given and repeated in 6 weeks if pain persists.\(^{[48]}\) Concern regarding corticosteroid injection is the risk of weakening the tendon structure in long-term. Recently, use of PRP has reported improvement in patients at 3- and 12-month follow up, but lacked high-quality evidence.\(^{[49]}\) Surgery may be considered if these measures do not relieve symptoms and pain lasts longer than 1 year.\(^{(x)}\)

**Ultrasound-guided injection of greater trochanteric bursa** is best approached with patient in lateral position with unaffected side up. Under strict asepsis, a linear probe is placed in the longitudinal plane to greater trochanter. Trochanteric bursae lies adjacent to the bone cortex, and a combination of steroid and local anesthetic is injected after aspiration.\(^{[42]}\)

For iliopeas tendonopathy, the patient is positioned supine and a linear probe is placed along iliopeas tendon lateral to the neurovascular bundle. The needle is advanced from the lateral side of the thigh, in plane, and a mixture of steroid and local anesthetic is injected in the peritendon area.\(^{(x)}\)

### 3. Meralgia paresthetica

Meralgia paresthetica (MP) refers to the entrapment of the lateral femoral cutaneous nerve at the level of the inguinal ligament. The cause is usually idiopathic but can be due to trauma, overuse, leg/trunk discrepancy, prolonged standing, external compression by belts, weight gain, and tight clothing. The symptoms include paresthesia, numbness, burning sensation, dysesthesia, and pain over the lateral aspect of the thigh. Treatment includes removal of source of compression, physical therapy, NSAIDs, tricyclic antidepressants, and anticonvulsants. For patients irresponsive to initial treatment, local anesthetic and/or corticosteroid injection under ultrasound guidance may be therapeutic.\(^{(x)}\)

**Pulsed radiofrequency of the lateral femoral cutaneous nerve (LFCN)** provides an effective, low-risk treatment in patients refractory to conservative medical management.\(^{(x)}\) In a recently published review article, insufficient data were found to compare the recommendation of neurolysis or neurectomy as the modality of treatment for MP.\(^{(x)}\)

### 4) Piriformis syndrome

Treatment of piriformis syndrome is mainly conservative methods, such as stretching exercises, injections, NSAIDs,
muscle relaxants, ice, and activity modifications.\[^{[52]}\] Corticosteroid injections may provide temporary analgesia to allow patients to participate in physical therapy, but it does not correct the underlying pathophysiology and may need to be repeated. Injections with neurotoxins such as botulinum toxin are also being investigated.\[^{[53,54]}\] Surgical decompression can be considered as the last option to reduce any tension in the piriformis muscle by releasing fibrous bands or constrictions compressing the sciatic nerve.\[^{[52]}\]

**Clinical points for management of chronic hip pain**

1. Correct diagnosis is most important in management of chronic hip pain. Taking detailed history, clinical examination, investigations, and clinical judgement allow one to reach the cause of pain
2. Mechanistic-based management of chronic pain relies on the type of pain, somatic, neuropathic, or mixed type of chronic pain
3. Strong evidence in support for use of NSAIDS and use of physical therapy as a treatment to improve function and reduce pain for patients with OA hip with mild to moderate symptoms
4. For OA hip, intra-articular hip joint once very popular is not being slowly replaced with extra-articular ablation of articular branches of hip joint
5. Treatment of trochanteric bursitis is conservative and NSAIDS. Local anesthetic with steroid may be injected in refractory cases
6. Gluteal tendinopathy therapy is directed toward quadriceps strengthening and iliotibial band stretching. Recently, use of PRP has reported improvement in patients at 3- and 12-month follow up, but lacked high-quality evidence
7. For MP and pyriformis syndrome, removal of source of compression, physical therapy, NSAIDs, tricyclic antidepressants, and anticonvulsants. Pulsed radiofrequency of the LFCN provides an effective, low-risk treatment in patients refractory to MP. For pyriformis syndrome, corticosteroid injections may provide temporary analgesia and may need to be repeated.

**Conclusion**

Management of chronic hip pain requires accurate diagnosis, multimodal approach with nonpharmacological, pharmacological, and pain-relieving procedures for therapeutic success. Further research is required in comparison of fluoroscopic- and ultrasound-guided procedures, role of PRP, and radiofrequency procedures with long-term follow-up of chronic hip pain patients.
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