Assessment of Hip Pain

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3.1 Overview

Pain is one of the most common clinical symptoms of hip diseases. The symptoms of hip pain are complex, and the pain site may occur in the groin, upper trochanter, proximal femur, or buttocks. The cause is also complex. It may come from the hip joint cavity, around the hip joint, or from the pelvis, lumbar spine, sacroiliac joint, or retroperitoneal space. Because of the rich soft tissue of the hip and pelvis and the complex anatomy, it is difficult to define the cause of pain by routine examination. Therefore, the diagnoses of the cause of hip pain and the purposeful treatment are important for restoring the physical and mental health of patients.

The source of hip pain can be divided into inside the hip, around the hip, and outside the hip. The sources of outside the hip pain include the waist, abdomen, pelvic cavity, and knee (Table 3.1). Usually, according to the detailed medical history, the nature of pain, physical examination, auxiliary examination, diagnostic injection treatment, etc., a correct diagnosis can be made for most patients; for those who cannot make a definite diagnosis, they should be closely observed changes in pain and outcomes.

Table 3.1 Classification of common diseases causing hip pain

Hip joint diseases	Diseases Around the hip	Diseases outside the hip
Osteonecrosis of femoral head	Iliotibial tract syndrome	Sacroiliac joint disease
Developmental dysplasia of the hip	Iliopsoas tendonitis	Ankylosing spondylitis
Femoro acetabular impingement	Greater trochanteric bursitis	Sports hernia
Labral injury or tear	Muscle-tendon strain	Lumbar disorders
Hip dislocation or subluxation	Piriformis syndrome	Abdominal disorders
Traumatic acetabular, femoral head, and femoral neck fracture	Myositis ossificans	Pubic ostitis
Hip infection	Hamstring syndrome	Pelvic diseases
Hip instability	Intertrochanteric fracture	Knee problems
Cartilage damage or degeneration		Pelvic fractures
Bone marrow edema syndrome		
Synovial chondromatosis		
Tumors of the acetabulum and femoral head		

3.2 Clinical Features

3.2.1 Medical History

A detailed medical history should be carried out. It is important to record the location, frequency, duration, and mitigation factors of pain. The radioactivity of pain contributes to the diagnosis; the onset and duration of pain are essential for differential diagnosis. In addition, the following characteristics of pain should be asked: Is the pain relieved or aggravated, or maintain the state? Does it cause the patient to wake up at night? What factors can relieve symptoms (position or medicine)? What factors make the symptoms worse? Whether there is a certain action or posture can aggravate symptoms?

Previous medical history includes childhood hip disease, trauma, surgery history; increasing activity level for possible stress fractures; risk factors for ischemic necrosis, including

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glucocorticoid use, alcohol abuse; and medical history of other systemic or local diseases, etc.

All previous treatments and responses to treatment should also be documented, including the use of drugs, local block injection, physiotherapy, adjustments to work and daily activities, and the use of ancillary equipment such as walking sticks, crutches, walkers, wheelchairs, etc.

3.2.2 Physical Examination

3.2.2.1 Observation

Pay attention to the patient's standing posture and gait, from standing to sitting position, the ability to stand up from the seat and to go to the examination bed, the mobility of the spine, and whether there is a C sign (Patients with intra-articular hip pathology often localize the area of pain by cupping the thumb and index finger in the shape of the letter C above the affected area.). The bilateral hip joints should be fully exposed, compared with each side of the hip, whether there are deformities, swelling, scars, rashes, ulcers, the length of limbs or muscle atrophy. Observe the height of the greater trochanter of the femur, and whether there is an abnormality in the position of the buttocks, knees, and feet. When there is a hip disease, it usually makes hip flexion, mild abduction, and external rotation. In this case, the intra-articular pressure is relatively small.

3.2.2.2 Palpation

Check and record the most obvious tender points, whether there are swelling and muscle spasm, especially the adductor muscle which is an early manifestation of the hip disease. The bony markers include the anterior superior iliac spine, iliac crest, posterior superior iliac spine, sciatic tubercle, and greater trochanter, etc. Evaluate whether the pelvic is tilt. Check muscle strength (Table 3.2). Check the nervous system, especially the sensory nerve (Table 3.3). Check the arterial pulsation such as the femoral artery, posterior tibial artery, dorsal artery. Check tendon reflexes.

3.2.2.3 Movement

The active and passive range of motion (ROM) of the hip joint was assessed: the lower extremity was straightened, and the patella was in the neutral position, 0 °. Flexion 130 °~140 °; extension 10 °; abduction 30 °~45 °; adduction (when the hip is in the slightly flexed position) 20 °~30 °. In the supine position, the internal rotation is 30 °~45 °; the external rotation is 40 °~50 °. In the prone position, the internal rotation is 40 °~50 °; the external rotation is 30 °~40 °. When examining the abduction and external rotation, the pelvis should be kept stable, that is, the iliac crest is at the same level, and the lateral curvature of the lumbar vertebrae is eliminated to compensate for the activity of the hip joint.

Provocative tests: These tests are helpful to distinguish different disorders that may have similar presentations. Keep in mind that none of these tests are 100% reliable in every circumstance.

1. Trendelenburg test: Lifting the unaffected leg off of the ground, with normal abductor strength, the patient should be able to maintain a level pelvis. If the abductors are weak, pelvis drops toward the unaffected side with the

Table 3.2 Grading of muscle strength

Grade	Ability to move
5	Movement against gravity with full resistance
4	Movement against gravity with some resistance
3	Movement with gravity alone
2	Movement without gravity
1	No movement but slight visible/palpable muscle contraction is present
0	No movement, no contraction

Table 3.3 Sensory nerve assessment

Nerve root	Dominant area
L1	Anterior inguinal region and pubis
L2	The front of the thigh
L3	The lower part of the front of the thigh and the knee
L4	Medial calf
L5	Lateral calf
S1	Plantar

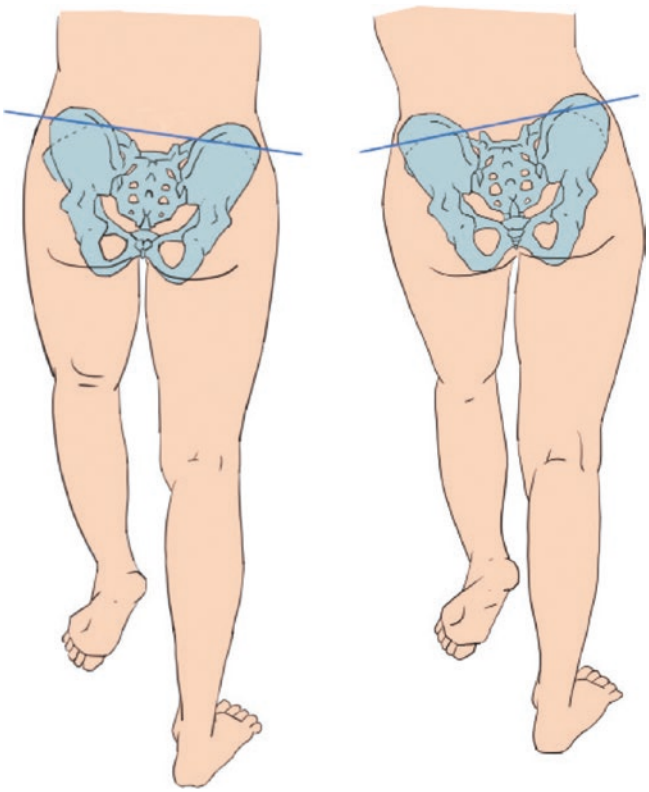


Fig. 3.1 Trendelenburg test

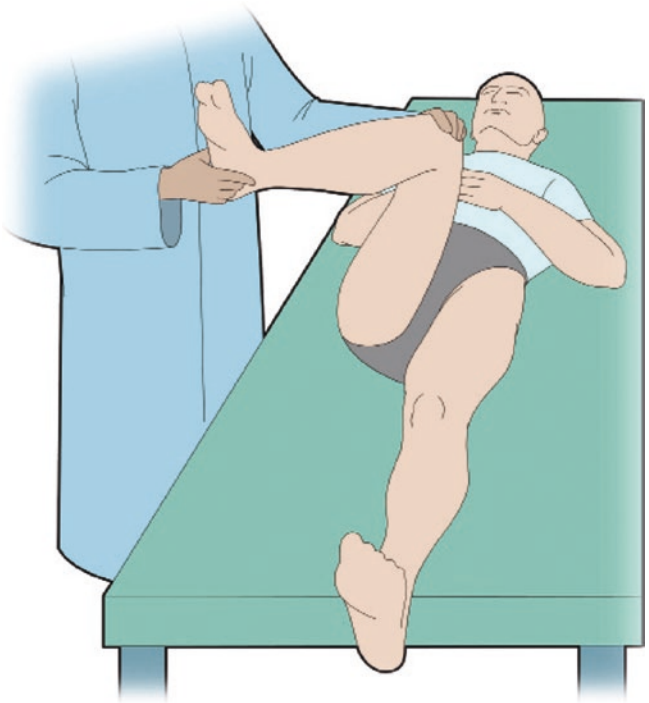


Fig. 3.2 Anterior femoroacetabular impingement test

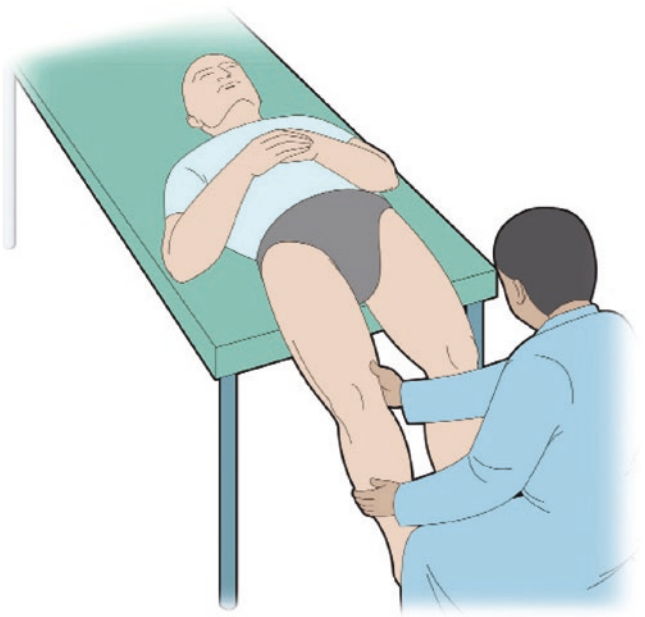


Fig. 3.3 Posterior femoroacetabular impingement test

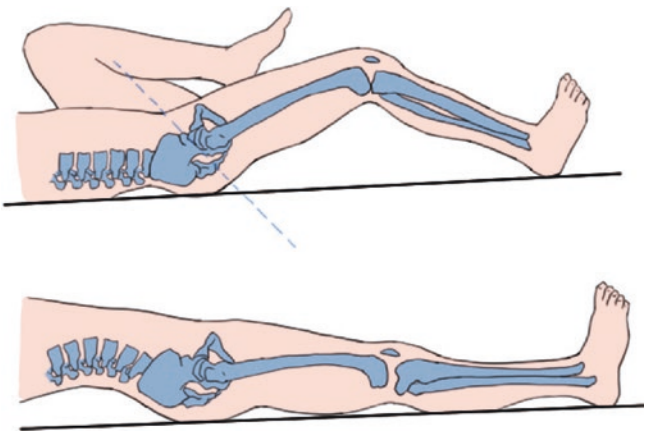


Fig. 3.4 Thomas test

raised leg (Fig. 3.1). In addition, abductor dysfunction can also be caused by pain or neurogenic problems.

2. Anterior femoroacetabular impingement test: The patient is supine with the hip dynamically brought into flexion, adduction, and internal rotation; the test is positive if the patient has reproducible groin pain with this movement, and typically signifies the presence of intra-articular pathology especially in the presence of anterior bone abnormalities and associated with labral injury (Fig. 3.2).
3. Posterior femoroacetabular impingement test: This test is performed with the patient's buttock at the end of the examination table with both legs suspended. With the patient's hip extended, the examiner externally rotates the hip, and the test is positive if this maneuver reproduces pain. The test is helpful to detect the presence of associated posterior lesions in the joint (Fig. 3.3).
4. Logroll test: The patient is supine with the leg extended. The leg is passively rolled into full internal rotation and external rotation. It is a sensitive test for intra-articular hip pathology.
5. Thomas test: In the supine position, the patient grasps one knee with both hands and flexes it to the chest as the hip of the contralateral leg is allowed to completely extend. The test result is positive for a hip flexion contracture if the leg is unable to completely extend (Fig. 3.4).
6. Patrick test: The patient is supine with hip flexion, abduction, and lateral rotation. And the ipsilateral foot is placed in a 4-shaped position on the opposite knee. The examiner holds the pelvis with one hand and pushes down the bending knee joint with the other hand. If the pain is similar to the patient's clinical symptoms, which means positive. It indicates abnormal sacroiliac joint or spasm of Iliopsoas muscle (Fig. 3.5).
7. Lasegue test (Straight leg raise test): The examiner grasps the ankle of the leg and place the other hand on the front of the thigh to maintain the knee in full extension. Slowly raise the leg until the patient complains of pain or maximal flexion has been achieved. The positive test result is induce/reproduce the patients pain down the leg, which is often indicative of lumbar spine pathology with radiculopathy (Fig. 3.6).

Fig. 3.5 Patrick test

Fig. 3.6 Lasegue test

8. Anterior compression test of iliopsoas tendon: The patient is supine, the examiner's finger pressed against the anterior capsule of the hip to prevent the hip from snapping. It is often used to inspect the medial snapping hip caused by the iliopsoas muscle.
9. Ober test: The patient is in the lateral decubitus position with the affected side up. The examiner stands behind the patient and, with the patient's knee in 90° of flexion, abducts and extends the hip as far as is comfortable. The leg is then allowed to slowly adduct. The test is positive for iliotibial band contracture when the knee does not reach the midline (Classic Ober test). Extending the knee while performing the same maneuver evaluates for tensor fascia latae contracture (modified Ober test).
10. Leg-clamping test: The patient is supine with knee flexion at 90 ° initiative, do active adduction by leg-clamping to resist to the examiner. If the patient feels pain accompanied by or without loss of strength, suggesting adductor-related disorders.

3.2.2.4 Measurement

The measurement of the length of the lower limbs and the circumference is the main method for checking the asymmetry. It should be performed in the patient's standing position or the supine position. And it is important to distinguish between the true and the false length of the lower limb.

The lower limbs must be placed in a symmetrical position, the pelvis should be placed at the same level, and the iliac crest on both sides should be on one lateral surface to measure the relative length and true length of the lower limbs. If there is a deformity on one side, the healthy side should be placed in the same state, and the measured length comparison is reliable. Symmetrical circumference measurements can be used to understand the degree of muscle atrophy.

1. Apparent lower limb length: The patient is supine, and the distance from the umbilicus to each side of the medial malleolus is measured. Values are affected by developmental arrest, obesity, or lower extremity asymmetry; suggesting abductor or adductor tendons, or pelvic tilt due to scoliosis.
2. True lower limb length: The patient is supine, the feet are separated by 15 ~ 20 cm, and the distance from the anterior superior iliac spine to the ipsilateral medial malleolus is measured. Even if the length of the apparent lower extremity is different, the length of the true lower extremity may be equal. Mild unequal lengths within 1 cm may be considered normal, but may cause symptoms in some patients. Progressive unequal length of the lower limbs suggests a sinking of the prosthesis.

3.3 Laboratory Tests and Imaging Examination

Laboratory tests based on medical history and physical examination, including blood routine, erythrocyte sedimentation rate, C-reactive protein, procalcitonin, gout, rheumatism, and rheumatoid immune disease-related tests, are helpful for the diagnosis of hip diseases.

Imaging studies of hip pain include X-ray, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Magnetic Resonance Arthrography (MRA), Electromyography (EMG), hip ultrasound, and Positron Emission Tomography-Computed Tomography (PET-CT).

3.3.1 X-Ray

3.3.1.1 Anteroposterior View

It can help understand whether the whole structure of pelvis and hip joint is abnormal. By measuring some parameters, we can know the development of hip joint, fracture, osteonecrosis of femoral head, and so on (Fig. 3.7).

1. CE Angle: The angle between the line from the center of the femoral head to the lateral edge of the acetabulum and the vertical line through the center point of the femoral head. The normal CE angle is 25° or more. Values of 20-25° are considered borderline DDH. Values of less than 20° are diagnosed as DDH.
2. Tonnis angle: The inclination angle of the weight-bearing area of the acetabulum. The angle should be <10 °.
3. Anteversion and retroversion of the acetabulum: Observing the anterior and posterior margins of the acetabulum, if the anterior margin overpasses the posterior margin, it is called a crossover sign, which indicates excessive retroversion of the acetabulum.
4. Shenton line: It is a continuous arc drawn from the inner edge of the femoral neck to the superior margin of the obturator foramen. This should be smooth and undisrupted; otherwise, it may indicate the secondary subluxation caused by DDH.
5. If there is a fracture on the margin of the acetabulum, there is stress concentration.
6. The hip joint gap can be used to assess the degree of the articular cartilage degeneration.

3.3.1.2 Frog Lateral View

It can better display the anterior abnormalities of the femoral head, which are commonly used in the diagnosis of femoral head necrosis, femoroacetabular impingement syndrome, and other diseases (Fig. 3.8).

Fig. 3.7 Anteroposterior radiograph of pelvis

Fig. 3.8 Frog lateral radiograph of pelvis

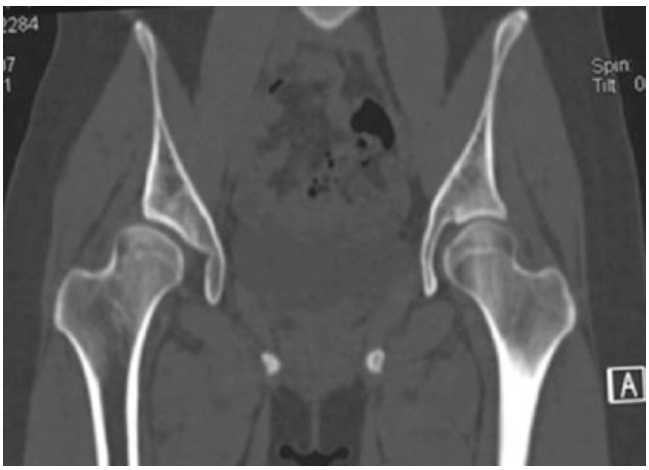


Fig. 3.9 CT scan of hip joint demonstrating right DDH

3.3.1.3 Abduction Functional View

The hip joint is placed at the maximum abduction position. It can be used to simulate the angle that osteotomy needs to be corrected, and to observe the congruency, reduction, and coverage.

3.3.2 CT

The changes of the acetabulum and femoral head can be observed in coronal, sagittal, and transverse sections by CT (Fig. 3.9). It is simple and accurate to measure the anteversion of the femoral neck on CT. The angle between the midpoint of the medial and lateral femoral condyles and the longitudinal axis of the femoral neck is the anteversion angle of the femoral neck. The normal values are 10 °~15 °. 3D-CT can clearly show the pathological changes of the acetabulum, femoral head, and surrounding tissues. As a preoperative and postoperative evaluation method, it is superior to other methods, and can be used for surgical simulation, providing personalized treatment program.

3.3.3 MRI

MRI has a high soft-tissue resolution and multiparameter imaging, which has unique advantages in the diagnosis of hip disease. It has obvious advantages for displaying the complex three-dimensional structure and tissue level in complex joints. It can help analyze the morphological structure of the acetabular labrum and the imaging features associated with abnormal stress, such as cartilage loss, which can remind the surgeon to locate and identify the characteristics of the lesion during the operation and treat it accordingly (Fig. 3.10).

3.3.4 MRA

MRA can be divided into indirect and direct MRA. The former uses the contrast agent (glucuronide injection) to enter the vein. After waiting for a period of time, the contrast agent gradually penetrates the joint cavity then the patient undergoes magnetic resonance scanning. The latter is that a small amount of contrast agent is diluted and directly injected into the joint cavity. To improve accuracy, it is usually operated under ultrasound guidance or C-arm fluoroscopy. Due to the presence of the contrast agent, the intra-articular structure is more obvious and accurate, and diagnosis of intra-articular lesions can be easily made. It has a high diagnostic value in the labral tear, cartilage injury or delamination, articular capsule relaxation leading to joint instability, et al (Fig. 3.11).

3.3.5 EMG

EMG can determine the presence, location, and characterization of nerve damage, providing a reference for differential diagnosis.

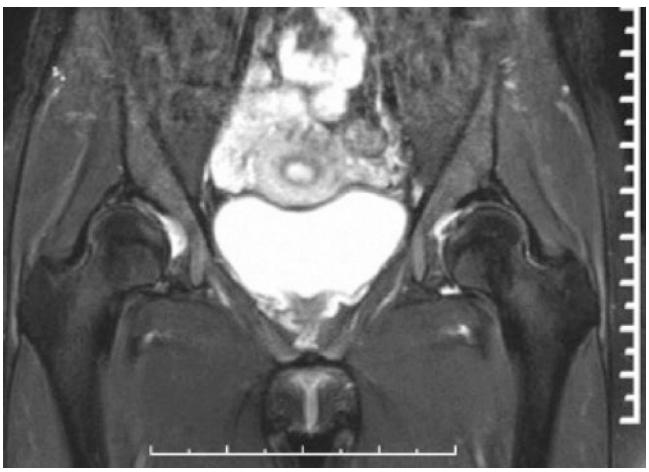


Fig. 3.10 MRI scan of hip joint

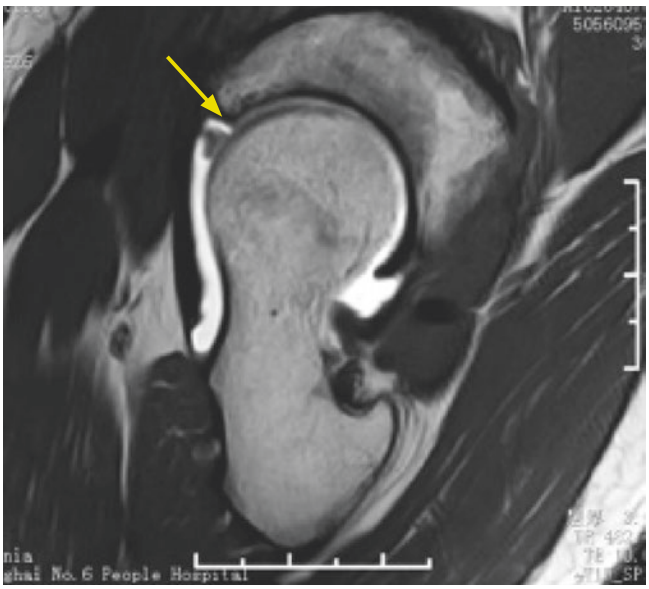


Fig. 3.11 MRA scan of hip joint demonstrating the labral tear

3.3.6 Hip Ultrasound

As a noninvasive and convenient method, ultrasound is increasingly used in the diagnosis of hip joint diseases. It can be applied to the qualitative and localization of the mass around the joint, synovitis, joint infection and effusion puncture, dynamic observation of snapping hip and so on.

3.3.7 PET-CT

Systemic PET-CT examination is often used to exclude metastases from cancer. Local examination of the hip is usually used for the exclusion diagnosis of unexplained hip pain, such as infectious arthritis.

3.4 Diagnostic Injection Therapy

Diagnostic injection therapy for hip pain is relatively simple to operate, minimally invasive, and easy to perform in the outpatient clinic. For patients with or suspected hip disease who are excluded from local mass, tuberculosis and fractures, it is a very practical diagnosis and treatment method, which can not only confirm the diagnosis but also play a therapeutic role.

The proximity of the hip to important neurovascular structures, lack of palpable anatomic landmarks, and deep location of targets make use of ultrasound-guided injections ideal for improved accuracy without the radiation of

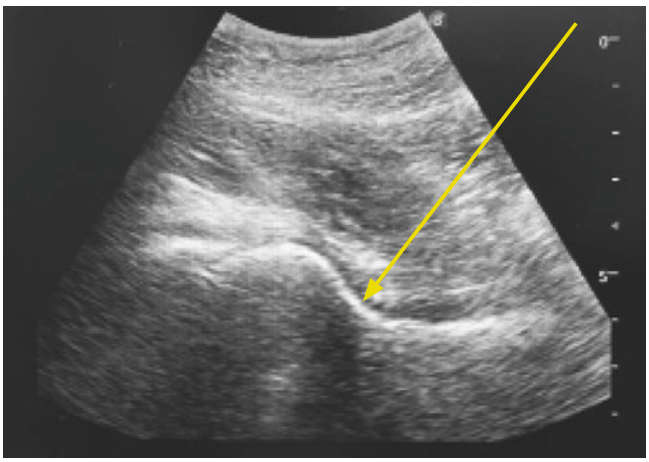


Fig. 3.12 Ultrasound-guided hip joint cavity injection

fluoroscopy. The patient's response to these injections can help isolate the pain source and guide treatment plans. (Fig. 3.12). Lidocaine and/or triamcinolone acetonide injection are commonly used. Before and after injection, detailed records should be recorded to check for changes and outcomes in pain.

3.5 Hip functional rating scales

Hip functional rating scales can be used to assess the severity of the disease as a whole and to meet the basic requirements for an outcome measurement.

3.5.1 Harris Hip Score

Harris hip score (HHS) is one of the most widely used hip scoring system, which is composed of a combination of patient self-evaluation and doctor's examination. The HHS included pain (44 points), function (47 points), absence of deformity (4 points), and range of motion (5 points), with a full score of 100 (Table 3.4). A higher score indicates higher function, pain and functional capacity are heavily weighted in this scoring scale. Which shows that "it would prefer to have a motionless and painless hip than a motional but painful hip."

3.5.1.1

3.5.1.2 History

It was initially proposed by Harris in 1969 as a research tool to assess the clinical results of mold arthroplasty for traumatic hip arthritis. It has been widely used in the evaluation of hip diseases.

3.5.1.3 Grading Standard

Excellent: 90 ~ 100 points; Good: 80 ~ 89 points; fair: 70 ~ 79 points; Poor: ≤ 69 points.

3.5.1.4 Advantages

1. Highlighting the weight of pain and joint function, reflecting the patient's subjective perception, and those of them can be highly reproducible.
2. Clinician-patient with face-to-face to administer rating without special imaging examination.

3.5.1.5 Disadvantage

1. The score has not been verified by systematic reliability only its content validity confirmed was excellent and there are ceiling effects that severely limit its validity. It is doubtful to reflect the true state of hip joints.
2. The weight of range of motion is not large, but its measurement of scores are too complex and need for accurate measurement by doctors.
3. Some of the metrics (such as distance block) may not applicable for Chinese, and local patients cannot easily understand those term.
4. There is a natural bias when scoring of bilateral hip joints, which is likely to cause inaccurate evaluation.

3.5.1.6 Applicable Population

This scoring system is a common outcome tool and suitable for unilateral hip arthroplasty and hip joint preservation (such as hip fracture, osteonecrosis of the femoral head, and osteoarthritis).

3.5.2 Oxford Hip Score

Oxford hip score (OHS) assesses pain and function outcomes in patients undergoing hip replacement and is based on the patient-reported outcomes which is commonly used in clinical. The scale consists of 12 items with 5 categories of response, no subscales. The items include hip pain, function, walking ability, and work ability during the past 4 weeks. Each option was graded from lighter to heavier score of 1–5 points, and the scale highlights pain issues (Table 3.5).

3.5.2.1 History

It was presented by Dawson et al. in 1996. The reliability and sensitivity of the scoring system have been confirmed.

3.5.2.2 Grading Standard

Excellent: 12 ~ 23 points; Good: 24 ~ 35 points; fair: 36 ~ 47 points; Poor: 48 ~ 60 points.

3.5.2.3 Advantages

1. The scale is simple and easily understand, and it is suitable for patients with all kinds of educational levels.
2. The OHS is an outcome of patient-reported scale, in addition to evaluation by face-to-face on site, it also can be applied to evaluate by telephone, letter or other not-to-face types. Its clinical practicality is strong.

Table 3.4 Harris hip score

Item	Points
I. Pain (44 points)	
• None	44
• Slight: Occasional ache or awareness of pain of low grade, no compromise of activities	40
• Mild: No effect on average activities, rarely may have moderate pain following unusual activities, may take aspirin	30
• Moderate: Pain tolerable but patient makes concessions to his pain, some limitation of ordinary activities but able to work regularly, may require pain medicine stronger than aspirin occasionally	20
• Marked: Severe pain at times, but ambulatory; serious limitation of activities; takes pain medicine stronger than aspirin usually or frequently	10
• Disabled: Severe pain even in bed; pain forces patient to bed; crippled by pain; bedridden	0
II. Function (47 points)	
A. Gait (33 points)	
Limp	
• None	11
• Slight	8
• Moderate	5
• Severe	0
Support required to walk	
• None	11
• Single cane for long walks	7
• Single cane most of the time	5
• One crutch	3
• Two canes	2
• Two crutches	0
• Not able to walk at all	0
Distance walked	
• Unlimited	11
• Six blocks	8
• Two or three blocks	5
• Indoors only	2
• Bed and chair	0
B. Daily activities (14 points)	
Stairs	
• Foot over foot without use of banister	4
• Foot over foot using banister	2
• Stairs in any manner	1
• Unable to do stairs	0
Shoes and Socks	
• With ease	4
• With difficulty	2
• Unable	0
Sitting	
• Comfortably in ordinary chair one hour	5
• On a high chair for one-half hour	2
• Unable to sit comfortably in any chair	0
Transportation	
• Able to enter public transportation	1
• Unable	0
III. Absence of deformity (4 points)	
• Less than 30° fixed flexion contracture	1
• Less than 10° fixed adduction	1
• Less than 10° fixed internal rotation in extension	1
• Limb-length discrepancy less than 3.2 cm	1
IV. Range of motion (index values are determined by multiplying the degrees of motion possible in each arc by the appropriate index; to determine the over-all rating for range of motion, multiply the sum of the index values × 0.05) (5 points)	
Flexion	
• 0–45° × 1.0; 45°–90° × 0.6	
• 90°–110° × 0.3; 110°–130°× 0	

Table 3.4 (continued)

Item	Points
Abduction	
• 0–15° × 0.8; 15°–20° × 0.3	
• Over 20° × 0	
Adduction	
• 0–15° × 0.2; Over 15° × 0	
External rotation in ext.	
• 0–15° × 0.4; Over 15° × 0	
Internal rotation in extension	
• any × 0	

Table 3.5 Oxford hip score

Item	Scores	Categories
During the past four weeks		
I. How would you describe the pain you usually had from your hip?	1	None
	2	Very mild
	3	Mild
	4	Moderate
	5	Severe
II. Have you had any trouble with washing and drying yourself (all over) because of your hip?	1	No trouble
	2	Very little trouble
	3	Moderate trouble
	4	Extreme difficulty
	5	Impossible to do
III. Have you had any trouble getting in and out of a car or using public transport because of your hip? (whichever you tend to use)	1	No trouble
	2	Very little trouble
	3	Moderate trouble
	4	Extreme difficulty
	5	Impossible to do
IV. Have you been able to put on a pair of socks, stockings or tights?	1	Yes, easily
	2	With little difficulty
	3	With moderate difficulty
	4	With extreme difficulty
	5	No, impossible
V. Could you do the household shopping on your own?	1	Yes, easily
	2	With little difficulty
	3	With moderate difficulty
	4	With extreme difficulty
	5	No, impossible
VI. For how long have you been able to walk before the pain from your hip became severe? (with or without a stick)	1	No pain/>30 min
	2	16–30 min
	3	5–15 min
	4	Around the house only
	5	Not at all
VII. Have you been able to climb a flight of stairs?	1	Yes, easily
	2	With little difficulty
	3	With moderate difficulty
	4	With extreme difficulty
	5	No, impossible
VIII. After a meal (sat at a table), how painful has it been for you to stand up from a chair because of your hip?	1	Yes, easily
	2	With little difficulty
	3	With moderate difficulty
	4	With extreme difficulty
	5	No, impossible
IX. Have you been limping when walking, because of your hip?	1	Rarely/never
	2	Sometimes or just at first
	3	Often, not just at first
	4	Most of the time
	5	All of the time

(continued)

Table 3.5 (continued)

Item	Scores	Categories
X. Have you had any sudden, severe pain—'shooting', 'stabbing' or 'spasms' – from the affected hip?	1	No days
	2	Only 1 or 2 days
	3	Some days
	4	Most days
	5	Every day
XI. How much has pain from your hip interfered with your usual work (including housework)?	1	Not at all
	2	A little bit
	3	Moderately
	4	Greatly
	5	Totally
XII. Have you been troubled by pain from your hip in bed at night?	1	No nights
	2	Only 1 or 2 nights
	3	Some nights
	4	Most nights
	5	Every night

Table 3.6 WOMAC osteoarthritis index

	Scores rating				
Index	No 0	Slight 1	Moderate 2	Severe 3	Extreme 4
I. Pain					
1. Walking					
2. Stair climbing					
3. Rest					
4. Weight bearing					
II. Stiffness					
1. Morning stiffness					
2. Stiffness occurring later in the day					
III. Physical function					
1. Descending stairs					
2. Ascending stairs					
3. Rising from sitting					
4. Standing					
5. Bending to floor					
6. Walking on flat					
7. Getting in/out car					
8. Going shopping					
9. Putting on socks					
10. Rising from bed					
11. Taking off socks					
12. Lying in bed					
13. Getting in/out bath					
14. Sitting					
15. Getting on/off toilet					
16. Heavy domestic duties					
17. Light domestic duties					

3.5.2.4 Disadvantages

The shortcomings are mainly from patients' subjective judgment, the degree or frequency of the rating items lacks specific description, and there are certainly individual variation.

3.5.2.5 Applicable Population

The scale is applied to assess outcome after total hip replacement by measuring patients' perceptions in adjunction to surgery.

3.5.3 WOMAC Osteoarthritis Index

The scoring system was designed a disease-specific instrument for osteoarthritis in the hip and knee and for evaluating clinical outcomes after total hip replacement, and it is self-administered instrument with three subscales: pain, stiffness, and physical function (Table 3.6).

3.5.3.1 History

In 1988, it was proposed by Bellamy et al., patients with symptomatology of hip or knee osteoarthritis were evaluated with 17 items on 5 dimensions. They can also be used to monitor disease progression and determine the efficacy of antirheumatic drugs.

3.5.3.2 Grading Standard

the higher the score is, the more serious the patient condition is.

3.5.3.3 Advantages

1. Internationally recognized osteoarthritis evaluation criteria.
2. The self-assessment of patients is relatively simple.

3.5.3.4 Disadvantages

1. The scope of application is relatively narrow.
2. There is likely to have ceiling effects when used in a young and active population.

3.5.3.5 Applicable Population

It is appropriated to use in outcome measure for older patients with osteoarthritis or rheumatoid arthritis in the hip and knee.

3.5.4 Shanghai Sixth Hospital Hip Function Scoring System

Based on a comprehensive analysis of their pros and cons of used frequently hip rating scales, a new hip functional score was proposed. The scoring system is completely self-assessed by the patient, highlighting the importance of pain in hip diseases. The scoring system consists of I ~ V parts, including I pain (45 points), II daily living ability (25 points), III walked activities (21 points), IV labor ability (9 points), and V self-rating on the hip health score (100 points). Among of them, the V part is the VAS score (on 100-point scale, 0 point is the worst, 100 points is the best), and the patient would give himself/ herself a general rating based on the health status of the involved hip joint on day of evaluation, and then presented a score in the form of scale of 20 centimeters, which is a necessary and appropriate compensation for rating the relative healthy hip when bilateral involved. The final total weight score is the total score of the I ~ IV part × 85% + V part score × 15%, and the total weight full score is 100 points (Table 3.7).

3.5.4.1 History

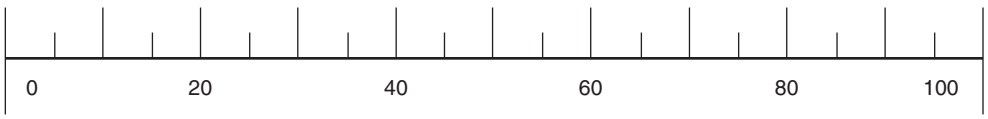
In 2018, the team of Professor Changqing Zhang from Shanghai Sixth People's Hospital designed and proposed a

Table 3.7 Shanghai sixth people's hospital (SSPH) hip score

Item	Points
I. Pain (45 points)	
• None	45
• Mild: Occasional pain or awareness of pain of low grade, no compromise of activities	40
• Moderate: No effect or a little compromise on average activities, rarely may have marked pain following unusual activities, may take aspirin occasionally	30
• Marked: Walking or daily activities can elicit pain; pain is tolerable but affect or limitation of ordinary activities, require pain medicine stronger than aspirin occasionally	20
• Severe: Spontaneous pain, ambulatory or daily activities are likely to exacerbate pain; takes pain medicine stronger than aspirin usually or frequently	10
• Extreme: Lasting spontaneous pain and unable to tolerable, reject any activity and need taking strong pain relief medicine frequently	0
II. Daily activities (25 points)	
A. Socks or ties shoes with knee-crossing "4" posture (7 points)	
• With ease	7
• Mild restriction: Can complete but have a little discomfort when put pressure on the knee	5
• With difficulty	2
• Unable	0
B. Sitting (5 points)	
• Comfortable in any chair for one hour	5
• Uncomfortable on a medium height chair (such as a sofa) for one-half hour	3
• Uncomfortable on a high chair for one-half hour	2
• Unable to sit comfortably in any chair less than one-half hour	0
C. From sitting to standing (4 points)	
• With ease	4
• With difficulty, standing-up on support by upper limbs or other aids	2
• Unable to stand by oneself	0
D. Squat or hip flexion (5 points)	
• Normal, with easy to squat or hip flexion over 120°	5

(continued)

Table 3.7 (continued)

Item	Points
• With slight restriction to squat or hip flexion more than 90° with aids	4
• Moderate restriction, it is somewhat difficult to squat, or hip flexion less than 90° with aids	3
• Severe restriction, it is marked difficult to squat, or hip flexion less than 60° with aids	1
• Unable to squat, stiff joints, or hip flexion less than 30°	0
E. Stairs (4 points)	
• Normal, without use of banister	4
• Foot over foot using banister	3
• Stairs in any manner (aids)	1
• Unable to do stairs	0
III. Walked Activities (21 points)	
A. Distance walked (9 points)	
• Unlimited or continuously walked more than 1500 meters	9
• Continuously walked for 45 minutes or walked less than 1500 meters	8
• Continuously walked for 30 minutes or walked less than 1000 meters	6
• Continuously walked for 15 minutes or walked less than 500 meters	4
• Only indoor activities, or walked for less than 50 meters	2
• Unable to walk	0
B. Support required to walk (7 points)	
• None	7
• Single cane for long walks	6
• Single cane most of the time	4
• One crutch or two canes	3
• Use a walker or two crutches	2
• Not able to walk at all	0
C. Gait (caused by the hip) (5 points)	
• Normal, no limp	5
• Slight or mild limp	4
• Moderate limp	3
• Severe limp or waddling gait	2
• Unable to go	0
IV. Labor ability (9 points)	
• Unlimited physical labors	9
• Tolerated moderate-intensity physical labor / activities	7
• Tolerated light-intensity physical labor (such as usual housework, shopping, standing operation instruments, control equipment, and assembly work)	5
• Only partial light-intensity physical labor / activities under non-weight-bearing conditions (such as work by hands under sitting position or light activities in the legs such as typing and sewing)	3
• Unable to do any intensity physical labor/activities	0
■ Total scores of I–IV parts (100 points)	
V. Self-rating on the hip health status (100 points;0 point is the worst, 100 points is the best): Patients' self-rating for hip health status (with scale of 10 cm) as following:  	
■ Final total hip weight scores (100 points): Total scores of I–IV parts *85% + VAS self-rating scores of V*15%	

Remarks: (1) when patients with bilateral involvements, pain, part of daily activities (including socks or ties shoes, sitting, Squat or hip flexion) and self-rating of hip health status would be scored separately; and another part of daily activities (such as from sitting to standing, stairs), walked activities, and labor ability cannot be scored separately (avoid interference and measurement bias); (2) Scores on self-rating for hip health status was considered to be 15% weight proportion at final total hip weight scores

new hip rating scale. which was based on analyzing the advantages and disadvantages of other used frequently hip score scales, and combined with the clinical features on diseases involvement of bilateral hips. After a potential questionnaire of hip rating assessment and its revised versions were sent to two rounds of Delphi consultations to dozens of experts in orthopaedics and epidemiology, the final measurement item of this scale was determined. According to distinction of its importance, the weight of each item and their scores were calculated.

3.5.4.2 Grading Standard

The lower the score is, the more serious the patient symptom is.

3.5.4.3 Advantages

1. The completeness and consistency of measured item presented in the scale was evaluated and proved to be relatively good and acceptable.
2. The scale is self-administered by patients, and it is simple, practical and can be used not only for on-site evaluation, but also suitable for off-site evaluation or in the remote follow-up.
3. Either unilateral or bilateral hips can be evaluated, which solves the defect of measurement bias when both hips are simultaneously involved.
4. Patient's self-rating on the hip health status is a new additional item, and controlled its weight proportion to 15%, which is contributed to the balance and reliability of the total score, especially for diseases with involvements of bilateral hips.

3.5.4.4 Disadvantages

The validity and reliability on the new hip scale is still subject to more clinical studies to test and verify its value.

3.5.4.5 Applicable Population

It is suitable for adult (except for the elderly) with hip diseases (such as osteonecrosis of the femoral head necrosis, osteoarthritis, hip dysplasia, hip fracture etc.), whether unilateral or bilateral involvements; it may be a little doubtable to the elderly for its value.

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