Hip examination

Introduction

The hip joint is a typical synovial ball and socket joint meaning an encapsulated articulation between two bones surrounded by synovium and lined by hyaline cartilage. The hip joint is a key joint in the human body and should not be considered solely as an orthopaedic joint. The hip joint may be examined by a multitude of professionals within a hospital environment, from rheumatologists, sports medicine doctors, orthopaedic surgeons, physiotherapists, podiatrists, gerontologists, paediatricians and emergency clinicians, and is a favourite in postgraduate exams. A systematic approach to the examination of the hip is essential in order not to miss pathology, to differentiate referred pain from local causes and to communicate these findings effectively to other health-care professionals.

Systematic approach

Table 1 shows a systematic approach to examining the hip joint which will speed up the examination process, while avoiding missing potential pathology.

Table 1. Examination order

Introduction
Gait and observation
Leg length measurement
Look
Feel
Move
Special tests
Finishing off

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Patient introduction

Table 2 shows a useful approach before examining any patient, using the mnemonic 'WIPER'. For the hip examination the patient should be in underwear or shorts depending on the environment in which you are examining the patient, whether this is in an outpatient department or on the ward where the patient may already be wearing a hospital gown.

Gait

Starting on the gait in the initial examination of the hip is useful to establish the mobility of the patient, but also allows the examiner to look for muscle wasting, scars, walking aids and examine the soles of the shoes for asymmetrical wearing.

In the outpatient department the gait is an important observational tool. An antalgic gait is a gait with reduced standing time on the affected limb, and can be described as a 'dash-dot gait' where the dot represents reduced time on the standing limb compared to the dash of the contra-lateral limb. *Table 3* lists causes of antalgic gait.

Another observation is looking for a trendelenberg gait, which is a drop in the pelvis as a result of weak abductors on the standing leg. This can be further evaluated by asking the patient to stand in front of the examiner. While supporting the patient by the hands or placing your hand on the patient's iliac crests and the patient's hands on your shoulders, ask the patient to stand on one leg (*Figure 1a*). Dipping of the pelvis or increased pressure through the contralateral arm signifies a positive test (*Figure 1b*).

Table 2. Introduction mnemonic

W	Wash your hands
I	Introduce yourself
P	Gain Permission
E	Expose the patient appropriately
R	Reposition patient to optimize your examination

Figure 1. a. Assessment of trendelenberg. b. Positive trendelenberg test.

Table 3. Some causes of an antalgic gait

Musculoskeletal	Trauma, arthritis, labral tears, bursitis, tendinopathies, septic arthritis, sacro-iliac joint inflammation, spinal pathology, knee ligament injuries, neoplasms, foot blisters, splinters or ingrowing toenails, gout
Paediatric hip	Septic arthritis, developmental dysplasia or dislocation of the hip, Legg–Calve–Perthes disease, slipped upper femoral epiphysis
Non-musculoskeletal	Diabetes, vascular insufficiency and gangrenous toes, inguinal hernia, referred pain from abdominal, urological or gynaecological conditions

Take this opportunity with the patient standing in front of you to also look at the skin, soft tissues and any bony deformities of the lower limb (*Table 4*). Ask the patient to turn round 90° to look at the front, both sides and back of the patient in a systematic manner.

Look and measure

A thorough approach to observation, looking at the skin, soft tissues and then the bone anatomy, will avoid missing pathology. A closer look can also occur with the patient on the couch.

If trauma to the lower limb is suspected from a fall, note to see if there is shortening or external rotation of the foot, as seen in proximal femoral fractures. If this is the case, review imaging to establish if there is a fracture, to avoid causing the patient unnecessary pain.

In the outpatient department with the patient on the couch a tape measure can be used to look for leg length discrepancy. True leg length is measured from the anterior superior iliac spine to the inferior border of the medial malleolus (*Figures 2a* and *b*), while apparent leg length discrepancy measures from the xiphisternum to the medial malleolus (*Figure 2c*). Discrepancy in the apparent leg length but not the true leg length is the result of pelvic tilt, scoliosis or soft tissue contracture such as fixed flexion deformity of the hip.

If there is true leg length discrepancy, place the knees and ankles together and look at the superior and anterior portion of the knee to establish if the femur or tibia are longer or shorter than the other side – the Galleazi test (*Figure 3*).

Feel

The hip joint is a deep-seated joint covered by large muscles and cannot be felt directly. It is important, however, to use a systematic approach and palpate the skin, soft tissues and bone surrounding the hip joint. The skin temperature is assessed, alongside any sensory changes. Areas that should be palpated specifically for tenderness include the greater trochanter for trochanteric bursitis and the pubic symphysis for osteitis pubis, as well as the adductor muscles on the inside of the thigh to look for adductor insertional tenderness found with tendinopathies or muscle tears.

It is important to bear in mind when examining the hip that referred pain from non-musculoskeletal causes can also occur, such as hernias, appendicitis, diverticulitis, testicular or gynaecological pain.

Table 4. Observation

Skin	Scars, cellulitis, bruising, sinuses
Soft tissues	Swelling, muscle wasting, abscess, skin creases
Bone	Pelvic tilt, knee valgus or varus, scoliosis, lordosis, kyphosis

Figure 2. a. True leg length. b. Inferior border of medial malleolus. c. Xiphisternum for apparent discrepancy.

Move

The passive range of movement in the hip is hugely variable; the importance of the examination is not necessarily the absolute range of movement (*Table 5*) but the comparison with the normal, asymptomatic side.

Movement of the hip joint can be divided into active, passive and resisted movements. With the patient lying at 15° inclination on the couch for comfort, the patient actively flexes the hip into the chest and the symmetry and ease of movement is noted by the examiner.

The examiner passively repeats this process, noting any discomfort in facial expres-

Figure 3. a. Normal. b. Longer left tibia. c. Longer left femur.

Table 5. Typical range of movement of the hip joint

Hip movement	Typical range of movement (°)
Flexion	120–140
Extension	30
Internal rotation	30–60
External rotation	30–60
Adduction	30
Abduction	45

sion denoting pain. With the hip and knee flexed to 90°, the tibia can be used as a lever and protractor to assess internal and external rotation, assess bilaterally to compare symmetry. In early arthritis of the hip, internal rotation is the first rotation to be lost. Abduction and adduction range of movement must be noted to come from the hip; this is achieved by placing the other hand on the patient's iliac wing and abducting or adducting the leg until the pelvis is felt to move. Extension is assessed with the patient lying on his/her side. Typical range of movement values can be seen in *Table 5*.

The important muscle groups to assess resisted movement are the hip flexors, this is done by asking the patient to lift the leg up off the bed and applying a downward force. Resisted hip extension can be achieved by squeezing the examiner's hand between the thigh and bed. The adductor muscle groups can be tested simultaneously by squeezing a clenched fist between the knees of the patient: with the legs straight the long adductors (adductor longus, adductor magnus and gracilis) are tested and with the knee flexed to 90° the short adductors (adductor brevis and pectineus).

Special tests

Thomas' test

This assesses for fixed flexion deformity of the hip. In order not to give a false negative, i.e. missing a fixed flexion deformity of the hip, the spine must be flat on the couch. A lordosis of the lumbar spine can hide a fixed flexion deformity of the hip, so a hand is placed behind the lumbar spine to confirm the absence of lordosis. In the elderly the contralateral hip does not need to be flexed to the chest to look for a fixed flexion deformity of the hip. The hip flexed with the foot flat on the couch is sufficient for elderly patients or those with total hip replacements to avoid the hip dislocating, or the knee can be held by both hands for support (*Figure 4*). The examiner must note if the contralateral thigh has risen off the couch and by what angle. The flexed leg can now be straightened and the process repeated for the contralateral hip.

Figure 4. Positive Thomas' test position.

The impingement sign

The sign is positive when pain is experience with the hip in flexion, adduction and internal rotation (*Figure 5*). This is a non-specific test, although it is suggestive of hip joint pathology and may indicate labral tears or femoral acetabular impingement.

Straight leg raise

Ask the patient to lift his/her leg off the bed as high as it can go. On the onset of discomfort, note the angle of hip flexion achieved. Establish if the pain is located in the back, groin or thigh. Asking the patient to describe this pain may indicate burning pain if neuropathic in nature, or pulling from hamstring contracture (*Figure 6a*).

Differentiating between these two pathologies can be accomplished by first flexing the hip to 90° with the knee flexed, and then gently extending the knee to see if the knee can go fully extend. With tight hamstring muscles the knee will not be able to go straight with the hip flexed to 90°, the resultant angle is the popliteal angle (*Figure 6b*).

Figure 5. Moving the hip into flexion, adduction and internal rotation.

Figure 6. a. Straight leg raise. b. Tight hamstrings.

The sciatic nerve stretch test

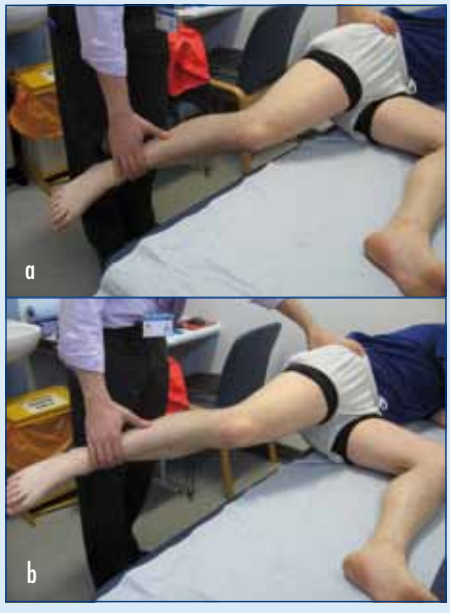
This can be used to assess for neuropathic pain. The patient is laid flat with the chin flexed into the chest, the examiner simultaneous dorsiflexes the ankle joint and then slowly flexes the hip, with the knee kept in extension to keep the leg straight (*Figure 7*). The examiner asks the patient to tell them when symptoms or discomfort is felt. At this point the examiner notes the angle of hip flexion, then asks the patient to extend the neck and place the head back on the couch and plantarflexes the ankle; relief of the symptoms indicates a positive sciatic nerve stretch test. Comparison can be made with the contralateral leg.

Ober's test

This evaluates the tightness of the iliotibial band and is assessed with the patient lying on his/her side. The upper leg is brought into extension, tightness in the iliotibial band will prevent the knee adducting when

Figure 7. Sciatic nerve stretch test.

Figure 8. a. Negative Ober's test; leg is adducted. b. Positive Ober's test.



the examiner removes his/her hand from the patient's knee (*Figures 8a* and *b*).

Finishing off

When finishing a joint examination it is essential to examine the joint above and below. With the hip joint this is crucial otherwise referred pain from the knee, sacroiliac joint or the lumbar spine may be missed. In addition the abdomen is examined. Documentation of the lower limb neurovascular status is an essential part of the examination, in particular in trauma patients and those with back pain.

A full history is key to the diagnosis but is beyond the scope of this article. However, finding out the symptoms, impact on daily living, job and social activities or hobbies, the use of walking aids, past medical history, medications and any previous operations will offer valuable information to the potential diagnosis and what investigations or interventions are warranted.

Finally appropriate investigations are ordered based on the examiner's differential diagnosis.

Conclusions

The hip examination can be regarded as a complicated joint to examine. Using a systematic approach and understanding the variety of areas causing referred pain will allow the examiner to confidently examine the hip joint and not miss important pathologies. **BJHM**

Conflict of interest: none.

Further reading

Harris P, Ranson C (2008) *Atlas of living and surface anatomy for sport medicine.* Churchill Livingstone, Edinburgh: 113–23

Solomon L, Warwick D, Nayagam S (2010) *Apley's system of orthopaedics and fractures.* 9th edn. Hodder Arnold, London: 493–6

KEY POINTS

- A systematic approach must be used to be thorough and avoid missing pathology.
- Referred pain can have both musculoskeletal and non-musculoskeletal causes.
- Review the whole limb and imaging in trauma patients before moving the limb to avoid unnecessary pain from broken bones.
- Finish by examining the joint above and below, assessing the neurovascular status and ordering appropriate imaging.

Table 6. Examination revision table

Overview	Contents		
WIPER	Wash hands, introduce, permission, expose, reposition		
Gait	Antalgic gait		
	Asymmetry of spine		
	Surgical scars		
	Trendelenberg test		
Tape	Apparent leg length		
	True leg length	Galleazi test	
Look	Skin	Erythema	
		Scars	
		Sinuses	
		Alignment of skin creases	
	Soft tissue	Wasting of glutei	
		Quadriceps wasting	
		Swelling	
	Bone	Deformity	
		Asymmetry	
		Pelvic tilt	
Feel	Skin	Temperature	
		Tenderness	
		Hypersensitivity or numbness	
	Soft tissue	Pulses	
		Cap refill	
		Neurology	
	Bone	Bone and joint contours	
		Greater trochanter (trochanteric bursitis)	
		Midpoint of inguinal ligament (hip joint)	
		Pubic bone	
Move	Active	Flex hip	
	Passive	Flex	
		Internal and external rotation	
		Abduction and adduction	
	Resisted	Hip flexion	
		Hip adduction	Short adductors – bend knees, squeeze fist
			Long adductors – straight legs
Special tests	Standing	Trendelenberg	
	Supine	Thomas test	
		Hip quadrant test	
		Straight leg raise	
		Sciatic nerve stretch test	
	Side	Ober's test	
Finishing off	Social history and impact on life		
	Examination of joint above and below with neurovascular status		
	X-rays		