Clinical examination of the knee

Fazal Ali

Abstract

Clinical examination of the knee starts with observing the patient standing and then walking. On sitting, patella height, tracking and crepitus can be demonstrated. With the patient supine the traditional sequence of look, feel and move of the joint is performed, followed by testing in turn the ligamentous and capsular structures.

Keywords clinical examination; knee

Introduction

As with all joints, the knee should be examined systematically following a standard routine. After carrying out a basic examination special tests may be added to help the diagnostic process.

Stand the patient and look

As with all other joints, except the hand, examination of the knee should start by scrutinizing the standing patient. The symptomatic knee should be inspected from the front, from both lateral and medial sides, then posteriorly (Figure 1 and Figure 2). The last is particularly important as it may be difficult later in the examination with the patient sitting or lying on an examination couch.

The patient's use of splints and walking aids should be noted as they give a clue to the level of disability of the patient.

Scars are indicative of previous injury or surgery. Muscle wasting may be indicative of disuse and/or pain.

It is essential to assess the general alignment of the lower limb as problems of alignment or rotation can have an influence on knee symptoms. Varus and valgus alignment may result in abnormal forces passing through one compartment and can also lead to patellar mal-tracking. In particular rotational abnormality leads to mal-tracking and is a cause of anterior knee pain.

The Q angle is important. An increase may be associated with patello-femoral symptoms. It is determined by measuring the angle between a line drawn from the anterior superior iliac spine to the midpoint of the patella and another line drawn from the tibial tubercle to the midpoint of the patella. The normal is about 10° in males and 15° in females.

Swelling of the knee may be obvious with the patient standing (but is best assessed with the patient lying on the examination couch). Lumps may be seen; their location is a clue to the diagnosis. For example a lump on the joint line may signify a meniscal cyst. Anterior lumps may represent either a 'housemaid's knee' (pre-patellar bursa) or 'clergyman's knee' (infra-patellar bursa). Posterior lumps are most typically a Baker's cyst or a semi-membranosus bursa (Figure 3).

Fazal Ali *FRCS (Tr & Orth) Consultant Orthopaedic Surgeon, Chesterfield Royal Hospital, UK.*

Walk the patient

The patient is then assessed walking (Figure 4), comparing the two sides. Particular points to note are the ease with which the patient flexes the knee as he walks and the patella progression angles and the foot progression angles. These are indicators of the rotational profile. The patella progression angle is the angle formed between the transverse axis of the patella and an imaginary sagittal line. This is usually 0°. An internal patella progression angle is seen with squinting patellae and the 'miserable malalignment syndrome'. The foot progression angle is the angle between the axis of the foot and the sagittal axis. It is usually between 10° and 15° external. Rotational abnormalities may be associated with diagnoses such as anterior knee pain and patella instability.

A varus or valgus lurch should also be noted. A varus lurch is evident when the lateral side of the knee opens on weight bearing, and it indicates either medial compartment osteoarthritis or lateral ligament laxity. A valgus lurch is indicative of either lateral compartment wear or medial ligament laxity.

Sit the patient

Patella height and tracking are best assessed with the legs over the side of the couch rather than at any other point in the examination (Figure 5). Thus the next stage of the examination is carried out with the patient sitting on the edge of the couch with their legs dependent over the side. Patella alta may be seen and tracking can be observed when the patient is asked to extend their legs. A positive J-sign, when the patella displaces laterally on the terminal part of extension should be particularly sought in tall slim females who frequently also display ligamentous hyperlaxity.

Lie the patient down

With the patient supine on the couch the examination sequence is look, feel, move followed by ligamentous testing and then special tests.

Look

A careful scrutiny should look for anything missed on the earlier more distant examination such as subtle arthroscopic portal scars, as well as muscle wasting and effusion (Figure 6). Quadriceps wasting is an indicative of knee pathology. It can be quantified by comparing the circumference of the thigh on both sides at an equal distance from a fixed point. While traditionally the point used has been the superior pole of the patella it is better to use the anterior superior iliac spine.

Feel

The knee should first be examined for the presence of an effusion. There are three tests for an effusion, the ballotment test, the patella tap test and the wipe (or bulge) test (Figure 7). The ballotment test is for large effusions, in which a fluid thrill is felt across the joint if the effusion is pressed on the opposite side.

Figure 1 Viewed from in front this patient demonstrates varus deformity of the knee, in this case due to osteoarthritis.

Figure 2 Viewed from the side a fixed flexion deformity is evident.

This is much like testing for ascites in the abdomen. The patella tap will demonstrate a more moderate effusion. The examiner uses one hand to obliterate the supra-patellar pouch and the other is used to press the patella posteriorly. A tap is felt when fluid is displaced and the patella touches the trochlea of the femur. The wipe test is intended to show small effusions. Again one hand is used to obliterate the supra-patellar pouch. The other hand is used to wipe fluid from one side of the patella tendon followed by the other side. If there is an effusion a bulge will appear on the opposite side.

The knee is then flexed 90° and the joint is palpated systematically. The knee, unlike the shoulder and the hip, is a superficial joint, therefore palpation of this joint is particularly important. The site of tenderness usually is a good indicator of the pathology present. For example medial joint line tenderness may indicate a medial meniscal tear or medial compartment osteoarthritis.

Move

Active extension should be tested first and the patient asked to straight leg raise as this assesses the integrity of the extensor mechanism. An extensor lag may be indicative of a chronic quadriceps rupture and is also seen in a patellectomized patient (Figure 8). Then active flexion should be compared to the other side. It should be ascertained if there is further passive movement of the joint if the active movement is restricted. The normal range of movement is 0° to at least 130°.

Ligaments

The initial assessment of the cruciate ligaments should always start with both knees flexed to 90° and with the heels together. This is a very important step because it permits proper interpretation of the anterior drawer and posterior drawer tests which would otherwise lack a defined starting point (Figure 10). The relative position of the tibial tubercles is viewed from the side and a posterior sag suggests a posterior cruciate ligament (PCL) rupture (Figure 9). If present, PCL insufficiency can be confirmed

Figure 3 If the knee is not viewed from behind an abnormality such as a popliteal cyst may be missed.