How to Reach a Diagnosis of Knee Pain

Introduction

It has been speculated that, in at least 60% of cases, the correct diagnosis for the cause of knee pain can be reached after history alone. This percentage increases significantly after an appropriate physical examination. There are many approaches to the physical examination of the knee. This article focuses on examination by anatomical location in the context of both traumatic and atraumatic injuries. Keep in mind that the diagnoses discussed represent an incomplete list, and they cover those that most commonly present to a family doctor’s office. A few less common diagnoses, specific to sports medicine, are included for interest.

Understanding the anatomy of the knee in the context of the mechanism of injury allows one to create a list of potential differential diagnoses based on the location of injury or pain.

Examination

Patient should be in shorts and bare feet

Stance of patient for observational purposes:
(patient should be standing in front of you with feet pointing forwards)

• Observe for neutral, varus, valgus Q-angle
• Presence or absence of foot pronation
• Patellar alignment — neutral, wink, squint

Meet Brent

A 48-year-old man injured his right knee while playing recreational hockey three weeks ago. His skate got caught in a rut and he twisted his knee. His knee did not pop, but it did swell the next day. He was able to bear weight immediately but had a slight limp. He has iced his knee daily and the swelling has improved. His knee does not lock, but he has a sense of instability. The swelling recurs every time he plays hockey and improves with ice and ibuprofen. He is otherwise healthy, but he had arthroscopy on the same knee 15 years ago when the medial meniscus was debrided. He would like to get back to his previous level of function.

Standing (on one leg at a time)

• Functional Trendelenburg test — have the patient stand on the affected leg with the knee bent about 20° to 30°. If they are unable to keep the knee from moving into valgus, the test result is positive. This would suggest hip weakness — a common cause of anterior knee pain
• Thessaly test — patient standing on affected leg with knee bent 20° to 30°. Hold their hands to support them and have them twist (internal and external rotation) three times. Pain that is reproduced in the appropriate compartment indicates a positive test result and suggests meniscal injury
### Differential Diagnosis for Atraumatic Knee Pain

**Anterior**
- Patellofemoral syndrome
- Patellar tendinopathy (jumper's knee)
- Bursitis
- Hoffa's fat pad impingement syndrome
- Infrapatellar plica syndrome
- Chondromalacia
- Effusion

**Lateral**
- Iliotibial band friction syndrome
- Hip or back as source of pain
- Osteoarthritis
- Osteochondritis dissecans — in children
- Insufficiency fracture — in the frail elderly

**Medial**
- Patello-femoral syndrome
- Pes anserine bursitis
- Hamstring tendinopathy
- Osteoarthritis
- Medial plica
- Osteochondritis dissecans
- Insufficiency fracture

**Posterior**
- Baker's cyst
- Popliteus muscle strain
- Back or hip as source of pain
- Calf strain
- Hamstring strain
- Popliteal artery entrapment
- Effusion

### Differential Diagnosis for Traumatic Knee Pain

**Anterior**
- Quadriceps muscle/patellar tendon rupture
- Injury to osteochondral surface patella
- Patellar dislocation
- Bursitis
- Patellar fracture
- Locked knee

**Lateral**
- Anterior cruciate ligament (ACL) tear (Segond lesion on X-ray)
- Posterolateral corner injury
- Lateral collateral ligament (LCL) injury
- Lateral meniscal tear (acute or degenerative)
- Injury to proximal tibiofibular ligament
- Bone bruise (osteochondral lesion)
- Fracture (including Maisonneuve fracture of proximal fibula)
- Patellar dislocation

**Medial**
- Medial meniscus tear (acute or degenerative)
- Bone bruise (osteochondral lesion)
- Medial collateral ligament (MCL) injury
- Fracture
- Locked knee
- Pes anserine bursitis

**Posterior**
- Posterior meniscus tear
- Ruptured Baker's cyst
- Deep vein thrombosis
- Posterior cruciate ligament (PCL) tear
- Proximal calf injury
- Distal hamstring strain
- Popliteus muscle strain
**Case In...**

**Diagnosis of Knee Pain**

**Gait**
- Range of motion — inability to fully extend knee
- Limp — for any other reason
- Varus thrust suggests end stage medial compartment osteoarthritis
- Squat and duck-walk

**Palpation (patient sitting on the bed with legs dangling and knees bent 90°)**
- Distal quadriceps muscle, patella, and tendon
- Tibial tubercle
- Medial and lateral joint lines
- Pes anserine bursa
- LCL, MCL
- Soft tissue of posterior knee

**Patient lying supine**
- Passive range of motion
- Assess for effusion — swipe test
- McMurray’s manoeuvre — the test is only positive when the manoeuvre elicits a palpable or audible click or clunk localized to the joint line
  - For medial meniscal tear — full flexion, internal rotation, varus force then extend
  - For lateral meniscal tear — full flexion, external rotation, valgus force then extend
- Assessing collateral ligaments — stabilize the ankle securely between your elbow and hip. Place hands on either side of the knee joint. Use hip and hand motion to create a varus force to assess LCL and a valgus force to assess MCL stability. Assess for the presence of gapping and compare with the other side — perform at full extension and 30˚ flexion — keep in mind that pseudolaxity can be normal and varus laxity in full extension often suggests an ACL tear
- Lachman’s test — knee bent about 20˚ with heel resting on the bed or ankle supported over the side of the bed with your hip — stabilize the distal femur with one hand and pull the tibia anteriorly in a firm but forceful manner — assess for amount of anterior translation and briskness of endpoint. Compare with the other knee
- Pivot shift test — hold ankle firmly between elbow and hip keeping the knee in full extension. Internally rotate tibia, apply a valgus force, and then flex the knee. Observing the anterior knee reduce or clunk is a positive test

**Patient lying supine with knees bent and feet flat on the bed**
- Anterior and posterior drawer tests — while sitting on the patient’s feet, place your hands behind the knee, ensuring that the hamstring muscles are relaxed. Grab the shin and push posteriorly and then pull anteriorly — assess for amount of translation and end feel. Compare to the other side
- Stability of proximal tibiofibular joint — sitting on the patient’s feet, grab the fibular head between your thumb and index finger — move it anteriorly and posteriorly. Assess if this reproduces the patient’s pain and if it moves more than the other side
- Sag sign — stand to the side of the patient and observe the plane of both tibiae. Assess if the tibia is sitting posterior to the plane of the other tibia — suggests a PCL tear
- Quads active test — stabilize the foot on the bed and have the patient contract his quadriceps muscles, while observing from the side. If his tibia is pulled posteriorly during this contraction, the test is positive and suggests a PCL tear

**Lying prone**
- Popliteus muscle strain — flex the knee to 90˚, internally rotate the tibia and have the patient flex the knee against resistance — the test is positive when it reproduces the patient’s posterior knee pain
• Palpate distal hamstring and proximal calf muscles for pain or defect

Conclusion

Keep in mind that this article presents only one approach of many for the effective use of the history and physical examination of the knee when a patient presents with knee pain. While it is certainly not all-inclusive, I believe that using this approach and an x-ray (routine, skyline, and tunnel weight-bearing views) can help you arrive at an accurate diagnosis about 80 to 90% of the time. An MRI of the knee can be useful in certain circumstances, but in most cases it is not required to make an accurate diagnosis.

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