Technique of knee joint aspiration

Anatomy and function

Knee joint aspiration and injection are performed to establish a diagnosis, relieve discomfort, drain off infected fluid, or instill medication.

The knee joint is the most common and the easiest joint for a clinician to aspirate. Because prompt treatment of a joint infection can preserve the joint integrity, any unexplained monoarthritis should be considered for arthrocentesis (*Table 1*).

Arthrocentesis may also help distinguish the inflammatory arthropathies from the crystal arthritides or osteoarthritis. If a haemarthrosis is discovered after trauma, it can indicate the presence of a fracture (fat globules in the aspirate) or other anatomical disruption.

An effusion of the knee often produces detectable suprapatellar or parapatellar swelling. Large effusions can produce ballottement of the patella. Medial or lateral approaches to the knee can be selected; some advocate the medial approach when the effusion is small and the lateral approach with larger effusions. The lateral approach will be discussed here.

Method

- The knee generally is easiest to aspirate when the patient is supine and the knee is extended. A pillow may be placed under the knee for comfort and to relax the quadriceps muscle group.
- Identify the medial, lateral and superior borders of the patella. Check for overlying cellulitis or coexisting pathology in the joint or surrounding tissues.
- The superior lateral aspect of the patella is palpated. The skin is marked with a pen, one fingerbreadth above and one fingerbreadth lateral to this site (*Figure 1*). This location provides the most direct access to the synovium.
- A wide area of skin is cleaned with povidone-iodine solution. The skin and underlying dermis is infiltrated with local anaesthetic at the point where aspiration will take place so that a small bleb is raised. The needle may then be advanced to the subcutaneous tissues for further infiltration of local anaesthetic, with negative pressure applied to the syringe throughout to ensure no vasculature is injected.
- A fresh syringe (ideally 20 ml) and large bore needle (18 gauge) is then used to aspirate the joint. The needle entry point is through the bleb, directed at a 45° angle distally and 45° into the knee, tilted below the patella, with negative pressure applied to the syringe throughout. The syringe should fill with fluid once the joint is entered. Using the non-dominant hand to compress the opposite side of the joint or the patella may aid in arthrocentesis.
- If the bore appears obstructed during the arthrocentesis, try rotating the needle or injecting some aspirate, attempting to clear the needle. If this fails, try reinserting the needle 1 cm deeper or changing direction slightly. A give may be felt when the needle pierces the synovium.
- Aspirate as much fluid as possible, changing syringe when needed but keeping the needle in the joint.
- Following withdrawal of the needle, dress the iatrogenic puncture wound with an antibiotic ointment and appropriate adhesive sterile dressing. Although rare, infection and haemarthrosis may complicate arthrocentesis. Application of a compression bandage may be indicated for haemarthrosis and large effusions.

Corticosteroid may be injected in the same manner. The use of local anaesthetic is not mandatory. There are many different techniques for aspirating or injecting the knee. These include medial, lateral and anterior approaches. Each has its own merit, but choice of approach is dependent on the clinician's preference. The lateral approach is most commonly used. For the medial approach, the needle enters the medial side of the knee under the middle of the patella (midpole) and is directed toward the opposite patellar midpole. In the anterior approach, the knee is flexed 60–90°, and the needle is inserted just medial or lateral to the patellar tendon and parallel to the tibial plateau. This technique is preferred by some for its ease of joint entry in advanced osteoarthritis. However, the anterior approach may incur greater risk of meniscal injury by the needle.

The indications, complications and pitfalls for knee arthrocentesis generally can be applied to other joints (*Tables 2* and *3*).

Table 1. Indications for knee joint aspiration

Crystal-induced arthropathy
Haemarthrosis
Suspected septic arthritis
Symptomatic relief from large effusion
Unexplained joint effusion
Unexplained monoarthritis

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Figure 1. Superolateral knee joint aspiration.

Table 2. Contraindications to intra-articular injection

Adjacent osteomyelitis
Bacteraemia
Haemarthrosis
Impending (scheduled within days) joint replacement surgery
Septic arthritis
Osteochondral fracture
Periarticular cellulitis
Uncontrolled bleeding disorder or coagulopathy

Table 3. Contraindications to joint needle aspiration

Bacteraemia
Overlying infection in the soft tissues
Severe coagulopathy
Severe overlying dermatitis
Clinician unfamiliar with anatomy of or approach to the joint

Table 4. Typical condition dependant characteristics of fluid aspirated

Type of fluid	Special features
Normal	Clear, colourless, viscous
Non-inflammatory	Clear, yellow, viscous
Inflammatory	Cloudy, yellow, watery. Glucose may be low
Septic	Purulent. Glucose very low

Many of the principles of needle aspiration and injection also can be used for soft tissue disorders, such as bursitis or tendinitis.

All fluid is sent for investigation: microscopy, white cell count, gram stain, crystals, glucose and protein. Even a 'dry tap' can yield important and sufficient information and should not be discarded. The colour and appearance of the aspirate should be noted as this may direct initial suspicions (*Table 4*).

Experience is important for the proper performance of joint aspiration and injection procedures. Each joint has different anatomical landmarks, and novice clinicians may need to review a textbook for approaches to an unfamiliar joint. Although arthrocentesis is a simple technique with minimal risk, one should have assistance or supervision with the first attempt at any site. **BJHM**

Conflict of interest: none.

KEY POINTS

- Knee joint aspiration and injection are performed to establish a diagnosis, relieve discomfort, drain off infected fluid, or instil medication.
- Medial or lateral approaches to the knee can be selected.
- The lateral approach: the skin is marked with a pen, one fingerbreadth above and one fingerbreadth lateral to this site.
- A wide area of skin is cleaned with povidone-iodine solution.
- The needle is directed at a 45° angle distally and 45° into the knee, tilted below the patella, with negative pressure applied to the syringe throughout.