Aspiration and injection of the knee

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ABSTRACT: Acute pain in the knee and its surrounding structures may be related to fractures, septic and inflammatory arthritis, ligamentous and meniscal injuries, or tendinous strains. Chronic symptoms often result from osteoarthritis and inflammatory arthritides, bursitis, and tendinitis. Aspiration and analysis of knee synovial fluid is a safe and reliable means of diagnosing many acute and chronic conditions, and knee injection also remains an effective way to administer pain-relieving therapies. For aspiration of large effusions, the medial retropatellar and superolateral retropatellar approaches are preferred because they permit access to the suprapatellar pouch. These two approaches may be used for aspiration or injection or both. The anterior approach is convenient when only injection is performed. (J Musculoskel Med. 2008;25:470-472)

The knee and its surrounding structures are a common site of both acute and chronic musculoskeletal problems. Acute pain may be related to fractures, septic and inflammatory arthritis, ligamentous and meniscal injuries, or tendinous strains and other injuries. Chronic symptoms often result from osteoarthritis (OA) and inflammatory arthritides, bursitis, tendinitis and, less frequently, malignancy and congenital defects. Aspiration and analysis of knee synovial fluid is a safe and reliable means of diagnosing many acute and chronic conditions that affect the knee and the musculoskeletal system as a whole. Knee injection also remains an effective way to administer pain-relieving therapies, such as localized corticosteroid injections for acute monarticular arthritis and viscosupplementation for chronic OA.

The knee is the largest synovial joint in the body. The major articulating surfaces are composed of the round femoral condyles proximally and the flat tibial plateau distally. A supporting combination of strong ligaments, tendons, and menisci act as joint stabilizers and dampen forces across the knee. Although there are tendinous bands connecting the lateral and medial aspects of the patella to the epicondyles (the patellar retinaculae), these are thin and are not protected by overlying fat or muscle. This "window" between the femoral epicondyles and patella leaves the knee susceptible to trauma but also receptive to the examiner's needle. Large plica may alter how synovial fluid collections distribute and may influence the best approach to aspiration.

Suggested supplies

- 3-mL syringe with 2 to 3 mL of 1% lidocaine (or, if preferred, ethyl chloride) for local anesthetic.
- 10-mL syringe with 5 to 7 mL of 1% lidocaine mixed with 1 mL of a triamcinolone-based corticosteroid, 40 mg/dL (or other fluorinated corticosteroid equivalent).
- Multiple 20- to 30-mL syringes for joint aspiration. Fluid accumulation in the knee may be quite large.
- 1.5-inch 25-gauge needles for injection of both anesthetic and corticosteroid/anesthetic mixture.
- 1.5-inch 18- to 21-gauge needles for joint aspiration and filling syringes with lidocaine or corticosteroid or both.
- Alcohol wipes, povidone-iodine, or chlorhexidine for sterilization.
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• Nonsterile or sterile gloves.
• Gauze pads/adhesive bandage.
• Appropriate tubes and slides for synovial fluid analysis.

Surface anatomy
With the patient's knee extended, the groove of the patellofemoral joint line can be located by first placing the index finger and thumb of the nondominant hand on the superior and inferior poles of the patella. Using the free hand, locate the medial and lateral aspects of the patella. Balloting the patella may help circumscribe its borders.
To locate the tibiofemoral joint lines, flex the patient's knee and encircle the fingers of both hands around the top of the tibia. Place the tips of both thumbs side-by-side in the midline of the patella superiorly, then move them in unison inferiorly, locating the patellar ligament at its attachment to the lower patellar pole. From that point, direct the thumbs outward along the medial and lateral tibiofemoral joint lines, first palpating the broad dimples on either side of the patellar ligament.

Procedure

Medial retropatellar approach: For aspiration of large effusions, the medial retropatellar and superolateral retropatellar approaches are preferred because they permit access to the suprapatellar pouch, the largest of the knee's synovial regions (Figure). Use of either approach for injection only may be performed by using a smaller-bore (25-gauge) needle for patient comfort. With the patient's leg extended fully or with slight flexion, the medial aspect of the midpatellar region is properly sterilized and anesthetized. A large-bore needle (18- to 21-gauge) is directed under the patella at a 30° to 40° angle from the horizontal and in a slightly caudal direction.

Superolateral retropatellar approach: This approach may be used for aspiration or injection or both. After proper sterilization and anesthetization, the proper-size needle is inserted at a point just supralateral to the intersection of lines drawn from the top and lateral margins of the patella. Direct the needle at a 30° to 40° angle from the horizontal, aiming for under the upper third of the patella.

Anterior approach: This approach is convenient for when only injection is performed. With the patient sitting comfortably and the knee flexed at 90°, locate the tibiofemoral joint lines and then palpate the sulci produced on either side of the patellar ligament. If there is a large effusion, these "dimples" may be difficult to localize and one of the retropatellar approaches above may be more beneficial. After proper sterilization and anesthetizing, direct a 25-gauge needle posteriorly and parallel to the tibial plateau, entering either the medial or lateral dimple and aiming for the midline intercondylar notch.

Pearls

• The patient may be spared an additional needle stick if the anesthetic syringe is removed from the implanted needle and replaced with either the syringe for joint aspiration or one prefilled with the lidocaine/corticosteroid mixture. A sterile hemostat holding the needle hub in place may help remove an overly tightened syringe.
• To improve fluid collection, an assistant may apply gentle pressure to the side of the patella opposite that of the needle or gently compress the suprapatellar pouch while aspirating. These maneuvers may help "milk" fluid toward the needle tip.
• Even with proper needle placement when using the medial retropatellar approach for aspiration of a clinically swollen knee, a dry tap may occur. This may be because of a large medial fat pad or medial synovial plica interposed between the needle tip and the effusion. Reattempting aspiration should then precede using the superolateral retropatellar approach.
• Remember that the inferior aspect of the patella is "V"-shaped. Therefore, on entering the knee joint, if the aspirating needle hits bone, you are probably hitting the undersurface of the patella. Withdraw the needle halfway but not out of the skin; redirect it, pointing it more inferiorly or at a steeper angle to get to the retropatellar area.

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