

7 The knee joint

Effusions of the knee joint are commonly seen in general practice, and both aspiration and steroid injection may be confidently undertaken.

There are many causes of effusion, such as trauma, strained collateral ligaments, cruciate and meniscus tears, haemarthrosis, rheumatoid disease, osteoarthritis, Reiter's syndrome, gout, pseudogout, psoriasis and rarely chondromalacia patellae.

Prepatellar and infrapatellar bursae ('clergyman's' and 'housemaids' knees), occur because of recurrent pressure or trauma of kneeling and should not be confused with effusion of the knee joint. Prepatellar bursitis was more common in coalminers and in carpet layers. These latter are prone to infection and must be distinguished from effusion of the knee joint. Osteochondritis dissecans causing loose bodies in the knee joint may lead to effusion and locking of the joint. Baker's cyst posteriorly may rupture during violent flexion of the joint. This may occur in rheumatoid arthritis.

Presentation and diagnosis

An effusion is often detected on inspection and both knees should be inspected with the patient first standing and then lying on the couch.

Palpate the patella for the following signs:

- with an effusion, the hollows alongside the kneecap disappear, and a suprapatellar bulge may appear that is painful on palpation. The 'patella tap' may be less painful with smaller effusions, but the fluid can be stroked from one side of the patella to the other
- synovial thickening, which may be nodular, indicates synovitis
- bony prominences (osteophytes), which may occur in osteoarthritis
- note the temperature, by placing the backs of the fingers on the patella. In infection and crystal synovitis, there will be warmth, tenderness and redness of the overlying skin
- patellar 'grating' and crepitus, which occur in osteoarthritis.

Examine the full active and passive movements of the knee joint and note any quadriceps wasting.

Functional anatomy

The knee joint is a hinge joint and major weight-bearing joint. The joint cavity is large and is essentially the patella-condylar space; it communicates with the supra- and infrapatellar bursae.

Aspiration and injection therapy

There are three indications for aspiration of an effusion of the knee joint:

- 1 *diagnostic*, in septic arthritis, haemarthrosis, traumatic effusion, rheumatoid arthritis, osteoarthritis, gout and pseudogout. Send aspirate to the laboratory for analysis
- 2 *therapeutic*, when a tense effusion causes pain and discomfort
- 3 (a) *steroid injection* for an acute flare-up, e.g. of rheumatoid arthritis, osteoarthritis, psoriasis, Reiter's syndrome, synovitis and soft tissue lesions that occur in trauma
(b) *viscosupplementation* with hyaluronic acid preparation in osteoarthritis.

Trauma which may be quite minor, as occurs on the playing field, may often produce a large effusion into the knee joint and as much as 60–70 mls of fluid may be aspirated. Should the effusion recur in the following two weeks it is good practice to re-aspirate.

Due to advances in orthopaedic surgery the management of rheumatoid and osteoarthritis affecting the knee and hip joints has changed considerably, mainly due to the success of total joint replacement. Osteoarthritis has become increasingly common in younger athletes (especially those who have required meniscus surgery) in whom joint replacement may not be appropriate because of their young age. Here steroid injections or viscosupplementation may well tide them over until they reach an age when total joint replacement is more appropriate. Both these therapeutic regimes are suitable for a flare-up of an osteoarthritic knee joint that presents with pain or a warm or hot painful joint that is not responding to NSAIDs. An acute exacerbation of sero-positive or sero-negative arthropathy due to rheumatoid or psoriatic arthropathy for instance, will respond dramatically to an injection of triamcinolone acetonide with a remission often lasting for six to twelve months.

In recent years there has been an increasing interest in viscosupplementation in the treatment of osteoarthritis of the knees.¹ This treatment has been used largely in Canada and Europe and presents an alternative treatment for osteoarthritis of the knees.

It is known that hyaluronan (hyaluronic acid) in synovial fluid is responsible for absorbing mechanical shocks, producing elastoviscous protection for soft

Table 7.1 Analysis of synovial fluid

Diagnosis	Appearance	Viscosity	Special findings
Normal	clear yellow	high	–
Traumatic	straw to red	high	blood may be ++
Osteo- arthritis	clear yellow	high	cartilage fragments
Gout	cloudy	decreased	monosodium urate crystals (needle-like)
Pseudogout	cloudy	decreased	calcium pyrophosphate crystals (rhomboid)
Rheumatoid arthritis	greenish cloudy	low	latex RA haemagglutination titre or sheep-cell agglutination test
Septic arthritis	turbid to purulent	low	culture positive
TB arthritis	cloudy	low	culture positive for acid-test Bacillus

tissues, shielding pain receptors and protecting cartilage against inflammatory mediators and degradative enzymes. Viscosupplementation is a means of injecting into the knee joint hyaluronic acid preparations of high molecular weight with optimal elastoviscous properties. These have the effect of restoring osteoarthritis synovial fluid to healthy levels and reducing pain and improving mobility. There are several preparations on the market – hylan G-F 20 (Synvisc) in the UK and hyaluronic acid (Hyalgan) in Europe. The former product has a higher molecular weight than the latter and claims a superior clinical effect.

Treatment using hylan G-F 20 is by administering a course of three intra-articular injections over three weeks. This course may be repeated, the maximum dose being six injections in six months. Adverse events are rare and transient and the average duration of effective relief is 8.2 months following one course of three injections. It is therefore worth considering for use in patients not helped by, or suffering adverse effects of, NSAID therapy.² Patients awaiting knee replacement surgery may also well be supported by this therapy and for some patients, may even delay the need for surgery.

Adverse effects of viscosupplementation

After injection increased pain and swelling may occur in approximately 2% of patients and may last up to a few days.

Always send joint aspirate for microscopy and analysis for diagnosis and to exclude infection. Joint aspirate in normal patients should appear clear and pale yellow in colour. Any turbidity in appearance of the joint aspirate will be suspicious of infection, in which case steroids must not be injected until the pathology laboratory excludes infection.

Analysis of the synovial fluid will usually confirm the diagnosis. A summary of the diagnostic signs is shown in Table 7.1.

Inject with steroids no more than once every three months. This is most effective for acute flare-ups of arthropathy, especially those that affect a single joint, as in psoriasis or rheumatoid arthritis exacerbations. Unlike steroids, a viscosupplementation course of three injections in three weeks may be repeated twice in one year.

Technique of aspiration and injection

The patient lies on the couch with the knee slightly flexed; a pillow behind the knee is helpful. This allows relaxation of the quadriceps and patellar tendon. Carefully palpate the bony margin of the patella, which may be moved freely before the needle is inserted. Injection can be from either the lateral or the medial side of the patella and below the superior border of the patella.

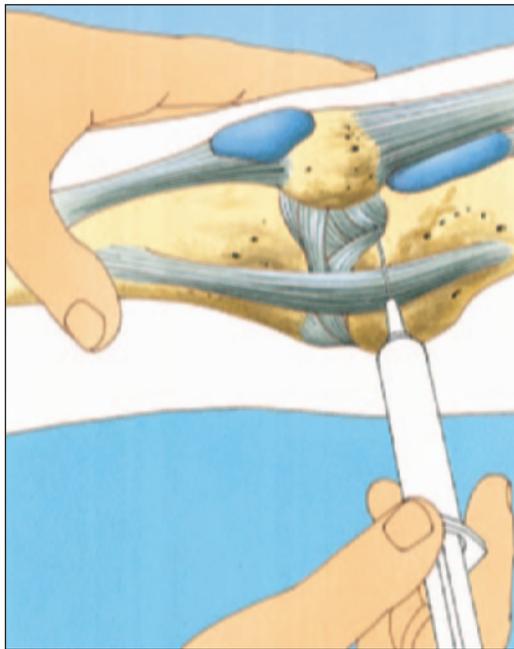


Figure 7.1 The knee joint.

Aspiration

- Prepare a 20 ml (or 50 ml) volume syringe and a sterile specimen container for diagnostic microscopy and culture. Use a 1.5 inch (3.8 cm) needle.
- Insert the needle horizontally and in a slightly downward (or posterior) direction into the joint, in the gap between the back of the patella and the femoral condyles. When the needle is behind the patella, it is in the joint space. Just before reaching that stage, it should be possible to slide the patella over the femur freely from side to side, ensuring relaxation of the quadriceps.
- If a steroid injection is to follow the aspiration, leave a small amount of synovial fluid in the knee joint. This will allow the steroid to diffuse around the joint cavity more easily.
- It is kinder, but not strictly necessary, to infiltrate 1 ml lignocaine 1% plain into the skin at the aspiration site.

Injection

- Use 1 ml steroid (20 mg triamcinolone acetonide, 40 mg methylprednisolone or 20 mg hydrocortisone acetate) in a 2 ml volume syringe. Use a 1.5 inch (3.8 cm) needle.
- Follow the same needle insertion procedure as for aspiration, above.
- Inject steroid into the knee no more than once every three months. After aspiration or injection, the knee joint should be rested for 24 hours, supported by a firm Tubigrip or elastic crêpe bandage.

The short-term benefit of intra-articular steroids in the treatment of osteoarthritis of the knee joint is well established and few side-effects have been reported. Longer-term beneficial effects have not been confirmed. The response to Hyaluronan appears to be more durable.^{3, 4, 5, 6}

References

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