Acta Orthop Scand 55, 657–659, 1984

Septic arthritis of the knee

Five cases treated with synovectomy

Five cases of suppurative non-gonococcal arthritis of the knee were treated with synovectomy 1–2 weeks after the diagnoses were confirmed. Indications for operation were persistent fever and continuous effusion, in spite of adequate antibiotic treatment and serial needle aspirations.
The infection subsided in all cases. At follow-up, 2 years after operation, one patient had died of other disease, and there had been no recurrences among the remaining four. One patient had disabling pain on weight-bearing and considerable restriction of knee motion with 2–3 mm radiographic narrowing of the joint space. Three knees were painless on normal motion, but in two cases changes resembling osteochondritis were found radiographically.

Per Riegels-Nielsen
Jørgen Steen Jensen

Departments of Orthopaedic Surgery U, Rigshospitalet, and T 2, Gentofte Hospital, University of Copenhagen, Denmark

Correspondence: Pantholm 24 F, DK-4200 Slagelse, Denmark

Septic arthritis carries a high risk of permanent joint damage. Many opinions regarding the treatment of bacterial arthritis seem based on empiric rules rather than accurate clinical evidence. The therapeutic goal today is to maintain normal function of the joint (Nade 1983).

In the initial phase of infection, when the lesion is only synovial, synovectomy may be indicated in cases that do not respond to medical treatment (Gérard et al. 1977). There have been only a few reports of synovectomy in cases of non-tuberculous bacterial arthritis (Cauchoix & Duparc 1962, Gérard et al. 1977, Törholm et al. 1983). The purpose of this investigation was to obtain further experience with synovectomy in septic arthritis of the knee.

Patients and methods

In the period June 1980 to April 1981, five patients were synovectomized due to septic arthritis of the knee (Table 1). The joints were in all cases warm and tender, with purulent aspirate, but in only three cases was it possible to culture bacteria. Antibiotic treatment was started immediately after the first joint aspiration. All patients had elevated ESR, but leucocytosis was demonstrated in only one case. In Case 1, a patient with juvenile diabetes mellitus, pneumococci were cultured from the blood. After joint aspiration, suction irrigation drainage was instituted, but as the drainage did not function, and the effusion recurred, synovectomy was performed after 36 h.

Synovectomy was considered when severe swelling and effusion together with fever continued in spite of antibiotics and repeated joint aspirations.

Table 1. Clinical and bacteriological data for five patients with septic arthritis of the knee.

Case	Sex	Age (years)	Etiology	Duration to synovectomy (days)	Antibiotic treatment	Treatment before synovectomy	Bacteriology
1	M	72	?	12	Penicillin, sulfamethizol	Joint irrigation Puncture × 1	G + cocci
2	M	38	Meniscectomy	11	Cloxacillin, ampicillin	Puncture × 4	0
3	F	26	Steroid injection	5	Methicillin, ampicillin	Puncture × 3	Staph. aureus
4	M	52	?	10	Cloxacillin, ampicillin	Puncture × 5	0
5	F	41	Meniscectomy	11	Methicillin	Puncture × 5	Staph. aureus

Table 2. Peroperative findings and late results for five patients treated with synovectomy for septic arthritis of the knee.

Case	Peroperative observations		Secondary operations	Follow-up			Late result
	Cartilage	Pannus		Motion (°)	Radiography	Pain	
1	Softening, fissures	+	0	0–100	0	0	Good
2	Softening	+	0	0–100	Osteochondritis lat. fem. condyle	0	Good
3	Normal	+	manip. × 2, quadricepsplasty	10–100	Normal	0	Good
4	Softening, fissures	+	0	0–130	Osteochondritis lat. fem. condyle	0	Good
5	Softening	(+)	Quadricepsplasty	30–80	2–3 mm joint space narrowing, osteoporosis	Loading	Failure

The operation was performed in a bloodless field through a conventional medial parapatellar incision with lateral dislocation of the patella. All accessible synovial and granulation tissue was carefully removed and visible pannus excised. A suction drain was inserted and the wound closed. In Case 5 the synovectomy was supplemented with continuous suction irrigation drainage for 2 days. Knee mobilising exercises were started the day after operation, and gradual weightbearing was permitted when the quadriceps muscle was functioning.

At operation only Case 3 had normal cartilage, and all had developed pannus (Table 2). Microscopically the synovial tissue showed non-specific acute and chronic inflammation with granulation tissue. Unfortunately, no cultures were attempted from the removed synovium.

The antibiotic treatment was continued for 6 weeks. Due to limited flexion to less than 90 degrees, manipulation was performed in one case, and quadricepsplasty in two cases about 3 months postoperatively (Table 2).

Figure 1. Case 2. Defect resembling osteochondritis of the lateral femoral condyle measuring about 1 × 2 cm two years after synovectomy for septic arthritis of the knee.

Results

In all cases the wounds healed uneventfully, the fever subsided within 1–2 days, and there were no further signs of infection.

Four of the patients were re-examined 21–30 months postoperatively. The other patient (Case 1) had died of a gastric cancer 2 years after the synovectomy; the last hospital files prior to death described a pain-free knee with motion through 90–100 degrees.

At follow-up, one patient (Case 5) had pain on weight-bearing which necessitated daily antiphlogistic medication. Radiography revealed 2–3 mm narrowing of the joint space, with severe impairment of mobility and 10 degrees increased valgus. Case 3 had an extension lag of 10 degrees, but no osteoarthrosis or pain. Both these patients had secondary operations (Table 2). Cases 2 and 4 had painless knees with normal motion, but radiographic signs of osteochondritis of the lateral femoral condyles measuring about 1 × 2 cm (Figure 1). In conclusion, the results were graded good in four cases and failed in one.

Discussion

Septic arthritis necessitates intensive treatment with appropriate antibiotics and mechanical drainage of the purulent fluid. Experimental and clinical studies clearly demonstrate that therapy must be initiated as early as possible, i.e. within 5–7 days, if permanent joint damage is to be avoided (Goldenberg & Cohen

1976, Ho & Su 1982, Newman 1976, Orchard & Stamp 1962). The accumulation of purulent material inside a joint can damage the articular cartilage, probably due to increased pressure and/or leucocyte enzyme activity (Curtiss & Klein 1963 and 1965, Daniel et al. 1973, Goldenberg & Cohen 1976). Furthermore, retained pus may inhibit the action of many antibiotics (Schmid & Parker 1969).

In acute septic arthritis the inflammatory process starts in the synovium. Even if the aspirate is properly handled microorganisms cannot always be demonstrated (Argen et al. 1966, Nade 1977, Newman 1976), perhaps because the bacteria are exclusively located inside the synovial membrane. Tissue cultures, however, have not been done routinely and, unfortunately, were not done in this series either.

Serial needle aspiration of purulent fluid from the knee joint has proven effective in cases of septic arthritis (Goldenberg & Cohen 1976, Ho & Su 1982, Russell & Ansell 1972, Schmid & Parker 1969), but if effusion persists beyond 3–5 days more vigorous attempts at drainage should be considered.

As the infection is located in the synovial membrane, synovectomy should be undertaken if the mechanical removal of the purulent material does not cure the clinical infection. The operation should probably be per formed at an early stage of the infection when its effect on the cartilage may still be reversible (Gérard et al. 1977). In our series synovectomy was performed within 2 weeks, but even after 4–6 weeks good clinical results have been reported (Cauchoix & Duparc 1962, Törholm et al. 1983).

In a long-term follow-up with radiographic examination of 14 knees, Törholm et al. (1983) reported only two cases with narrowing of the joint space. This is in contrast to our findings of two cases with lesions resembling osteochondritis of the lateral femoral condyle, although without clinical symptoms, and one case with painful osteoarthrosis and severe restriction of joint motion. Two other clinical series, with a follow-up of less than 2 years, reported 16 of 25 knee synovectomies with good functional results and only one patient with pain, but not all were radiographically examined (Cauchoix & Duparc 1962, Gérard et al. 1977).

In conclusion, synovectomy of the knee seems to be a valuable adjunct in the therapy of septic arthritis. The operation is indicated in cases of persistent fever and continuing effusion following adequate antibiotics and serial needle aspirations of the joint. In order to preserve undamaged joint cartilage, the synovectomy should be performed within 1 week.

References

Argen, R. J., Wilson, C. H. & Wood, P. (1966) Suppurative arthritis. *Arch. Intern. Med.* **117**, 661–666.

Cauchoix, J. & Duparc, J. (1962) La synovectomie dans le traitement des arthrites suppurées du genou. *Mém. Acad. Chir.* **88**, 569–573.

Curtiss, P. H. & Klein, L. (1963) Destruction of articular cartilage in septic arthritis. I. *In vitro* studies. *J. Bone Joint Surg.* **45**-A, 797–806.

Curtiss, P. H. & Klein, L. (1965) Destruction of articular cartilage in septic arthritis. II. *In vivo* studies. *J. Bone Joint Surg.* **47**-A, 1595–1604.

Daniel, D., Boyer, J., Green, S., Amiel, D. & Akeson, W. (1973) Cartilage destruction in experimentally produced *Staphylococcus aureus* joint infections: *In vivo* study. *Surg. Forum* **24**, 479–481.

Gérard, Y., Lamarque, B., Segal, P., Bedoucha, J. S. & Schernberg, F. (1977) La place de la synovectomie dans le traitement des arthrites aiguës à pyogènes. *Rev. Rhum.* **44**, 741–747.

Goldenberg, D. L. & Cohen, A. S. (1976) Acute infectious arthritis. A review of patients with nongonococcal joint infections. *Am. J. Med.* **60**, 369–377.

Ho, G. & Su, E. Y. (1982) Therapy of septic arthritis. *J. Am. Med. Assoc.* **247**, 797–800.

Nade, S. (1977) Choice of antibiotics in management of acute osteomyelitis and acute septic arthritis in children. *Arch. Dis. Child.* **52**, 679–682.

Nade, S. (1983) Acute septic arthritis in infancy and childhood. *J. Bone Joint Surg.* **65**-B, 234–241.

Newman, J. H. (1976) Review of septic arthritis throughout the antibiotic era. *Ann. Rheum. Dis.* **35**, 198–205.

Orchard, R. A. & Stamp, W. G. (1968) Early treatment of induced suppurative arthritis in rabbit knee joints. *Clin. Orthop.* **59**, 287–293.

Russell, A. S. & Ansell, B. M. (1972) Septic arthritis. *Ann. Rheum. Dis.* **31**, 40–44.

Schmid, F. R. & Parker, R. H. (1969) Ongoing assessment of therapy in septic arthritis. *Arthritis Rheum.* **12**, 529–534.

Törholm, C., Hedström, S-Å., Sundén, G. & Lidgren, L. (1983) Synovectomy in bacterial arthritis. *Acta Orthop. Scand.* **54**, 748–753.