CASE REPORT

Complicated septic arthritis after knee arthroscopy in a 75-year-old man with osteoarthritis and a popliteal cyst

Antonios Papadopoulos, Theofilos S Karachalios, Constantinos N Malizos, Sokratis Varitimidis

Department of Orthopedic Surgery and Musculoskeletal Trauma, Faculty of Medicine, University of Thessalia, Larissa, Greece

Correspondence to
Sokratis Varitimidis,
svaritimidis@hotmail.com

Accepted 13 March 2015

SUMMARY

A 75-year-old man presented in shock secondary to septic arthritis of the knee. The patient, with a known history of knee osteoarthritis, was treated elsewhere for mechanical locking symptoms and effusion with arthroscopic debridement, and developed septic arthritis, which disseminated to the leg and foot after a tear in the capsule, and a ruptured pyogenic popliteal cyst. Open debridement of the knee joint, and drainage of the abscesses of the leg and foot, were performed. Antibiotic-loaded cement beads were left in the residual space. Debridement was repeated and cement beads removed after 4 days, and finally the infection was eradicated without any serious consequences for the patient. There is debate over arthroscopic intervention for osteoarthritic knees. The presence of a popliteal cyst, which is a rather common finding in the latter, could be related to a significant number of complications, such as septic arthritis.

BACKGROUND

Septic arthritis in adults is a potential life-threatening condition with a major risk to joint function. Mortality is reported to be as high as 8–15%,¹ which rises to 19% in the elderly.² The incidence of septic arthritis in Western Europe is estimated between 4–10/100 000,³ but appears to increase in association with a rise of orthopaedic-related infections and ageing population, more aggressive surgical procedures and the increasing use of immunosuppressants.^{3 4} In the elderly, septic arthritis is most common in the knee in patients with concurrent medical conditions (24% diabetes mellitus) and is associated with a high complication rate (38% developing osteomyelitis, 18% osteoarthritis).²

CASE PRESENTATION

A 75-year-old man presented to the emergency department in shock (heart rate 130, systolic pressure 75 mm Hg) with a swollen, erythematous knee and temperature of 39°C, persistent for the previous 7 days. Haematology revealed a white cell count (WCC) of 22 000/mL, erythrocyte sedimentation rate (ESR) of 92 and C reactive protein levels of 220 mg/L. The patient was non-diabetic, non-rheumatological and had no history of immunosuppression. He had been treated elsewhere for mechanical locking due to osteoarthritis and effusion during the past 30 days. He had

previously been subjected to three joint aspirations for the effusion. Subsequently, he had an arthroscopic debridement planned to treat the locking and effusion attributed to osteoarthritis and degenerative meniscal pathology. After this procedure, the patient became febrile with malaise and was subsequently subjected to another arthroscopic debridement 5 days later. This resulted in a temporary improvement and a short non-feverish 12 h period, but fever rebounded to >38.5°C levels. The patient was then transferred to our department for further treatment.

TREATMENT

On admission to the emergency department, the patient was assessed and fluid resuscitation initiated for shock. The clinical diagnosis of septic shock secondary to major knee sepsis was performed. The decision for open arthrotomy and debridement was taken due to the general status of the patient (septic shock), the failure of previous arthroscopic debridements and the report of Gachter class III lesions.^{5 6} It was considered necessary to resect all necrotic tissue. There was also a suspicion of a calf abscess starting directly below the affected knee joint and a possible foot abscess. An MRI, obtained before the two arthroscopic procedures prior to treatment in our department, was assessed. It was consistent with an effused arthritic knee, but there was a clear picture of a large popliteal cyst, which was also affected (figure 1).

The knee joint was purulent and washed out thoroughly with 12 L of Ringer's lactate serum. Synovectomy was performed due to the clinically apparent synovial infection. Fibrinous deposits and necrotic tissue were excised. A large tear was seen

Figure 1 A large popliteal cyst appeared in the MRI among the other findings.

CrossMark

To cite: Papadopoulos A, Karachalios TS, Malizos CN, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2014-207394

in the medial gutter of the knee (3×3 cm) located posterior-medially. The cartilage was inspected and its condition was classified as class IV according to the Gachter classification (figure 2). A suction drain was used. The calf also seemed to be affected, as it appeared to be tumescent and warm. Incision on the medial side of the calf was performed, which revealed an abscess containing one and a half litres of pus. This extended medially and posteriorly to the gastrocnemius muscle. The abscess extended further distally to the ankle joint and medially to the Achilles tendon. The incision was extended to 25 cm and an additional incision was made on the medial aspect of the foot (figure 3). Muscular fascias and Achilles tendon sheath were clinically unaffected. The abscess in the foot was in continuity with the calf abscess and extended for about 8 cm in the sole. An additional incision on the anterolateral aspect of the calf was performed and unveiled another abscess. The abscesses, which were all in continuity, were drained and washed out. Beads of PMMA (polymethylmethacrylate cement with gentamycin with additional vancomycin and imipenem) were placed in the calf and the foot. The residual wounds were covered with the bead-pouch technique (figure 4).

Postoperatively, the patient's clinical condition improved significantly and temperature remained under 37°C. Four days later, the patient was taken back to the operating room, and underwent further debridement and lavage with 10 L of saline, but not inside the knee. The bead-pouch technique was necessary only for the wound in the medial calf. The wounds in the anterolateral calf and the foot were lavaged and sutured. Gastrocnemius muscle fascias were still unaffected. The patient had a further procedure 10 days after admission, in which the PMMA beads from the calf site were removed and the surgical site was closed. The patient was discharged 3 weeks after

Figure 2 The knee was filled with pus. The cartilage was inspected and classified as type or class IV according to the Gachter classification.

Figure 3 The incision was extended to 25 cm in the tibia and an additional incision at the medial aspect of the foot was also needed.

admission. On discharge, inflammation markers were: WCC 10 400, ESR44 and CRP 11 mg/L.

Between the last two surgical interventions, microbial cultures from the infected tissues grew *Streptococcus viridans* as the only pathogenic microorganism. Intravenous antibiotic administration was not altered by the antibiogram, as *S. viridans* was sensitive to imipenem-amikacin, which had been started empirically before cultures were available.

OUTCOME AND FOLLOW-UP

One month later, the patient was non-feverish, there was no surgical site infection and the knee was functional (with the symptoms and signs of pre-existing osteoarthritis). At final follow-up 16 months after the last surgical procedure, the patient recorded an Oxford Knee functional score of 35, as is usual in mild to moderate osteoarthritis. The patient has returned to daily activities and does not use walking aids.

DISCUSSION

The aforementioned patient was treated with two arthroscopic procedures 5 and 1 day (respectively) before admission to our department. The most likely scenario is the iatrogenic rupture of a popliteal cyst and the medial aspect of the synovium during the arthroscopic procedures performed before transfer. The abscess extended to the calf and foot through the space between superficial and deep posterior tibial compartments. There are

Figure 4 Antibiotic loaded cement beads in the residual calf space.

two distinct leakage pathways from the knee to the calf. One is a posteromedial route by rupture of an infected popliteal cyst. Another is a posterolateral route through the popliteus tendon.⁷

Arthroscopic debridement for knee osteoarthritis is a subject of major debate in orthopaedic surgery.⁸ Complication rates in older patients seem to be low,⁷ but they are sometimes fatal.⁹ Based in a search of the literature, there are only a few similar reports published of such a complicated septic arthritis of the knee.^{9–11} According to Izumi *et al*,¹⁰ two non-rheumatoid patients were reported with knee septic arthritis and a calf abscess, in which a ruptured popliteal cyst and a pathological popliteus hiatus were identified as the cause of the calf abscess. Only one of the cases had an arthroscopic procedure before developing the calf abscess. In the present case, three additional abscesses in the calf, anterolateral to the tibia and foot pad, were recognised and treated. In the three most recent case reports published in the UK on knee septic arthritis, 2/3 patients already had knee arthritis.¹¹

Early surgical management of septic arthritis of the knee is clearly related to a successful outcome.^{5 9 12} In elderly patients, poor outcome correlates with delayed treatment, multiple debridement procedures, more than one pathogen present and advanced macroscopic staging according to Gachter's classification.¹³

Septic arthritis of the knee after arthroscopy is reported to be as rare as 0.4% in older patients (with men more often affected than women).⁷ However, taking into account that this is a very popular procedure worldwide, the total number of patients is certainly of concern (~1100 septic knees in the series of Hame *et al* alone). Iatrogenic septic arthritis after arthroscopy must be considered, especially in patients in shock.^{9 10 14 15} Regarding the successful treatment of a septic knee, the pre-existence of a popliteal cyst, the duration of the operation, the number of procedures undertaken and the number of injections prior to the arthroscopic treatment, are considered factors affecting the outcome.¹² Treatment of septic arthritis of the knee with arthroscopy is associated with better functional results than arthrotomy,⁶ but is advised only in Gachter's I or II grading system.^{3 16} In advanced stages, open debridement is indicated, as in the presented case, with satisfactory outcome. Any dissemination of the infection must be treated aggressively in order to avoid irreversible damage to bony or soft tissues.

The dissemination of septic arthritis to the popliteal cyst during arthroscopy has been described by Corten *et al*,¹⁴ and has been related to the irrigation pump and the valve flow function of the cyst in flexion and extension of the joint. The same authors have proposed that immobilising the knee in extension may have contributed to the infected popliteal cyst as well. In our patient, this could be the opposite, with the popliteal cyst acting as an infection reservoir that apparently iatrogenically ruptured at some point, causing this nearly fatal complication. After the first arthroscopic procedure, septic arthritis developed, which could not be controlled arthroscopically. The second procedure following the iatrogenic rupture of the capsule and the presence of a ruptured popliteal cyst led to abscess formation and septic shock. The delay in transfer will have contributed to the patient's poor clinical condition. The only fortunate factor being presence of a microorganism of low pathogenicity.

There have been 21 case reports of septic popliteal cysts, to our knowledge, with most of them being related to immunosuppressed patients. There are several other cases of ruptured cysts mimicking thrombophlebitis and fading away slowly after several weeks.¹⁷

Septic arthritis of the knee is difficult to treat in the presence of a popliteal cyst.¹² Popliteal cysts are common in arthritic knees. Subsequently, a correlation between negative outcomes after arthroscopic treatment in arthritic knees in the presence of a popliteal cyst could be investigated.

Learning points

- ▶ The iatrogenic rupture of the posterior capsule in our reported patient was the main reason for the disseminated infection in the entire calf and foot, and caused the patient to be in shock from simple knee arthroscopy.
- ▶ Additionally, the presence of the popliteal cyst contributed to the severity of this complication, acting as a microorganism reservoir before disseminating the infection to the calf and leg.
- ▶ Arthroscopic procedures in arthritic knees (more on elderly patients) in the presence of a popliteal cyst could be related to a significant number of complications, such as septic arthritis. In the presence of a popliteal cyst, the use of an irrigation pump should be avoided. Since cases similar to ours are scarcely reported, further studies or a systematic review are necessary to determine the exact link of popliteal cysts to postoperative infections in knee surgery and the identification of comorbidities or risk factors in the elderly undergoing arthroscopic procedures. The association could be bimodal, with the cyst being contaminated from the joint through a valve flow and also acting as a microorganism reservoir. The dissemination of knee septic arthritis to the calf puts a toll on the severity of the infection requiring additional pre-operative planning while treating a septic knee.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Margaretten ME, Kohlwees J, Moore D, *et al*. Does this adult patient have septic arthritis? *JAMA* 2007;297:1478–88.
- 2 Vincent GM, Amiraault JD. Septic arthritis in the elderly. *Clin Orthop Relat Res* 1990; (251):241–5.
- 3 Mathews CJ, Weston VC, Jones A, *et al*. Bacterial septic arthritis in adults. *Lancet* 2010;375:846–55.
- 4 Geirsson AJ, Statkevicius S, Vikingsson A. Septic arthritis in Iceland 1990–2002: increasing incidence due to iatrogenic infections. *Ann Rheum Dis* 2008;67:638–43.
- 5 Ateschrang A, Albrecht D, Schroeter S, *et al*. Current concepts review: septic arthritis of the knee pathophysiology, diagnostics, and therapy. *Wien Klin Wochenschr* 2011;123:191–7.
- 6 Wirtz DC, Marth M, Miltner O, *et al*. Septic arthritis of the knee in adults: treatment by arthroscopy or arthrotomy. *Int Orthop* 2001;25:239–41.
- 7 Hame SL, Nguyen V, Ellerman J, *et al*. Complications of arthroscopic meniscectomy in the older population. *Am J Sports Med* 2012;40:1402–5.
- 8 Moseley JB, O'Malley K, Petersen NJ, *et al*. A controlled trial of arthroscopic surgery for osteoarthritis of the knee. *N Engl J Med* 2002;347:81–8.
- 9 Esenwein SA, Kollig E, Kutscha-Lissberg F, *et al*. [Fatal soft tissue infections after arthroscopy of the knee joint. A diagnostic or therapeutic problem?]. *Unfallchirurg* 2000;103:795–801.
- 10 Izumi M, Ikeuchi M, Tani T. Septic arthritis of the knee associated with calf abscess. *J Orthop Surg (Hong Kong)* 2012;20:272–5.
- 11 Rowton J. Three cases of septic arthritis following a recent arthroscopic procedure. *BMJ Case Rep* 2013;2013:pii: bcr2012007507.
- 12 Balabaud L, Gaudias J, Boeri C, *et al*. Results of treatment of septic knee arthritis: a retrospective series of 40 cases. *Knee Surg Sports Traumatol Arthrosc* 2007;15:387–92.

Reminder of important clinical lesson

- 13 Chen CM, Lin HH, Hung SC, *et al.* Surgical treatment for septic arthritis of the knee joint in elderly patients: a 10-year retrospective clinical study. *Orthopedics* 2013;36: e434–43.
- 14 Corten K, Vandenuecker H, Reynders P, *et al.* A pyogenic, ruptured Baker's cyst induced by arthroscopic pressure pump irrigation. *Knee Surg Sports Traumatol Arthrosc* 2009;17:266–9.
- 15 Weston V, Coakley G. Guideline for the management of the hot swollen joint in adults with a particular focus on septic arthritis. *J Antimicrob Chemother* 2006;58:492–3.
- 16 Mathews CJ, Kingsley G, Field M, *et al.* Management of septic arthritis: a systematic review. *Ann Rheum Dis* 2007;66:440–5.
- 17 Eichinger JK, Bluman EM, Sides SD, *et al.* Surgical management of septic arthritis of the knee with a coexistent popliteal cyst. *Arthroscopy* 2009;25:696–700.

Copyright 2015 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.

BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow