

ORIGINAL ARTICLE

Septic arthritis caused by *Granulicatella adiacens* after anterior cruciate ligament reconstruction[☆]



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Abstract Septic arthritis after knee arthroscopy is an extremely rare condition. A rate of 0.15–0.84% cases of postoperative infection is estimated in several series. The arthroscopy procedure most frequently related with an infectious complication is anterior cruciate ligament (ACL) reconstruction, with a prevalence of 0.3–1.7% cases. *Staphylococcus sp.* is the pathogen most commonly cultured. We describe a case of septic arthritis after ACL reconstruction. We found no published case of septic arthritis caused by this microorganism after knee arthroscopy. It is probably the first case published in the literature.

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Artritis séptica de rodilla por *Granulicatella adiacens* tras reconstrucción de ligamento cruzado anterior

Resumen La artritis séptica tras una artroscopia de rodilla es muy poco frecuente. Se estima una tasa de infección postoperatoria en torno al 0,15-0,84%, según las series. El procedimiento artroscópico más frecuentemente asociado a infección es la reconstrucción del ligamento cruzado anterior (LCA), cuya frecuencia está en torno al 0,3-1,7%. El microorganismo más frecuentemente aislado es el estafilococo coagulasa negativo. Describimos un caso de artritis séptica de rodilla tras reconstrucción de ligamento cruzado anterior en la que se aisló el microorganismo *Granulicatella adiacens* en el cultivo del líquido sinovial. No encontramos ningún caso descrito en la literatura de infección tras artroscopia de rodilla, por dicho microorganismo; tratándose probablemente del primer caso publicado.

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Clinical case

We present the case of a 40 year-old male without any known relevant record. He was operated in the Hospital Universitario Fundación Alcorcón for reconstruction of the anterior cruciate ligament by autologous internal rectus-semitendinosus ligamentoplasty. There were no incidents in the immediate postoperative period.

After 10 days symptoms of acute pain and swelling of the knee commenced that prevented the patient from sleeping, so he visited the emergency department. When examined the patient had no fever and there was major oedema of the knee with a range of joint movement from -30° extension to 60° maximum flexion. The knee was cold and the surgical wounds had a good appearance.

Blood analysis showed slight leukocytosis (12,000 leukocytes), reactive protein c at 267 mg/l (normal values: <5 mg/l) and a blood glucose level of 412 mg/dl (normal values: 70–110 mg/dl), without other metabolic alterations.

In arthrocentesis 60 cc of intra-articular fluid with an inflammatory appearance was extracted. Biochemical analysis of the joint fluid was glucose 174 mg/dl, proteins 5.9 g/dl, lactate 11.5 mmol/l (normal value: <10). No crystals were observed and leukocytes could not be counted due to coagulation of the sample.

The fluid from the joint was inoculated in aerobic and anaerobic blood culture flasks (BacT/Alert[®], bioMérieux) which were positive after 11 h and 17 h, respectively. In gram staining, gram positive cocci in chains were observed. These were sub-cultured in blood agar and chocolate agar at 37°C in a 5% carbon dioxide atmosphere and Schaedler agar (bioMérieux) in anaerobiosis. After 48 h very weak growth of a microorganism was detected. This was identified by mass spectrometry (MALDI-TOF, Brucker[®]) as *Granulicatella adiacens* with a score of 2.03 (good identification at species level).

Meanwhile arthroscopic washing and debridement was carried out. During the arthroscopic examination the ACL graft was found to be intact so that it could be conserved, while the cartilage and surrounding tissue had a good appearance. A serum washing system was left in place for 72 h.

In the analysis performed during admission a glycated haemoglobin level of 8.5% was detected (normal value: $<7\%$), indicating the onset of diabetes in the patient.

Treatment with intravenous amoxicillin/clavulanic acid was started at 2 g/8 h, with insulin to control glycaemia. This intravenous antibiotic treatment was maintained for 10 days after which the antibiotic was taken orally until a course of 6 weeks was completed.

The result was an improvement in the symptoms of pain and swelling of the patient's knee, so that after 4 days he was able to start rehabilitation of the crossed ligament, with good tolerance of the same.

The patient continued with his rehabilitation treatment until it finalised and remained in follow-up for 24 months. His knee was stable and achieved 0° extension, although with a deficit of 5° in flexion in comparison with his other knee (reaching 130°). He has resumed practicing his usual sport (running) without further episodes of instability or pain. He has not had any further episodes of knee pain or inflammation and the infection markers normalised in analysis.

Discussion

Infection is the main complication after a knee arthroscopy. The arthroscopic procedure associated the most often with infection is reconstruction of the crossed ligaments, and the frequency at which this occurs stands at around 0.3–1.7%.¹ Tobacco use,² diabetes mellitus,³ patients with a history of surgery in the same knee⁴ or those patients with additional surgery in the same procedure⁴ which increase the duration of surgery, are all risk factors described for infections of this type. The most common microorganisms are staphylococcus in 70–80% of cases, the majority of which (60–65%, depending on the series) correspond to coagulase negative staphylococcus. Although *Staphylococcus aureus* is less common (20–30%, depending on the series) than coagulase negative staphylococci, it seems to have a worse prognosis.⁵

G. adiacens was described for the first time in 1961 by Frenkel and Hirsch as a gram positive bacteria with special requirements for culture that grows as a satellite colony around other bacteria. Due to its similarity it was grouped together with *Streptococcus viridans*. Subsequently, in 1995, 3 of these Streptococci (*S. adiacens*, *S. defectivus* and *S. elegans*) were assigned to the new genus *Abiotrophia*, and *S. adiacens* then came to be known as *Abiotrophia adiacens*. Phylogenetically, the genus *Abiotrophia* has 2 different lines and, from the year 2000, *A. adiacens* and *Abiotrophia elegans* have been included in the new genus *Granulicatella*. They are found as saprophytic flora in the respiratory and urogenital tract, as well as the human gastrointestinal tract.⁶

Granulicatella is a microorganism that is rarely isolated in clinical practice. In the longest series described⁷ the majority of cases were isolated in blood cultures in patients with endocarditis, while other less common locations were the bone marrow, brain abscesses, endophthalmitis, vertebral osteomyelitis and discitis. One case of septic arthritis has been described,^{8–10} as has a case of knee arthroplasty infection.^{11,12}

The bibliography was reviewed and no case associated with an arthroscopic procedure was found, so that our case would be the first to be described in the literature of septic arthritis caused by *G. adiacens* following knee arthroscopy, and probably associated with the onset of diabetes in our patient.^{8–10,12,13}

The symptoms of infection following reconstruction of the anterior crossed ligament are not very specific. The most common symptoms are pain, haemorrhage and sometimes mild fever. This is why diagnosis is usually late, at 3 weeks and even 2 months after the operation. Medical as well as surgical treatment must be urgent. The gold standard is abundant washing during arthroscopy and debridement of the damaged tissue while trying to preserve the graft. Antibiotic treatment should also be prescribed. Controversy currently exists regarding the duration of antibiotic treatment, as depending on the author it may vary from 4 to 14 weeks; however, the majority agree that it should last at least 6 weeks. On the other hand, the most decisive factor is the duration of the intravenous antibiotic treatment, which according to the different reviews should last for approximately 2 weeks. The antibiotic treatment applied will depend on the microorganism that is isolated in the cultures, and its sensitivity to the antibiogram of the same.

The patient should be evaluated again after 72 h, and if the course is unfavourable and clinical as well as analytical signs of infection persist, arthroscopic washing should be repeated as often as is necessary, and we may sometimes be obliged to remove the graft.

By using this protocol an infection eradication rate after ACL reconstruction of from 85% to 100% has been described, with functional results in these patients that are the same as those in patients who have not suffered an infection, in spite of their slower recovery.^{14,15}

Conclusion

To conclude, we present a patient operated for reconstruction of the anterior crossed ligament due to partial breakage of the same, with the onset of diabetes and acute postoperative infection by *G. adiacens*. He was treated by correction of his metabolic alterations and arthroscopic washing and early debridement, together with commencement of the correct antibiotic treatment. We were able to conserve the graft, eradicate the infection and start an early rehabilitation programme, obtaining a good result with this.

Ethical responsibilities

Protection of human and animal subjects. The authors declare that no experiments were undertaken on human beings or animals for this research.

Confidentiality of data. The authors declare that they followed the protocols of their centre of work regarding the publication of patient data.

Right to privacy and informed consent. The authors obtained the informed consent of the patients and/or subjects referred to in this paper. This document is held by the corresponding author.

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