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***Streptococcus gallolyticus* subsp. *gallolyticus* knee periprosthetic joint infection[☆]**



Infección de prótesis de rodilla por Streptococcus gallolyticus subsp. gallolyticus

The *Streptococcus bovis*/*Streptococcus equinus* complex (SBSEC), in particular *Streptococcus gallolyticus* subsp. *gallolyticus*, has generated interest in recent years in light of the link detected between infections with this micro-organism and colorectal cancer.¹ Below we report an uncommon case: a periprosthetic knee infection with *S. gallolyticus* subsp. *gallolyticus*.

A 67-year-old patient underwent a total left knee replacement in 2016 due to knee osteoarthritis. In 2019, she sought care for gradually worsening knee pain over the past 12 months with no history of trauma, after having been pain-free for two years following her operation. Initial examination revealed signs of inflammation, with a C-reactive protein (CRP) level of 6.4 mg/dl. Periprosthetic infection was suspected, and therefore diagnostic arthrocentesis was performed. This procedure yielded a cloudy fluid with glucose 142 mg/dl and protein 4.6 g/dl (the bloody and viscous nature of the fluid precluded a cell count). After 48 h, growth of *S. gallolyticus* subsp. *gallolyticus* (sensitive to penicillin, cefotaxime and vancomycin and resistant to clindamycin and levofloxacin) was reported. Six months earlier, the patient had undergone a colonoscopy involving polypectomy of a tubulovillous adenoma with low-grade dysplasia.

Surgery was performed in two stages. The first stage included prosthesis removal with debridement, lavage and placement of a BioFix spacer with antibiotics (vancomycin plus gentamicin). After intraoperative samples had been collected, ceftriaxone 2 g/12 h was

started. *S. gallolyticus* subsp. *gallolyticus* was isolated in these samples and found to have the same antibiogram as in the synovial fluid. The patient followed a favourable course after the operation, completing 14 days of parenteral treatment, followed by oral amoxicillin 1 g/8 h for eight weeks. During admission, she underwent a transthoracic echocardiogram, which yielded no imaging indicative of endocarditis, as well as blood cultures before starting antibiotic therapy, which came back negative, and an abdominal ultrasound, which was normal.

The second stage of the surgery was performed six months later. The patient was given preoperative prophylaxis with ceftriaxone plus teicoplanin, and a total knee replacement was performed. Antibiotic therapy with ceftriaxone was maintained, then discontinued after one week in light of negative results for cultures of intraoperative samples. The patient was followed up on an outpatient basis without incident.

The SBSEC comprises seven species distinguished using molecular biology techniques, with a recent change in taxonomy: *S. equinus*, *S. alactolyticus*, *S. gallolyticus* subsp. *gallolyticus* (biotype 1), *S. gallolyticus* subsp. *macedonicus*, *S. gallolyticus* subsp. *pasteurianus* (biotype 1/2), *S. infantarius* subsp. *infantarius* (biotype 1/1) and *S. infantarius* subsp. *coli* (biotype 1/1).² The usefulness of this distinction lies in the fact that the biotype apparently associated with colon cancer at a higher rate is biotype 1 (*S. gallolyticus* subsp. *gallolyticus*).¹

These catalase- and oxidase-negative micro-organisms are Gram-positive cocci and facultative anaerobes that express Lancefield antigen group D in their cell wall. They form part of the intestinal microbiota in 5%–16% of healthy adults. These micro-organisms have been linked to infections in animals and humans. They are causal agents of bacteraemia and endocarditis, as well as meningitis and urinary tract infections, biliary tract infections and osteoarticular infections. Arthritis is less common than spondylodiscitis.³

Periprosthetic knee infection is a serious complication with an incidence of 0.4%–3.9%.⁴ Risk factors include immunosuppression, diabetes mellitus and malnutrition. The most commonly isolated

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pathogens are *Staphylococcus* spp. (both *Staphylococcus aureus* and coagulase-negative staphylococci);⁵ cases caused by *Streptococcus bovis* are rare.

In 2016, García-País et al. published a review of cases of osteoarthritic infection due to group B streptococci (GBS) reported to date in which they found 11 cases of periprosthetic joint infection due to GBS.³ In 2020, Mayo Clinic published a review of 2459 cases of periprosthetic joint infection and identified GBS as causal in just nine cases, amounting to 0.4% of the total.⁶ In most cases, the species could not be identified; *S. gallolyticus* subsp. *gallolyticus* was identified in four cases. In the majority of the patients, the antibiotic therapy administered consisted of ceftriaxone 2 g/24 h for four to eight weeks. Among those for whom surgery-related data were available, the average time elapsed between the first and the second stage of surgery was 48 weeks.⁶

Our case report corresponds to a late periprosthetic knee infection by *S. gallolyticus* subsp. *gallolyticus*, a very uncommon pathogen in infections of this nature. It was likely of haematogenous origin, given the patient's history of colonic disease with manipulation prior to the onset of her signs and symptoms, since there appears to be a relationship between abnormalities in the intestinal mucosa and periprosthetic joint infection with *S. gallolyticus* subsp. *gallolyticus*. Our patient had a colon tumour as a risk factor when her joint signs and symptoms developed.

Authors

All authors made intellectual contributions to the article and approved the final version thereof.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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Clostridium difficile associated reactive arthritis: An unusual clinical case and review of the literature[☆]



Artritis reactiva asociada a *Clostridioides difficile*: un caso clínico inusual y revisión de la literatura

We report the case of a 65-year-old man with a history of hypertension, dyslipidaemia and ischaemic cardiomyopathy who visited the accident and emergency department due to diarrhoea for the past three weeks, with 10–12 liquid bowel movements per day with no pathological products or abdominal pain. This was associated with peripheral polyarthritis in the past two weeks, initially in the left knee and ankle and subsequently in the right carpus and first metacarpal bone; fever spikes at 38 °C; and 6 kg of weight loss. Prior to the onset of his signs and symptoms, he had suffered from two urinary tract infections secondary to *Escherichia coli*. These infections had been treated with trimethoprim/sulfamethoxazole for five days. The latter infection had occurred approximately a month earlier. Initial laboratory testing revealed elevated acute-phase reactants with a C-reactive protein level of 19 mg/dl. As inflammatory bowel disease was clinically suspected, the patient was given

corticosteroid therapy (inappropriately, in the absence of an aetiological diagnosis), with initial but only temporary improvement. An outpatient colonoscopy showed areas of erythematous mucosa covered in whitish formations throughout the colon, indicative of infectious disease rather than inflammatory bowel disease (Fig. 1A). Colon biopsy was inconclusive, although it did point to an infectious origin. Given the patient's poor clinical course, with increased numbers of bowel movements and affected joints, and in the absence of an aetiological diagnosis, a decision was made to admit him to hospital.

At the beginning of his hospital stay, laboratory testing showed elevated C-reactive protein (31 mg/dl), an erythrocyte sedimentation rate of 120 mm/h, 17,700 leukocytes/mm³ (75% neutrophils) and normocytic normochromic anaemia of 9.8 g/dl. Abdominal computed tomography was ordered and revealed concentric wall thickening 5 cm long in the sigmoid colon (Fig. 1B). A stool analysis testing for *Clostridioides difficile* found antigen and toxin positivity by means of enzyme immunoassay (glutamate dehydrogenase [GDH], C. Diff Quik Chek Complete®, Alere). Thus a diagnosis of colitis due to *C. difficile* was confirmed. The rheumatology department was consulted for joint assessment of articular disease. Rheumatology reported symmetric polyarthritis in both elbow, carpal, metacarpophalangeal, proximal interphalangeal, knee, ankle, tarsal and metatarsophalangeal joints. Arthrocentesis of the patient's left knee, in which clear synovial fluid was extracted, with laboratory testing revealing 12,112 leukocytes/mm³ and negative cultures, was consistent with arthritis with inflammatory characteristics. A rheumatoid factor test and serologies for human

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