



Case Report

Osteomyelitis Due to an Unusual Bacterium: *Morganella Morganii*

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Abstract

The emergency service received the case of a new-born girl, 19 days old at the time, to be assessed due to swelling and pain in the right knee joint. The analytical studies suggested a joint infection. The ultrasound of the right knee showed joint effusion in accord with the clinical suspicion of infection. The surgical drainage of the joint fluid appeared purulent, confirming the diagnosis of septic arthritis. The culture tested positive for *Morganella morganii*. Due to the null response to antibiotic treatment, an MRI was conducted to assess possible bone involvement. Two small abscesses were found, compatible with osteomyelitis of the right distal femur.

Keywords: *Morganella morganii*, Osteomyelitis, Pediatric infection

Introduction

Septic arthritis is a serious infection of a joint caused by microorganisms that can trigger permanent lesions due to the loss of joint function. In general, the pathogen, which is most often found in children and adults, is *Staphylococcus aureus*. Although currently, *Kingella kingae* is considered the main bacterial cause of osteoarticular infections in children under 48 months [1, 2].

On rare occasions, septic arthritis can be a precursor of osteomyelitis owing to the dissemination of adjacent bone tissue.

Osteomyelitis is an infectious disease affecting the bone, caused by microorganisms that generally disseminate through proximity or hematogenous spread. Hematogenous osteomyelitis in children affects mainly the metaphysis of long bones, as it is highly vascularised [3]. *Morganella morganii* is a gram-negative

bacillus located in the normal flora of the colon, which was first isolated in 1906 by Morgan in children's faecal culture⁴. It is not a common pathogen to be found in either septic arthritis or acute osteomyelitis, which is why this case is presented.

Clinical Study

A nineteen-day-old female is admitted into the neonatal unit for suspected septic arthritis of the right knee.

The personal background includes premature birth at 35 weeks with no need for resuscitation. Controlled pregnancy with negative serology. It is worthy of mention that from week 26 an image in the left axillary region is observed through ultrasonographic control. This image is compatible with macrocystic lymphatic malformations with brachial and thoracic extension, seemingly unrelated to our case.

The patient carried out follow-ups in neonatal outpatient care for hypocalcaemia secondary to prematurity. The physical

exploration showed swelling, pain and inflammation of the right knee. An analytical and haemoculture control was conducted, providing evidence of elevation of acute phase reactants (CRP 64mg/dl. PCT 1,19ng/ml).

At this time, our service was consulted with this case under the suspicion of being septic arthritis. With this suspicion, an ultrasound was requested of the right knee. It showed a joint effusion with echogenic tissue inside, in the femorotibial and patellofemoral compartment (7mm thick), which extended towards the suprapatellar recess (14mm thick) and toward the ipsilateral distal femoral physis, related to the suspicion of septic arthritis of the knee.

After the physical examination of pain, swelling and functional limitation, compatible with articular infection, and after reviewing the laboratory tests (leukocytes 28.4×10^9 with 6% band cells, 49% neutrophils, 37% lymphocytes and 5% monocytes) and radiological tests (Figure 1& 2), it was decided, under general anaesthetic, to conduct an arthrotomy, joint lavage and collect culture samples.

An intravenous antibiotic treatment was introduced under neonatal control with no clinical nor analytical improvement, requiring on up to two more occasions another arthrotomy, joint

lavage and the collection of further culture.

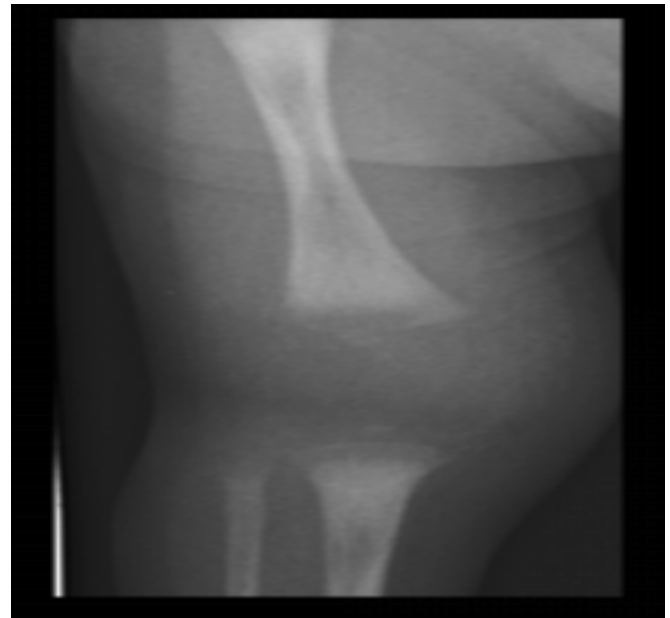


Figure 1: Initial XR: Metaphysis irregularity of right femur. Important augmentation of periarticular soft tissues.

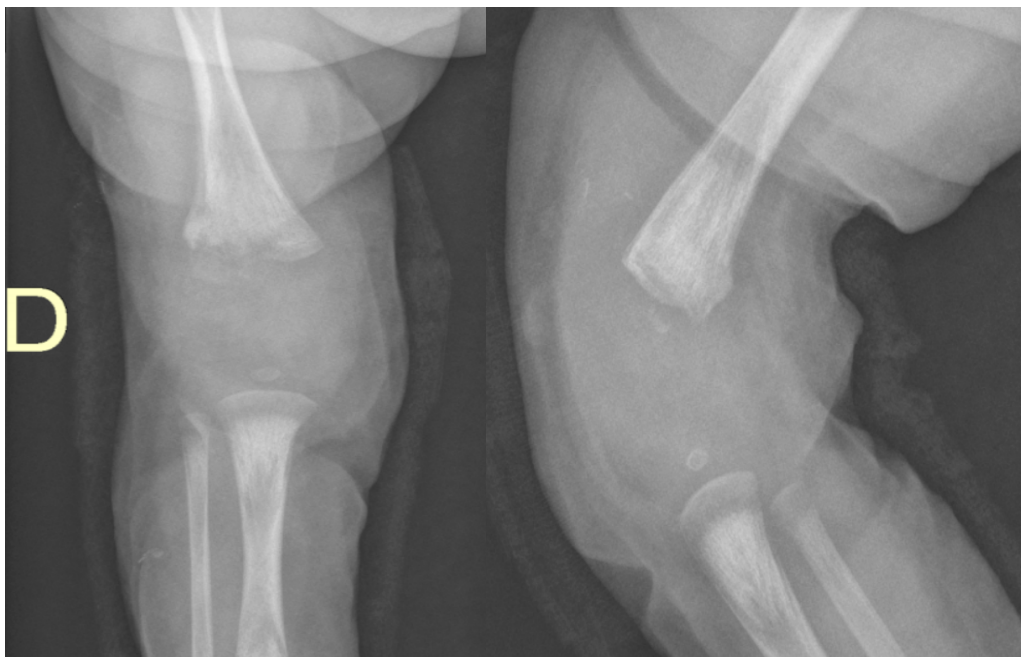


Figure 2: Simple radiology after first surgery: Destruction with irregular margins of lateral and central juxtaaphyseal of the distal metaphysis of the right femur, with continuous periosteal reaction, compatible with osteomyelitis.

At this point, given that the clinical and analytical improvement was scarce, an MRI of the right knee was conducted (Figure 3), showing an alteration of the bone marrow, poorly defined, hypointense in T1 and hyperintense in T2, suggestive of bone edema secondary to the osteomyelitis diagnosis. Similarly, a focal alteration is found on the anterior surface of the epiphysis and on the anterolateral surface of the distal femoral metaphysis, well defined, hypointense in T1 and hyperintense in T2, of approximately 3x10x5mm and 5x5x6mm respectively, which could be related to two small intraosseous abscesses. The femoral physis is found blurred, especially its central portion, which suggests its affectation. Additionally, a lateral periosteal reaction is observed, already present in the simple radiology study.

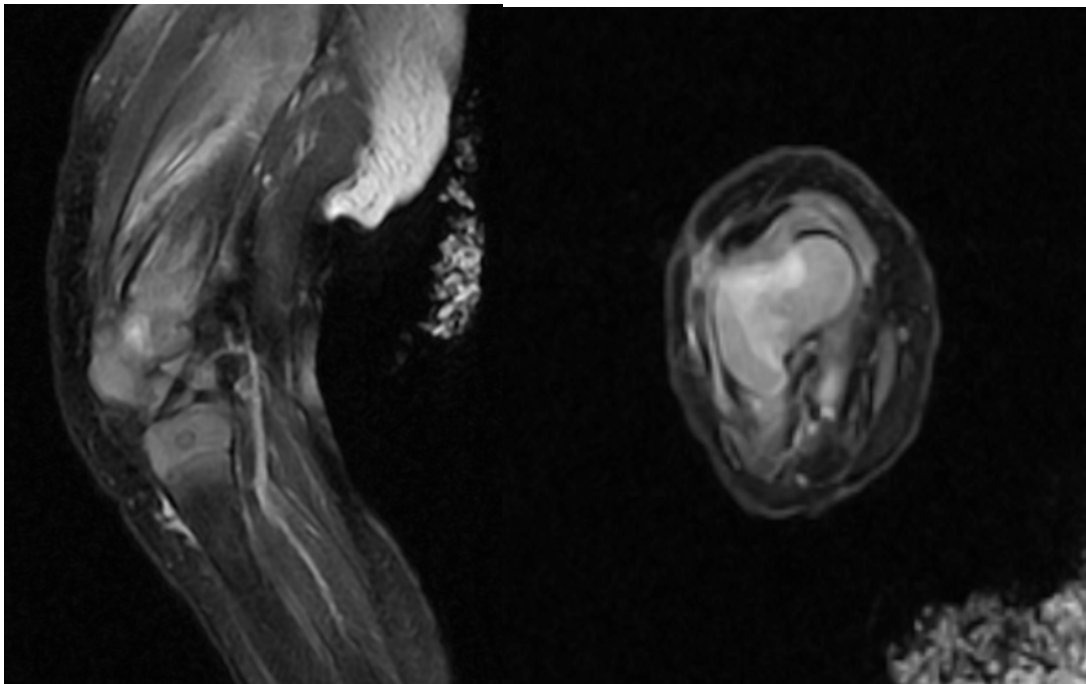


Figure 3: MRI: Findings in relation to the diagnosis of metaphyseal-epiphyseal osteomyelitis in the right distal femur, with two small intraosseous abscesses with affectation of the distal femoral physis and inflammatory changes in the anterior muscular compartment.

Due to these findings, a new surgical procedure was programmed, conducting a new joint lavage and curettage of the small abscesses found in the MRI. Samples were taken and sent to microbiology, where the bacteriological study found a growth of *Morganella Morganii*.

After this additional, more aggressive surgery, together with the anti-biotherapy change conducted by the neonatology service, an important clinical and analytical improvement was noted (leukocytes 17.9×10^9 with 37.3% neutrophils, 45.7% lymphocytes, 9.2% monocytes).

The patient required intravenous antibiotic treatment for a total of four weeks. Initially with ceftazidime, amikacin and vancomycin, and subsequently with cefepime and vancomycin.

After two weeks of intravenous treatment, and without requiring further surgical reintervention, and once the blood tested

negative for cultures, the anti-biotherapy was changed to an oral intake of cefixime, enabling the patient to leave the hospital and have outpatient consultation follow-ups.

With the acute osteomyelitis diagnosis of the distal femur due to *Morganella morganii* secondary to septic arthritis of the right knee, and after five years of follow-ups (Figure 4), the patient is clinically and analytically stable. She does not present pain, limping nor functional limitation of the right knee.

However, the patient follows clinical monitoring every six months as well as yearly radiological control, as there is a discrepancy in the inferior members and a radiological bone deformity. Which currently does not appear to be a clinical alteration which limits her daily life, but which will likely require the aid of a correcting surgical procedure in future.



Figure 4: XR: Rarefaction of the articular surface of the external femoral condyle with altered density and morphology. Deformity in genu valgum secondary to residual changes.

Discussion

Osteoarticular infections in new-borns are rare. As they affect a developing musculoskeletal system, a delay in diagnosis or treatment can incur in serious ramifications [5]. This is due to their immature immune system and the possible association with osteomyelitis.

The prevalence in developed countries is of 22 cases for every 100.000 children, with 25% of them emerging before the age of two. The most common germ in every age group is *Staphylococcus aureus*, being accountable for 70 to 90% of osteomyelitis cases. In the new-borns age group, this germ is often followed by pathogens like *K. Kingae*, *Escherichia coli*, *Streptococcus agalactiae*, other gram-negative bacilli and *Candida albicans* [6].

Morganella morganii is a gram-negative bacillus, a facultative anaerobe part of Enterobacteriaceae family. It is part of the common intestinal microbiota, considered an opportunistic pathogen, which causes mainly nosocomial infections, especially throughout the urinary tract [4, 7, 8].

Arthritis secondary to this bacterium is a rare entity in the general population, as we have only found seven cases in the literature [9-15]. Similarly, only five cases have been published on osteomyelitis due to this germ [16-20] one of which subsequently presented articular affection. Regarding its incidence in the paediatric age group, only one of these studies [19] refers to a

sixteen-month-old patient with osteomyelitis in the talus bone region, which is why we considered we should present our case.

Most patients present as personal background history: immune-depression, prolonged corticotherapy, alcoholism, previous surgeries or permanent urinary catheters. These have been identified as risk factors for infection from *Morganella morganii* [21, 22]. The only risk factor our patient presented was immaturity, despite which neither corticoids nor antibiotics were necessary after birth.

The diagnosis of this pathology in the early stages of the disease can be difficult, and even more so in new-borns as it may not be suspected, delaying treatment.

For this reason, a correct physical exploration is essential. The most frequent signs and symptoms include irritability, pseudo paralysis of the member, fever (which may not arise) and local erythema.

The diagnostic confirmation is normally completed through laboratory tests and imaging techniques. Very often, the analysis is non-specific, showing elevated CRP values in 98% of cases. As for the imaging tests, the simple radiography is usually normal during the first days, with the first alterations showing after 7-10 days of evolution, revealing the lysis after two weeks [23]. The ultra-sonographic image is the technique chosen in the diagnosis of arthritis, as it can detect effusion during very early stages, in

addition to assisting in conducting guided puncture procedures.

As for the magnetic resonance, this plays a key role in the diagnosis and follow-up of osteomyelitis in patients of the paediatric age group [24].

It can detect early changes at osseous level, assess the real extension of the area affected, help in surgical planning, and assess the evolution [25].

In terms of the general treatment of septic arthritis, the main accepted approach is drawing fluid from the joint as soon as possible and prior to initiating antibiotic treatment is. However, there is ongoing debate as to the best method to conduct this procedure (arthroscopy, arthrotomy or joint aspiration). Children with recent clinical diagnosis could benefit from joint aspiration and targeted antibiotic treatment, except with new-borns, where there is no clear evidence of improvement without arthrotomy [26], as was our case.

The length of the antibiotic treatment, both intravenous and oral, remains an ongoing debate. Traditionally the endovenous treatment is continued for 4 to 6 weeks; however, currently, many clinical guides shorten these timeframes according to the patient's medical evolution. The symptom remission is assessed, the analytical improvement and the absence of fever among other factors [27].

Even so, concerning the neonatal affectation the debate is greater and further customising of the treatment to the individual is proposed, depending on the pathogen and the patient's clinical situation [23]. It is generally recommended that the total treatment length in non-complicated cases be no less than 3 or 4 weeks, and that most of this treatment be administered intravenously in this group [28].

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