



Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

A rare pathogen for subacute osteomyelitis in adolescent: *Serratia marcescens*



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ARTICLE INFO

Article history:

Received 4 August 2014

Received in revised form 9 November 2014

Accepted 12 November 2014

Available online 18 November 2014

Keywords:

Serratia marcescens
Osteomyelitis
Infection
Debridement
Orthopedics
Meningomyelocele

ABSTRACT

INTRODUCTION: There are various pathogens reported for osteomyelitis. Osteomyelitis is bone infection which produces pain and fever, also threatens bone instability. It can lead to nonunion. The purpose of this report was to describe a case with union delay of the tibia due to *serratia marcescens* osteomyelitis. *Serratia marcescens* is an unexpected pathogen for subacute osteomyelitis in adolescence. Because of difficulty of diagnosis, treatment can be delayed or the situation can cause complications like nonunion or loss of function.

PRESENTATION OF CASE: *Serratia marcescens* is an unexpected pathogen for subacute osteomyelitis in adolescence. Because of difficulty of diagnosis, treatment can be delayed or cause complications like nonunion or loss of function. We present a meningomyelocele female adolescent operated with distal tibia varus osteotomy for correcting ankle valgus deformity. Insufficient healing was determined at osteotomy side on radiographs. The patient's erythrocyte sedimentation rate and CRP level was slightly higher with minimal clinical inflammation. MRI examination showed abscess formation at T2 imaging. Debridement, grafting and circular external fixation was performed. Sulperazon was started for drug therapy. Union was achieved after compression and distraction osteogenesis by circular external fixator.

Orthopedic surgeons should be aware of opportunistic infections like *serratia* and keep in mind as a probable cause of disease.

DISCUSSION: Osteomyelitis is one of our main problems in orthopedics. *Serratia* does not come to mind as a causative factor when we learn the patient has osteomyelitis. We give treatment for the most expected pathogens like staphylococcus species firstly. This shows us the importance of bone biopsies and wound culture tests. Presented case is diagnosed as *serratia* osteomyelitis after culture results and given treatment with antibiotics and debridement.

CONCLUSION: Orthopedic surgeons should be aware of opportunistic infections like *serratia* and keep in mind when diagnosing the unexpected problem.

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1. Introduction

Osteomyelitis is one of the major problems in orthopedics to deal and treat with success. The most common causes in osteomyelitis depend on the patient's age. *Staphylococcus aureus* is the most responsible cause of acute, subacute and chronic hematogenous osteomyelitis in adults and children. Group A streptococcus, *Streptococcus pneumoniae*, and *Kingella kingae* are the next most common pathogens in children.¹ Group B

streptococcal infection occurs primarily in newborns. Increasingly, methicillin-resistant *S. aureus* (MRSA) is isolated from patients with osteomyelitis. In some studies, MRSA accounted for more than one-third of staphylococcal isolates. *Serratia* species are a rare etiologic cause of osteomyelitis.² *Serratia* is classified as a member of Enterobacteriaceae family, gram-negative bacillus. It is widely known that they can cause nosocomial infections. In past they were admitted as non pathogens but nowadays we are sure about their impact and especially *serratia marcescens* genus is the most responsible one.³ We present a 14 year old female patient suffered subacute osteomyelitis who is infected by *Serratia marcescens* bacteria in tibia distal diaphysis.

2. Case report

A fourteen year old female patient with pain in the right cruris. She had inability to walk and stand because of her neurologic

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Fig. 1. Preoperative ankle valgus deformity X-rays.



Fig. 3. Added fibula osteotomy and tibial wires.



Fig. 2. Postop tibial osteotomy X-ray.

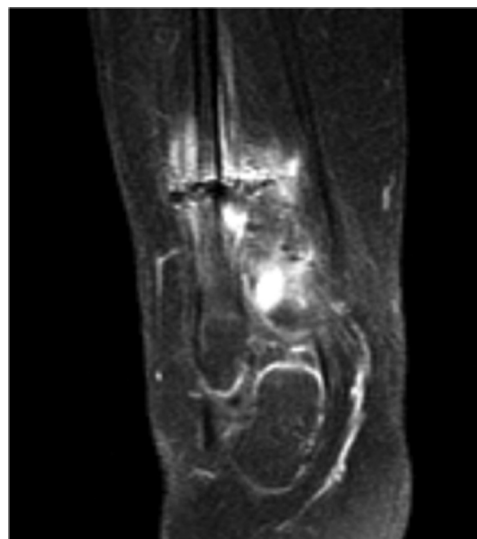


Fig. 4. X-ray shows osteomyelitis.

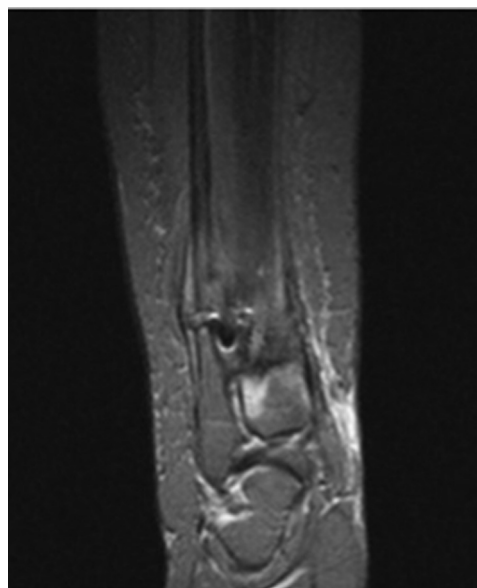


Fig. 5. MRI shows metaphyser abscess.

disease. Meningomyelocele was the main responsible disease for her walking disability (Fig. 1). She underwent a shunt operation during infancy in another clinic. During childhood she underwent bilateral achillotomies for Achilles tendon contracture, supracondylar extension osteotomy and two times hamstring release for knee flexion contracture. We performed a supramalleolar distal tibia varus dome osteotomy regarding her to be able to stand because of valgus deformity of ankle (Fig. 2) at least in 09/2013. In her controls, we saw that tibia distal diaphysis has union delay. Therefore at the same level in 12/2013 we added a fibula osteotomy and stabilized tibia with three Kirschner wires (Fig. 3) and waited for union. We could not reach the exact healing what we expected in controls. There was still not healing at osteotomy area. At third month controls minimal inflammation was detected. In her exam there was a little warmth in distal tibia however no erythema was seen. We began to have doubts about infection. She had laboratory results revealed a normal leukocyte level, an acute phase reactants level elevation especially in C-reactive protein level of 8 mg/dL. Sedimentation rate was normal. Radiographs of the right cruris showed radiolucent zones in the metaphysis of the distal part of the tibia (Fig. 4). Right cruris MRI was performed and metaphyseal abscess was determined at T2 weight MRI (Fig. 5). We needed a right cruris MRI. We looked at the results and came to the conclusion that she



Fig. 6. Ilizarov distraction osteogenesis.

had tibia distal diaphyseal osteomyelitis and thought that could be the main factor in union delay. The tibia was immobilized with a below knee cast. Empirical antibiotics were given and treatment continued without biopsy.

She was operated for infected nonunion. After 3 months clinical follow up we decided that we should add an extra surgical procedure. We used a tibia distal diaphysis medial side longitudinal incision and curetted the pseudoarthrosis region and took biopsy. We fixed tibia using ilizarov circular type external fixation for osteosynthesis to maintain distraction osteogenesis for union obtainment (Fig. 6). After three days *serratia marcescens* was the isolated microorganism. Antibiotic susceptibility test was performed and consulted our infectious diseases unit. Sulperazon (sulbactam and cefoperazon combination) 4 gram (3 equal doses/per day) was administered. There was only little leak on wound postoperatively and we took wound swab samples and the results were matched, gram-negative bacillus were seen and antibiotic regime continued. The wound was clean and there was no problem in the 6th day. We started compression in pseudoarthrosis area thanks to ilizarov methods in postop fifth day. One week later we stopped compression and stabilized the system for union. Postop 3rd week the patient was sent home with oral antibiotic. Antibiotic regime lasted totally for six weeks. During her follow up the union was obtained after two months (Fig. 7). Circular external fixator was removed gradually after dynamisation (Fig. 7) in 05/2014.

3. Discussion

Serratia marcescens is a common nosocomial infection but an uncommon causative factor when it comes to osteomyelitis.⁴

Nearly all of the articles published about *serratia* osteomyelitis are case reports. *Serratia* species especially *serratia marcescens* were thought to be nonpathogen in the past.³ We know that it is an opportunistic bacteria, can create a lot of problems in many locations of human body and we also know that it causes hospital based infections.



Fig. 7. Ilizarov fixator extraction and tibial union.

Osteomyelitis treatment is still too difficult. We should commence treatment as soon as possible to prevent chronicity. Treatment consists of evaluation, staging, determining the microbial etiology and susceptibilities, antimicrobial therapy and, if necessary, debridement, dead-space management and stabilization of bone.¹

Our main weapons systemic antibiotherapy (iv or oral) and surgical therapies. Empiric antibiotics are given before we learn the exact causative microorganism. Then antibiotic regime is changed to a specific antibiotic which the microorganism is sensitive for.

Our patient had meningomyelocele and long term hospital stay. These factors created an opportunism for *serratia* species. G6PD deficiency leads to immunodeficiency in infancy and a 4 month old male infant presented swelling of right big toe and culture from the toe abscess grew *serratia marcescens*.⁵ Immunosuppressive diseases, medicines, kidney failures, liver failures, steroids etc. can corrupt our immune system and lead to opportunistic infections. It is reported in literature some osteomyelitis caused by *serratia marcescens* without predisposing factors.⁶

In conclusion orthopedic surgeons should be aware of opportunistic infections like *serratia* and keep in mind when diagnosing the unexpected problem.

Conflicts of interest

None declared.

Funding

There is no study sponsor.

Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor in Chief of this journal on request.

Author contributions

All authors contributed to the article. Study design has been created by Turgut Akgul and Necmettin Turgut. All data were analyzed and collected by Ufuk Arzu, Mehmet Ekinici and Sefa Giray Batıbay. Necmettin Turgut wrote the manuscript. Cengiz Şen and Turgut Akgul were the supervisor for the article.

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