ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 11, Issue, 07, pp. 48436-48438, July, 2021
https://doi.org/10.37118/ijdr.22264.07.2021

RESEARCH ARTICLE OPEN ACCESS

TIBIAL OSTEOMYELITIS: REPORT OF THREE CASES IN A HOSPITAL IN RIO DE JANEIRO

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ARTICLE INFO

Article History:
Received 27th April, 2021
Received in revised form
29th May, 2021
Accepted 20th June, 2021
Published online 25th July, 2021

Key Words:
High morbidity, Post-traumatic, Osteomyelitis.

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ABSTRACT

Objective: to report the case of three patients admitted with osteomyelitis in a large hospital. **Method:** information was obtained by means of medical record review, patient interview, photographic record of the diagnostic methods to which the patient was submitted, and literature review. **Final Considerations:** post-traumatic osteomyelitis has a high morbidity, often leading the patient to permanently disabling injuries. The reports show the occurrence of post-traumatic tibial osteomyelitis and summarize the management of the respective cases.

Citation: Walmir Silva Moraes, André Luís Marinho Ramos, Valdenice Rodrigues da Cunha Sousa, Matheus Ribeiro Viana Goulart, Venício Wunderlich da Rocha, Erika Homsi, Rodrigo Petito, Ítalo Porto Alves, Igor Fernando Satin de Oliveira, Vítor Tenorio and Pedro Henrique Ribeiro, 2021. "Tibial osteomyelitis: Report of three cases in a hospital in rio de janeiro", *International Journal of Development Research*, 11, (07), 48436-48438.

INTRODUCTION

Osteomyelitis is an inflammatory disorder of the bone, usually caused by infection by an organism, that leads to destruction and necrosis. The inflammation can involve the cortex (technically, "osteitis") or the marrow of the bone ("myelitis"), or both.[1] Bone destruction is typically accompanied by the formation of new periosteum. Osteomyelitis is a heterogeneous disorder that affects people of all ages, can involve any bone, manifests with variable signs and symptoms, and can be caused by many different types of microorganisms.[2] Osteomyelitis can be divided into the acute, subacute and chronic form. The acute form is the most common and is often found in children. The subacute form, on the other hand, has milder and more persistent symptoms than the acute form. Osteomyelitis, called bone tissue inflammation of infectious etiology, evolves with progressive bone destruction and necrosis, resulting in bone neoformation and sequestration, with a consequent decrease in local blood supply and limitation of adequate antibiotic action. In this Young adult males are the most affected by the development of societies, an increase in high-energy traumas, such as traffic accidents, motorcycle accidents, and pedestrian accidents, which are among the most frequent causes of tibial shaft fractures. Open fracture is the most frequent complication due to the scarce anteromedial skin coverage. Diabetes mellitus, vascular insufficiency, ischemic arterial disease, and infectious diseases are associated risk factors[2,3]. Our goal is to report three cases of tibial ostomyelitis, learning more about the causes and evolution of this pathology, highly prevalent in large hospitals.

METHODS

The present study was approved by the ethics committee with CAAE 13517919.4.0000.80. This is a presentation of three clinical cases involving the development of tibial osteomyelitis in patients admitted to the Hospital Geral de Nova Iguaçu, Rio de Janeiro.

CASE REPORT 1

A 10-year-old male student, attended the pediatric emergency department accompanied by his mother, complaining of pain on palpation and swelling in the left tibia region after contusion during physical activity. On examination, he was in good general condition, with only increased volume and pain on palpation in the left tibia region. No other changes on clinical examination.. Five days after the event, he developed a specific clinical picture of left distal tibial osteomyelitis. He presented pain, edema, and limitation of movement in the left leg, pain on palpation of the distal tibia, feverish, regular general condition, presence of erythema, and no secretion at the site, requiring hospitalization. Radiographies and laboratory tests were performed. The images did not show fractures, periosteal and lytic lesions. The laboratory showed slight leukocytosis and increase of inflammatory markers. Treatment was performed with Surgical Mechanical Cleaning (SCW) and sample was collected for culture and pathogen identification; however, the presence of bacteria and fungi was not evidenced. The patient was submitted to intravenous antibiotic therapy with oxacillin (500mg/5ml) for 6 weeks with improvement of the inflammation in the left knee and later hospital discharge.

CASE REPORT 2

A 43-year-old male patient was hit by a car with an open fracture of the left tibia (fig 1A.). He was immediately taken to the surgical center for an ostectomy, submitted to serial SCW and surgical debridement. A culture for common germs was requested from the bone fragment of the left tibia, and growth of gram negative bacilli and gram positive cocci was observed. *Enterobacter sp.* and coagulase negative *Staphylococcus aureus. The* antibiogram analysis of coagulase negative *Staphylococcus aureus* showed resistance to ciprofloxacin, levofloxacin, clindamycin, gentamicin, erythromycin, oxacillin, and penicillin. The *Enterobacter sp.* antibiogram showed resistance to cephalothin and ampicillin. Radiographs were taken in two views of the left leg, with the presence of a solution of continuity in the diaphyseal region of the tibia. A biplane external fixator was used for damage control and soft tissue envelope wound management. The patient was submitted to intravenous antibiotic therapy with clindamycin 2,400mg/day and gentamicin 240/mg/day.

Figure 1. A– open fracture in left tibia (arrows). B – Note the infectious condition

CASE REPORT 3

A 54-year-old male patient, victim of a motorcycle accident, with open fracture of the femur and right tibia, submitted to emergency surgery, ostectomy and serial SCW. A culture for common germs was requested from a bone fragment of the left tibia, and no germ growth was observed. Laboratory showed leukocytosis without deviation. The patient was submitted to intravenous antibiotic therapy with clindamycin 2400mg/day and gentamicin 240/mg/day.

Figure 2A- open fracture in roght tibia (arrow). B- Note the infectious condition

DISCUSSION

Osteomyelitis is a common complication in patients with open fracture of the tibia, a consequence of the absence of protective layers. The most common site of involvement is the distal tibia, typically an isolated lesion located near the metaphysis. Long bones may be favored because the tortuous metaphyseal capillary loops are vulnerable to thrombosis, providing a favorable site for seeding bacteria. In this sense, the type of trauma causing the fracture is often related to the severity of the injury caused and often to the severity of the patient. It is known that tibial fractures, added to the fact that they are exposed in themselves already represent a large set of predictive factors for infection in the evolution of treatment. These fractures require special care from the moment the patient arrives at the hospital, so that all attitudes are directed towards preventing complications, including infection[3.] The exposure time, that is, between the occurrence of the accident and the beginning of surgical treatment, may be a predictive factor of infection. Studies report that this exposure time is probably due to bureaucracies and other measures, such as waiting for X-rays, preparation of the surgical room, among others, which could be more agile and eventually lead to a decrease in the incidence of infections4. As for the pathogens present in the infection, only one case had a positive culture, with evidence of *S. aureus* and Enterococcus. These results do not differ much from those presented by Gustilo, 10 who found a predominance of *Staphylococcus aureus* (gram positive) and 60% of gram positive agents, in general. Clifford stated that 60% to 70% of the entry cultures are positive, with a predominance also of Staphylococcus aureus and Enterococcus sp. (gram negative)[5,6]. The treatment of osteomyelitis must be multiphasic and basically involve three combined strategies: 1) clinical compensation of the patient; 2) drug treatment with antibiotic therapy; and 3) surgical approach. 1) Patient compensation The first step after diagnosis is to improve the host's clinical conditions, aiming at controlling systemic diseases such as diabetes, malnutrition, immunosuppression, and vascular disease, among others. 2) Drug treatment The antibiotic to be used should preferably be low cost, convenient as to the form of administration and dosage, in addition to offering high serum and bone tissue concentrations. [2,7] In this study, it was observed that regardless of the type of open fracture, most patients used a regimen with clindamycin 2400mg/day and gentamicin 240/mg/day, with the exception of the pediatric patient, who within the hospital routine starts with Oxacillin.

A study by Müller et al 8 shows a preference for cephalothin, which is well indicated to cover gram positive germs; according to the authors, the combination of crystalline penicillin + amikacin could cover gram positive and negative germs, but with the disadvantage that crystalline penicillin is not a good choice for *Staphylococcus* in general. Another, more expensive option would be the combination

of clindamycin + amikacin, with the advantage of coverage against gram positive and anaerobes (clindamycin) and gram negative (amikacin). The use of systemic antibiotics to treat chronic infection has no consensus in the literature regarding the time of treatment and the choice of medication. Surgical approaches in chronic osteomyelitis aim at the mechanical removal of infected and devitalized tissues.

In some situations, the patient does not present clinical conditions that allow proceeding with surgical treatment (host type C in Cierny and Mader's classification)[9]. Finally, we agree with Sapienza et al10 , who reported that post-traumatic osteomyelitis has a high morbidity, often leading the patient to permanently disabling injuries, from the physical and/or psychological point of view, and/or to costly and prolonged treatments, with sometimes discouraging results. Therefore, the control of factors such as antibiotic therapy, exposure time, bacterial resistance to the antimicrobial used, great tissue damage, and fracture location is very important to nullify the predictive effect of infection in open fractures.

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