

2022

Interosseous Access Osteomyelitis

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Recommended Citation

Siddiqui O, Sheikh A, Baig R, Surath H, Chadalavada S, Siddiqui F, Arun G, Virk J, Shah N. Interosseous Access Osteomyelitis. *Advances in Clinical Medical Research and Healthcare Delivery*. 2022; 2(4). doi: 10.53785/2769-2779.1126.

ISSN: 2769-2779

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Interosseous Access Osteomyelitis

Abstract

Intraosseous (IO) access is a recommended technique in cases of an emergency situation where IV access cannot be obtained. Despite advancements in IO devices and FDA approval of many types of IO devices, it has various complications that although are rare, can be potentially life-threatening. We report a case of acute tibial osteomyelitis in an adult female with a history of polysubstance drug abuse a few weeks after an IO access from a previous hospital stay.

Keywords

Interosseous Access, Osteomyelitis, Source Control

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Conflict of Interest Statement

None

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CASE REPORT

Interosseous Access Osteomyelitis

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1. Introduction

Intraosseous (IO) access is considered a safe and effective course for all age groups requiring fluid resuscitation, laboratory evaluation, or emergency administration of medication or fluids [1]. IO infusion can be used as an alternative to intravenous administration in cases with difficulty achieving vascular access due to IV drug abuse, decompensated shock, obesity, or cardiac arrest [5]. The success for IO device insertion has proved to be 80-95% in several literature studies [3]. Although it is a life-saving alternative, it is still not a commonly used technique in clinical practice due to its potential rare infectious complications [4]. Complications include extravasation or subperiosteal infusion, penetration of bone, osteomyelitis, physical plate injury, and skin necrosis. We report an atypical case of osteomyelitis of the tibia secondary to IO access in anticipation of adding to literature that focuses on etiology, diagnosis, management/ treatment, and outcome of such a rare complication.

2. Case report

A 36-year-old female with a significant history of intravenous polysubstance drug abuse, type I DM, Addison's disease presented to the hospital for left lower extremity cellulitis and leg pain after obtainment of interosseous access on previous hospital admission. She was noted to be admitted ten days prior for hypoglycemia and UTI when IO access was obtained due to the difficulty in acquiring intravenous access secondary to IV drug abuse.

She presented with altered mental status, hypoglycemia, and left lower extremity rash, yellow

discharge, and pain at the insertion site where superior tibial IO access was obtained. She was afebrile, normotensive, tachycardic at 115 bpm and without signs of hemodynamic instability. She was somnolent due to hypoglycemia, with levels of 23 mg/dL. She was noted to be non-compliant with insulin regimen and daily glucose checks. Lab results were significant for leukocytosis at 15.9 10³/uL, C-reactive protein at 11.7 mg/dL, lactic acidosis with levels of 2.4 mmol/L, and hypomagnesemia at 1.6 mg/dL. Blood cultures were positive for gram-positive cocci- group A streptococcus. The patient was started on piperacillin-tazobactam and vancomycin in the emergency department along with 500 mL of D5W and a liter of normal saline. Radiograph of left tibia-fibula revealed 0.7 cm benign-appearing linear lucency at the anterior tibial cortical margin and mild interval increase in soft tissue swelling anterior to the proximal to mid tibia compared to last hospital visit, potentially representing infection or inflammation or posttraumatic soft tissue injury. The magnetic resonance showed bone marrow edema and enhancement of the tibia as well as sinus tract extending from this area through the cortex and into the medullary cavity of the tibia at the level of the proximal tibial diaphysis. MRI results were compatible with the diagnosis of osteomyelitis of the tibia with overlying cellulitis. Treatment with IV vancomycin 1250 mg and piperacillin-tazobactam was continued and anticipation to add dalbavancin upon discharge given the concern for IV drug abuse and the advantage of less frequency of administration. Wound culture from the surgical site and soft skin and tissue grew methicillin resistant *Staphylococcus aureus* (MRSA). Infectious disease consult

Received 13 August 2022; accepted 28 October 2022.
Available online 21 December 2022

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<https://doi.org/10.53785/2769-2779.1126>
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recommended to order Hepatitis C, HIV panel, and TTE to rule out endocarditis due to her extensive IV drug abuse. These studies were not completed as the patient left against medical advice from the hospital the following day. She was noted to only complete 3/6 weeks of Dalbavancin for osteomyelitis treatment and ultimately, lost to follow-up.

3. Discussion

IO devices provide rapid vascular access in emergency situations where IV access cannot be obtained. European Resuscitation Council Guidelines for Resuscitation established in 2015 stated that IO route can be used for infusion of medications, drugs, and blood samples. Few trials conducted in both children and adults supported by several studies concluded that IO access was a safe and effective method [1,2]. In addition to traditional manual IO needles, there are now battery-powered and impact-driven IO infusion devices that provide fast and easy IO access. Because of the large medullary canal and lack of interposing neurovascular structures, the proximal tibia is the most common anatomic location for placement- located 2 cm below the tibial tuberosity and 1 to 2 cm medial in the middle of the flat bone surface [4]. The distal tibia, femur, proximal humerus, and superior sternum are also possible locations [4].

Although IO access is a safe life-saving technique, it comes with its own risks and adverse events. These include osteomyelitis, soft tissue infection, skin necrosis, extravasation of infusate, compartment syndrome, tibial fracture, and growth plate injury in pediatric patients. While these complications are extremely rare and are reported between 1-5% [3], they could be potentially life-threatening. It should be noted that the procedure of IO access should always be performed under sterile conditions. Osteomyelitis is a rare complication and there is not much reported in the literature about the same. Some case reports have described a rate of 0.4-0.6% as the potential risk of osteomyelitis [1,3].

Osteomyelitis is defined as an inflammatory process. It is an infection of the bone and bone marrow. It may be caused by direct surgical implantation of bone or trauma, continuous spread of infection from surrounding tissue to bone, or hematogenous spread. Most common organisms include *S. aureus* and aerobic gram-negative bacilli. Less common ones include mycobacterium, fungi, and enterococci [1,3]. The gold standard for diagnosis of osteomyelitis is bone biopsy with histopathologic examination and tissue culture and is usually treated with operative debridement and IV antimicrobial therapy.

We report a case of osteomyelitis secondary to a contiguous focus of infection in a comorbid drug addict patient. *Staphylococcus aureus* is certainly the most frequent organism responsible for osteomyelitis in any age group and is responsible for up to 70-90% of confirmed cases [1,3]. It requires antibiotic therapy, initially IV antibiotics. Most authors concord to reducing the IV antibiotic duration to a few days and tapering down to an oral antibiotic with targeted oral therapy for at least 6-8 weeks [1].

4. Conclusion

In conclusion, if IV access is not readily available, intraosseous infusion is an effective alternative for patients who require urgent parenteral access for initial resuscitation. However, healthcare staff reports significant difficulties such as immediate dislocation which would render the IO access useless [5]. This could add to the reason why providers are reluctant to choose IO access as a method for delivering emergent resuscitation. We reported a potentially limb-threatening acute tibial contiguous-focus osteomyelitis ten days after an intraosseous line insertion. Although the adverse effects are rare, they cannot be underestimated. With the increased use of IO access in prehospital settings, healthcare providers and patients must be aware of the risk of serious infectious complications, like osteomyelitis, and the potential for significant long-term morbidity.

Conflict of interest

The authors report no conflict of interest.

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