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Cranial osteomyelitis 7 years after orbital exenteration and orbital implants: A cascade of problems with a good final outcome

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ABSTRACT

Cranial osteomyelitis is an uncommon, but important entity, particularly when misdiagnosed. This case report describes a 73-year-old woman with a history of basal cell carcinoma in her right eyebrow. After treatment with surgery and radiotherapy, two years later, she had undergone another operation for reconstruction and orbital implants. The present study describes imaging aspects, treatment options, and follow-up of an incident that occurred seven years after reconstruction. The patient visited the emergency department, due to a deep infection around the orbital implants. We detected early cranial osteomyelitis, but treatment was followed by a cascade of problems. After two months, she presented with exposed osteosynthesis material. Two months after removal of the material, she was diagnosed with supraorbital osteoradionecrosis. Subsequent treatment with antibiotics, debridement, and a transposition flap provided a successful final outcome.

1. Introduction

Cranial osteomyelitis primarily affects young children, because of their densely vascularized and rapidly growing bones. Osteomyelitis predominantly affects the tubular bones of the arms and legs [1]. Rarely, osteomyelitis occurs in the neurocranium, which is a dangerous condition. Adequate clinical recognition and management are necessary to prevent life-threatening complications.

In industrialized countries, 0.3–1.5% of all osteomyelitis cases involve the cranium [1,2]. The most common sources worldwide are postsurgical craniotomy infections, but in developing countries, the predominant sources are paranasal sinusitis and scalp infections [3].

Radiotherapy is a broadly applied adjuvant therapy for head and neck oncological disorders. However, radiotherapy targets all cells with a high turnover rate, whether malignant or normal host tissue. The dose must be correctly balanced to eradicate the tumor, but preserve the normal host tissue cells. This balance is critical to avoid complications, like osteoradionecrosis (ORN) [4]. Radiation doses higher than 60 Gy are associated with a high risk of developing ORN [5]. The prevalence of ORN varies widely, but most studies report prevalences between 10 and 15% [6]. The potential interventions for patients with ORN range from non-invasive therapies, with antibiotic coverage; through sequestrectomy and debridement; to major surgical procedures [7].

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2. Presentation of case

2.1. Patient history

This study describes a 73-year-old woman with a history of basal cell carcinoma in the right eyebrow. She was treated with surgery and supraorbital radiotherapy (60 Gy). Two years after excision, she noticed a suspicious lesion around the scar tissue. This lesion was histologically confirmed to be a recurrence of the tumor. She underwent a second operation with exenteration, which included the orbital roof and eyelids. Reconstruction was performed with a split-bone of the orbital roof (bone graft from the hip) and a free vascularized vastus lateralis muscle flap (from the left leg). Two months later, she was again treated with 60 Gy (3×2 Gy) radiotherapy in a wider volume than the initial volume (orbital). One year after radiotherapy, she received 20 sessions of hyperbaric oxygen treatment (HBOT) to secure the placement of three orbital implants. After she received the prosthesis, no subsequent complications were reported.

2.2. Cranial osteomyelitis

Here, we describe an incident that occurred seven years after the reconstruction with orbital implants. The patient consulted the emergency department, upon noticing a malodor after removing the prosthesis. In addition, redness and pus had appeared around the orbital implants (Fig. 1). The patient had no fever or pain at this moment, and the implants were not mobile. Vision from the healthy eye remained unmodified. The findings supported the diagnosis of a deep infection around the orbital implants and early cranial osteomyelitis. Single-photon emission computed tomography (SPECT) images revealed little expansion of osteomyelitis, and bone turnover was discretely increased in the right orbit (Fig. 2).

A culture of the exudate demonstrated growth of *Staphylococcus caprae* and *S. simulans*. The culture was negative for yeast and fungi. In collaboration with the ophthalmological and maxillofacial department, the patient was hospitalized for treatment with intravenous Ciprofloxacine (1000 mg) and Metronidazole (4×500 mg during 48 h). This treatment was followed by six weeks of oral antibiotics, 20 sessions of HBOT, regular cleaning, and applications of Terramycin and Jelonet. After 20 days, there were no signs of deep infection around the orbital implants or osteomyelitis.

2.3. Complications

Two months later, during a follow-up consultation, we noted exposed osteosynthesis material. Treatment with doxycycline (100 mg, once per day) was started. The patient was sedated with intravenous Dormicum (4 cc) and Fentanyl (4 cc); then, we applied local anesthesia with a vasoconstrictor, and removed the osteosynthesis material. After removal, we applied Leukocyte and Platelet Rich Fibrin (LPRF), before closing the wound.

Two months after the removal of the osteosynthesis material, wound dehiscence and exposed necrotic bone (due to ORN) were observed (Fig. 3). However, there were no signs of inflammation or infection, due to doxycycline therapy. Taking into account the patient's age and the multiple preceding interventions, we decided to treat the ORN by debriding the site. Subsequently, the defect was closed with a transposed flap; we used a "full thickness" skin graft derived from the right upper leg (Fig. 4).

After surgery, the patient received prophylactic amoxicillin/clavulanate (875mg/125mg, three times per day) for 5 weeks. No further complications were reported (Fig. 5). After five months, the patient was pain-free, and she was able to use a functional orbital epithesis. Follow-up is to be continued every six months.

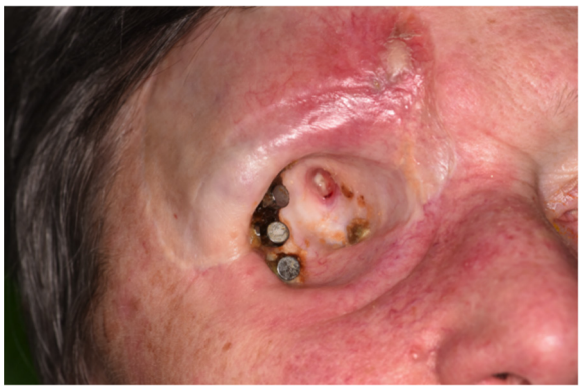

Fig. 1. Right orbit after removing eye prosthesis. Deep inflamation, skin redness, and pus are apparent around the implants, combined with supraorbital redness and skin inflammation.