

Management of scalp osteoradionecrosis. A case report

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Background

Osteoradionecrosis (ORN) is a well-known complication of radiotherapy, but scalp ORN management can be challenging and it is only seldom discussed. We report a case of 79-year-old man who presented with osteoradionecrosis of the scalp after squamous cell carcinoma resection and radiotherapy. He has developed a wound infection 1 month after the reconstruction.

Keywords: Osteoradionecrosis, scalp reconstruction.

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Case report

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Osteoradionecrosis (ORN) is an ischemic bone and soft tissue necrosis due to radiotherapy, without evidence of persisting or recurrent tumor (1). The radiations induce vascular changes resulting in hypoperfusion and thus a hypocellular, hypovascular and hypoxic environment (2).

Mostly described in the head and neck cancer management, ORN of the cranium are barely reported.

Their management with scalp defect is mainly surgical, different techniques have recently emerged to avoid serious complications as osteomyelitis resulting in meningitis and brain abscess.

The reconstructive surgery of scalp defects with exposed calvaria after irradiation is challenging. We report a case of scalp osteoradionecrosis and its management.

Case report

A 79-year-old patient with no significant history presented a scalp wound with calvaria exposition. One year before, he underwent a squamous cell carcinoma (cSCC) resection with skin graft and adjuvant radiotherapy 2 months after surgery. CT-scan showed no osteolysis.

Tissue biopsy revealed a penicillin-susceptible *Staphylococcus aureus* (SA) infection and thus Flucloxacillin was administered for 2 weeks (Figure 1). A new skin graft with regional tissue transfer was performed after resection of the old graft (Figure 2). Histological analysis showed cSCC recurrence in deep resection margins with bone contact.

The brain CT-scan revealed osteolysis, a moth-eaten appearance and suggested ORN.

Unfortunately, the skin flap was swollen and suppurative 1 month later. SA infection was confirmed and demonstrated a chronic osteitis in context of ORN. We proceeded to aggressive debridement (Figure 3,4) and intravenous oxacillin was administered for 3 weeks. After favorable wound healing and the decrease of inflammatory syndrome, the patient was discharged after 3 weeks. He was treated with rifampicin and cotrimoxazole for 9 weeks.

Two nodules appeared at the edge of the flap 1 month later and their biopsy supported cSCC recurrence (Figure 5).

At the moment, the patient is receiving immunotherapy and the wound evolves favorably with local meshing (Figure 6).



Figure 1. A preoperative photograph of the wound with calvaria exposition.

Discussion

cSCC is the second most common form of non-melanoma skin cancer and accounts for 20% of



Figure 3. A perioperative photograph of surgery before the debridement.

all cutaneous malignancies. When surgery is possible and appropriate, it is the treatment of choice. Adjuvant radiotherapy is recommended for patients with incompletely excised cSCC (3,4).



Figure 2. After the reconstruction with skin graft and regional tissue transfer.



Figure 4. After the surgical debridement.



Figure 5. Two nodules appeared at the edge of the flap 1 month after surgical debridement.

For the greatest efficiency, postoperative radiation therapy is usually given within 8 weeks after reconstruction (5) and has a wide range of effects on normal tissues. Although the pathological process begins immediately after the treatment, the clinical and histological effects may not be apparent within the first weeks or months. ORN is characterized by bone necrosis, failure to heal for at least 3 months after irradiation and it can occur up to 40 years after irradiation. The most common location is the jaw but ORN can occur in any irradiated area (6). In the literature, the incidence of ORN varies between 8% and 15% (7,8).

In the past half-century, both use of external beam radiation and survival of patients with head and neck malignancy have greatly increased (9).

Their etiology is multifactorial, patient- and treatment-related factors determine an individual's response to radiation. Treatment-related factors include total radiation dose, dose per fraction, and schedule of treatment. Patient-related factors include genetic susceptibility to radiation, immunosuppression, advanced age, and comorbid conditions including diabetes and hypertension (10,11).

The management of ORN include hyperbaric oxygen therapy, local wound care, reconstructive surgery as free tissue transfer, skin graft and dermal substitutes (12). Some authors suggest that the rotation



Figure 6. The wound evolves favorably at 5 months after the second operation.

flap is the first-line treatment of scalp defect due to radiotherapy for skin cancer (13). The treatment should be discussed in balancing the surgical risks, the postoperative recovery and the potential risks of conservative management.

In this presented case, the graft infection was favored by ORN. Considering the graft was viable, we preferred to perform debridement, antibiotherapy and local wound care.

Conclusion

The use of radiotherapy for skin cancer treatment, the patient survival is increasing and therefore the risk of ORN enhances.

The treatment of ORN can be challenging and it is only seldom discussed. We report a case of scalp ORN with exposed calvaria and its management was complex. We should keep in mind this complication and discuss the best care according to patient condition and needs.

Conflicts of interests

The authors have no conflicts of interest to declare.

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