Abstract

Objectives: To describe the management considerations that improve the likelihood of implant osseointegration and minimize the risk of osteoradionecrosis in orbital exenteration defects that are scheduled for PORT.

Study Design: Retrospective case series

Methods: Preoperative radiographic assessment of the malignancy is used to estimate the extent of resection and the likely clinical target volume (CTV) required for PORT. Interdisciplinary treatment planning between the surgeon, radiation oncologist, and maxillofacial prosthetist is employed to evaluate the optimal location for osseointegrated implantation. Implants were placed lateral to the midportion of the orbital defect when the proposed high-risk CTV contours were limited to the medial orbit. Implants were not inserted if the proposed high-risk CTV contours included the lateral portion of the orbit.

Results: The CTVs could be acceptably contoured so that the lateral orbit would not receive high-dose radiation when there was limited tumor extension into the medial portion of the orbit and the orbital apex was free of malignancy.

Conclusions: Careful interdisciplinary preoperative planning is essential to maximize implant success, minimize the risk of osteoradionecrosis, and optimize prosthetic rehabilitation.

Illustrative Clinical Scenarios

Scenario #1: Adenoid cystic carcinoma of the lacrimal gland
- Preoperative Radiographic Assessment: Extensive orbital involvement with intracranial extension
- Surgical Plan: Craniofacial resection with orbital exenteration
- Radiotherapy Plan: Postoperative IMRT, delivering 74.4 Gy in 120 cGy bid fractions to the high-risk clinical target volume
- Dose to lateral orbit: 74.4 Gy
- Prosthetic Surgical Plan: Osseointegrated implantation is contraindicated

Scenario #2: Recurrent squamous cell carcinoma of the skin with medial orbital involvement and intracranial extension
- Preoperative Radiographic Assessment: Medial orbital involvement with intracranial extension
- Surgical Plan: Craniofacial resection with orbital exenteration
- Radiotherapy Plan: Postoperative proton therapy, delivering a total dose of 64.8 CGE (Cobalt Gray Equivalent) in 1.2 CGE bid fractions
- Dose to lateral orbit: 35-50 CGE
- Prosthetic Surgical Plan: Osseointegrated implantation into the lateral orbit

*64.8 CGE (protons)=64.8 Gy (photons)

Intensive and Coronal Views of the proton dose gradient. The lateral and inferior orbital walls received less than 50 CGE, permitting implant placement. (Red-brown=64.8 CGE, Green=35-50 CGE)

Conclusions

1. The success and safety of osseointegrated implantation is maximized by carefully selecting patients who will not require high-dose PORT to the lateral orbital region.

2. Thoughtful preoperative planning and close communication between the surgeons, maxillofacial prosthodontist, and radiation oncologist permits the optimal placement of osseointegrated implants without compromising the administration of PORT.

3. Proton therapy, which provides higher spatial accuracy and greater sparing of adjacent normal tissues than photon IMRT, should be considered to deliver adjuvant RT following craniofacial resection.

References


