Minimally Invasive Mandibular Hardware Removal Post Reconstruction

Neerav Goyal MD MPH1,2, Daniel G. Deschler MD1

1Harvard Medical School, Department of Otolaryngology, Massachusetts Eye and Ear Infirmary, Boston, Massachusetts
2Penn State Milton S. Hershey Medical Center, Division of Otolaryngology Head and Neck Surgery, Hershey, Pennsylvania

Abstract

Outcome Objective: To evaluate a minimally invasive technique for hardware removal in patients status post osseous reconstruction of the mandible

Methods: A retrospective review was performed of all patients with a history of head and neck cancer requiring resection with osseous free flap reconstruction that later had mandibular hardware removed between June 2013 and June 2014 were included. Each patient underwent hardware removal via 1-2cm percutaneous incisions directly over the hardware allowing for screw removal and hardware extraction. For each patient relevant demographic and cancer information was recorded as well as time of symptom onset, type of hardware removed, length of hospital stay and last follow up.

Results: A total of 6 patients were identified since this technique was employed. All patients had received prior radiation and had evidence of recurrent infections at the reconstruction site. The average time between reconstruction and hardware removal was 47.8 months. Follow up after hardware averaged 8.3 months. All patients had resolution of their infections, and there were no complications from the surgery. One patient had persistent bone exposure that was asymptomatic.

Conclusion: Removing exposed mandibular hardware in the setting of prior radiation and active infection can present a technical challenge. This technique uses small incisions to allow for percutaneous removal of the screws and removal of the mandibular hardware without the need for extensive dissection over the native and reconstructed mandible. All patients demonstrated resolution of their infections and healing of any open or draining wounds during the follow up period.

Methods

From July 2013 through July 2014, patients who underwent removal of mandibular hardware using the described method were reviewed. Data regarding the pathology, surgery (resection and reconstruction), interval to removal, the type of hardware placed, prior chemotherapy or radiation treatment, the presence of osteoradionecrosis, wound cultures and prior use of hyperbaric oxygen were recorded. This review was approved by the Massachusetts Eye and Ear Infirmary Institutional Board Review.

Surgical Technique

Prior to hardware removal, radiographic studies were reviewed. In addition to the available computed tomography (CT) imaging, scout plain x-ray films were also used to identify the position and number of screws requiring removal (Figures 1 and 2).

Under general anesthesia, the hardware at the frank fistula sites was explored and the accessible screws removed.

Results

Six cases were identified, 3 men and 3 women with an average age of 57 years (range 46–67). All were treated for squamous cell carcinoma of the oral cavity or oropharynx and underwent surgical resection with segmental mandibulectomy and fibula free flap for osseous reconstruction. All patients received radiation therapy prior to necessitating hardware removal (either adjuvant or prior to surgery).

Five patients had osteoradionecrosis prior to hardware removal, and 4 underwent hyperbaric oxygen treatment. Other treatments included drainage of abscesses (2 patients), debridement of exposed bone (2 patients), or placement of vascularized tissue (2 patients).

All patients were treated with multiple courses of antibiotics prior to hardware removal. The average interval between hardware placement and removal was 47.8 months (range 6.8–137.7 months). The removed plates were 2.0mm and 2.5mm locking titanium plates between 8–10 holes in length with between 5–15 screws. One patient also had 2 mini plates that were removed. Intraoperative cultures demonstrated a variety of flora including Staphylococcus aureus (MRSA and MSSA), coagulase negative Staphylococcus species, Corynebacterium, Fusobacterium, and Actinomyces. Patients were placed on antibiotics following the hardware removal. All patients were discharged the same day following surgery.

Patient follow up ranged from 3.1–12.6 months (average of 8.25 months). Within the cohort, 5 out of 6 patients demonstrated complete healing of the prior infected region with closure of sites of exposed bone and fistulae (Figure 3C, D). One patient had an asymptomatic residual area of dry exposed bone less than 5 mm without evidence of infection or fistula. No patient had iatrogenic facial nerve palsy secondary to the hardware removal.

Discussion

Hardware related complications necessitating removal in this patient population has been previously reported at approximately 15%, with tobacco use, radiation therapy, cancer recurrence and prior hyperbaric oxygen treatment noted as associated factors. In patients who have a chronic infection and/or fistula, the social and economic impact of a draining wound, with repeated clinic visits and hospital admissions, can be significant. This technique forges a large skin flap elevation and dissection in a scarred operative bed without increasing risk to the facial nerve or causing cosmetic deformity. All patients were discharged the same day after the surgery, and all patients had resolution of their infections. The technique presented provides a safe and efficient method to remove large mandibular plates without significant patient morbidity or hospital stay.

References