Re-creation of the Buccal and Lingual Vestibules following Marginal Mandibulectomy

John W. Werning, MD, DMD\textsuperscript{1}, Glenn E. Turner, DMD\textsuperscript{2}, and Fong Wong, DMD\textsuperscript{2}

From the Departments of \textsuperscript{1}Otolaryngology and \textsuperscript{2}Prosthodontics, University of Florida, Gainesville, FL

Abstract

Objectives: To describe a novel technique that maximizes the depth of the buccal and lingual alveolar vestibules following marginal mandibulectomy for eventual dental prosthetic rehabilitation.

Study Design: Retrospective case series.

Methods: A customized acrylic stent, which is fabricated prior to surgery, is lined with a synthetic impression material that duplicates the contours of the remaining mandible and extends to the base of the buccal and lingual vestibules. The resulting stent is lined with a self-polymerizing soft relining material and is stabilized with circum-mandibular wires.

Results: In each case, intimate adaptation of the stent to the mandible improved skin graft survival and resulted in alveolar vestibular depths and contours that improved the retention of the removable dental prosthesis.

Conclusions: Customized stents with vestibular extension maximize skin graft survival and dental prosthetic rehabilitation following marginal mandibulectomy.

Introduction

Following marginal mandibulectomy, split-thickness skin graft (STSG) placement is frequently required to achieve soft-tissue coverage of the mandible in preparation for radiotherapy and denture fabrication. Ideally, the skin graft should completely cover the surgically exposed bone and re-establish the alveolar ridge contour and height so that removable prosthetic rehabilitation is optimized. The functionality of a removable partial or complete denture is determined by three factors:

1. **Support**: The resistance to movement of a prosthesis toward the tissue.
2. **Retention**: The resistance to vertical displacement of the prosthesis.
3. **Stability**: The resistance to prosthesis displacement by functional, horizontal, or rotational forces.

These factors are largely impacted by the presence, location and periodontal health of abutment teeth, the height and contour of the residual alveolar ridge, and the depth of the buccal and lingual vestibules. Hence, the placement of an immediate surgical stent which closely conforms to the contours of the surgically altered bony alveolar ridge and maximizes vestibular depth should improve function during speech, mastication and swallowing. Moreover, soft-tissue coverage of the mandible with a skin graft or flap that does not re-create the contours of the alveolar ridge may preclude prosthetic rehabilitation altogether. If this situation arises, secondary vestibuloplasty may be required, which results in delayed prosthetic rehabilitation and places the irradiated mandible at risk of osteoradionecrosis (ORN). This presentation describes a novel method of immediate surgical stent fabrication that achieves these goals.

Methods and Materials

**Pre-surgical Phase**
- A stone dental model is fabricated from an alginate (irreversible hydrocolloid) impression of the existing dentition and alveolar ridge
- An acrylic tray is fabricated on the stone cast with self-polymerizing methyl methacrylate
- The vestibular extensions or flanges of the acrylic tray are trimmed back approximately 2 mm with a rotary burr

**Surgical Phase**
- The marginal mandibulectomy is completed, preserving important abutment teeth and rounding off any sharp bony edges
- Brown impression compound\textsuperscript{TM} is inserted into the tray and the tray is placed on the mandibular alveolar ridge, molding the compound to conform to the altered surgical site. The tongue and buccal soft tissue are moved to reproduce the natural vestibular soft tissue contours that exist during oral function
- Coe-soft\textsuperscript{TM}, a self-polymerizing soft denture relinie material, is then poured into the hardened, molded brown compound tray. The stent is firmly seated on the mandible, once again moving the tongue and buccal soft tissues.
- Silk suture or circum-mandibular wires are placed to secure the stent to the mandible.

**Post-surgical Phase**
- The stent is removed 7 to 10 days following surgery
- Definitive prosthetic rehabilitation with a removable denture is completed three months after surgery and radiotherapy.

Results

Three patients who underwent marginal mandibulectomy with STSG placement and immediate mandibular surgical stent insertion have completed their dental rehabilitation with removable dentures. Each patient:

- has complete soft tissue coverage of the residual alveolar ridge
- is able to speak, chew and swallow with their denture inserted
- is pain-free during functional activity with the prosthesis in place

Conclusions

1. Custom-designed mandibular stents optimize re-creation of the buccal and lingual alveolar vestibules, leading to greater support, retention and stability of the definitive prosthesis.
2. Insertion of an immediate surgical stent that intimately conforms to the surgically altered alveolar ridge increases the likelihood of complete skin graft survival.
3. Achievement of the above-stated goals precludes the need for subsequent vestibuloplasty that delays prosthetic rehabilitation and places the irradiated mandible at risk for ORN. Consequently, the placement of a customized surgical stent following marginal mandibulectomy should be viewed as a valuable pre-prosthetic procedure.

References