

SEPTEMBER 1987

VOLUME 58 NUMBER 3

THE JOURNAL OF  
PROSTHETIC  
DENTISTRY

Fixed prosthodontics and operative dentistry

Removable prosthodontics

Maxillofacial prosthetics and dental implants

Craniomandibular function and dysfunction

Research and education

Dental technology

FOUNDED IN 1951 BY

The Academy of Denture Prosthodontics

The American Prosthodontic Society

The Pacific Coast Society of Prosthodontists

PUBLISHED BY

**MOSBY**

THE C.V. MOSBY COMPANY St. Louis, Mo., U.S.A.

ISSN 0022-3913

---

## Coordinated intraoral and extraoral prostheses in the rehabilitation of the orofacial cancer patient

Seymour Birnbach, D.D.S.,\* and Gerald L. Herman, D.M.D.\*\*

New York University College of Dentistry, New York, N.Y.

**R**adical surgery for treatment of cancer of the head and neck may result in unsightly and incapacitating defects of the face and oral cavity. Large facial defects are rarely amenable to surgical reconstruction because of their size and imperfect cosmetic results (Figs. 1 and 2). The primary objectives of prosthodontic treatment are the restoration of the vital functions of mastication, deglutition, speech, and the improvement of facial appearance.

Orofacial defects referred to the prosthodontist for restoration are usually the result of resection of epithelial tumors.<sup>1</sup> The facial defect may involve the nose and upper lip, the cheek and orbital contents, and may communicate with an intraoral maxillary defect. The restoration of function in harmony with facial esthetics poses one of the greatest challenges to the maxillofacial prosthodontist.

The prosthodontist must prepare the patient by explaining the functional and esthetic limitations of prosthetic reconstruction of large facial defects. Psychologic counseling is recommended as an adjunct to prosthodontic therapy. The patient must be considered in the

context of the social world in which he lives.<sup>2</sup> The rehabilitation must be managed by a team effort involving medical, dental, psychosocial, and speech and hearing expertise.

Communication and cooperation between the surgeon and the prosthodontist are essential for successful rehabilitation of the head and neck cancer patient. The prosthodontist should be consulted before surgery to examine the patient and obtain preoperative records and diagnostic casts. The surgeon should prepare the residual soft tissues to create undercut regions for retention of the facial prosthesis. In addition, complete resection of the upper lip is recommended when preoperative surgical evaluation reveals involvement of more than one half.<sup>3</sup> The stiffness and immobility of a surgically reconstructed upper lip make intraoral procedures difficult and may interfere with normal function.

The prosthodontic management of the patient with defects of intraoral and extraoral structures includes the immediate surgical prosthesis, the postsurgical transitional prosthesis, and the postsurgical definitive prosthesis.

### IMMEDIATE SURGICAL PROSTHESIS

After surgical resection, an immediate surgical prosthesis fabricated from preoperative casts is inserted to obturate the intraoral defect and support the skin graft

\*Professor of Prosthodontics and Occlusion, Director of Maxillofacial Prosthodontics.

\*\*Postgraduate student, Advanced Education Program in Prosthodontics.



Figs. 1 and 2. Postsurgical views of patient showing extensive loss of facial structures.

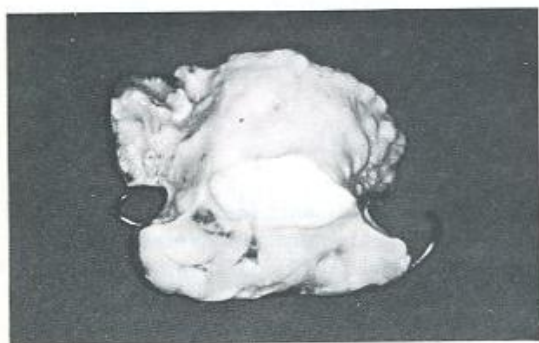


Fig. 3. Immediate surgical prosthesis relined with tissue conditioning material.

(Fig. 3).<sup>4</sup> The prosthesis should be light in weight, constructed of wrought wire clasps and acrylic resin, and should not include artificial teeth.<sup>5</sup> It is adjusted and modified in the operating room. The immediate surgical prosthesis allows the patient to feed normally by mouth instead of requiring nasal intubation.<sup>6</sup> In addition, the patient has intelligible speech and is encouraged to look forward to further definitive rehabilitation.

The immediate surgical prosthesis may be removed in 10 to 14 days after the skin graft has become firmly attached to the residual tissues, creating an optimal environment for definitive prosthodontic treatment.

#### TRANSITIONAL POSTSURGICAL PROSTHESES

Unlike the immediate surgical prosthesis, the intraoral transitional postsurgical prosthesis is fabricated on casts made from impressions of the existing anatomy of

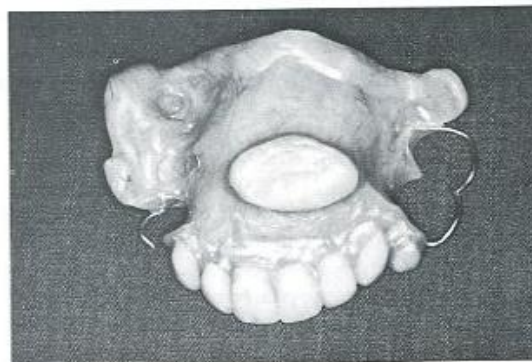


Fig. 4. Transitional postsurgical prosthesis.

the oral cavity and does not have to be modified as was done for the immediate prosthesis. The transitional prosthesis allows greater patient comfort and a more optimal level of function in speech and mastication (Fig. 4). All efforts should be made to retain as many teeth as possible regardless of their prognosis.<sup>7</sup> They are essential for the retention of the intraoral prosthesis and the restoration of mastication. The replacement of missing teeth produces an acceptable esthetic result, again reinforcing the positive potential for further prosthodontic rehabilitation.

A transitional facial prosthesis is fabricated at this time to provide the patient with normal anatomic facial contours and features. The transitional facial prosthesis restores the facial defect in harmony with the residual anatomy and allows the prosthodontist to evaluate the esthetic requirements. Modifications of the transitional facial prosthesis create a pattern for the definitive facial

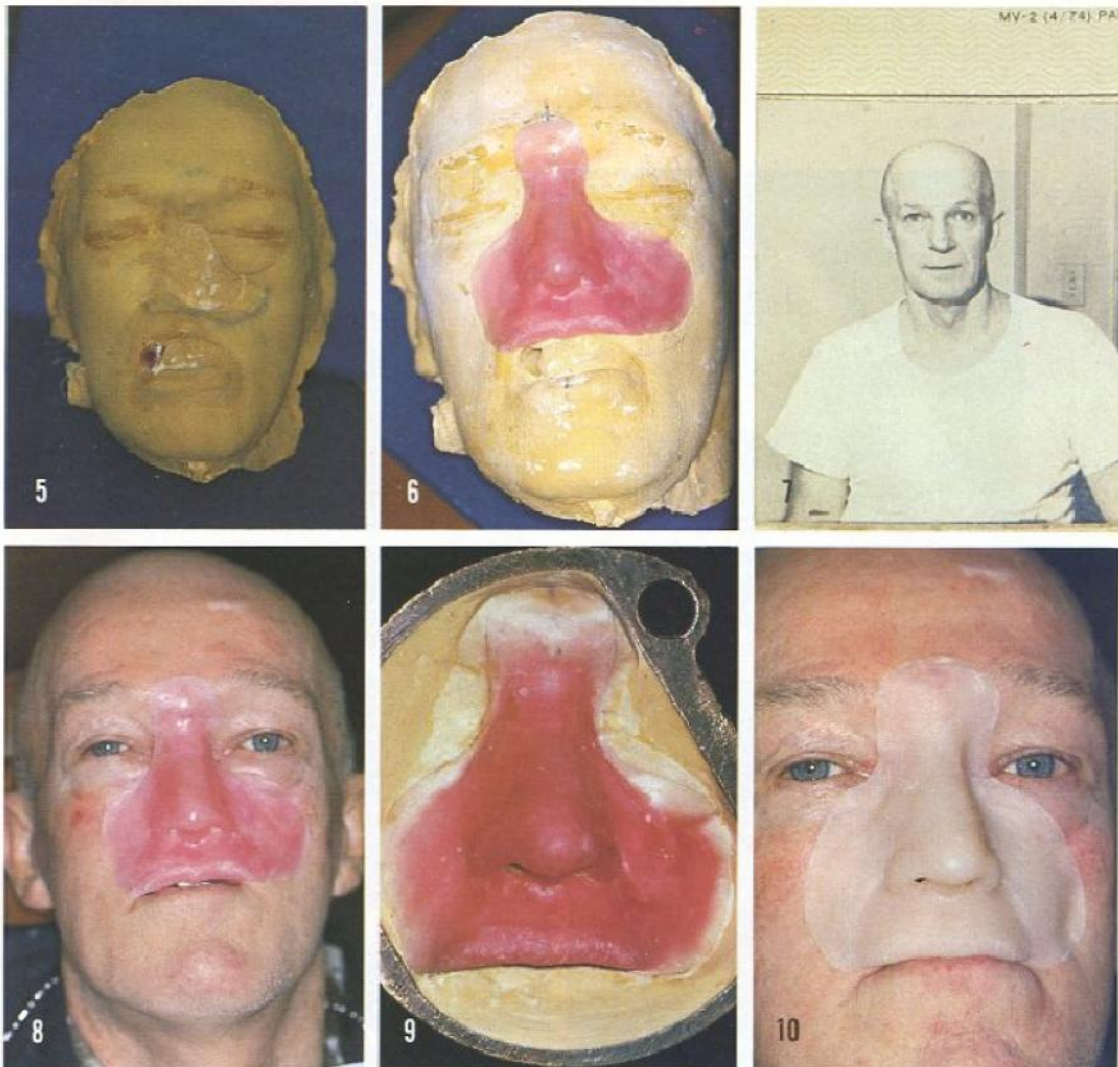


Fig. 5. Stone cast of facial moulage.  
 Fig. 6. Wax-up of transitional facial prosthesis.  
 Fig. 7. Old photographs may aid in esthetic interpretation of prosthesis.  
 Fig. 8. Waxed prosthesis tried on patient's face.  
 Fig. 9. Waxed prosthesis is flaked.  
 Fig. 10. Transitional facial prosthesis deflasked, trimmed, and tried on patient's face.

prosthesis. Every effort is made to ensure skin color match and functional adaptability without movement or loosening of the prosthesis under function.

**MOULAGE TECHNIQUE<sup>®</sup> AND FABRICATION OF FACIAL PROSTHESIS**

The patient's head is boxed in cardboard and wet paper towels. The eyebrows and eyelids are lubricated

with petroleum jelly. Fistulae are blocked with moistened gauze pads. A narrow tube is placed into the mouth to extend past the impression materials, protecting the airway.

The patient's face is covered with a creamy mix of irreversible hydrocolloid. Moistened gauze pads are unfolded and placed onto the setting irreversible hydrocolloid material. Impression plaster is mixed and layered

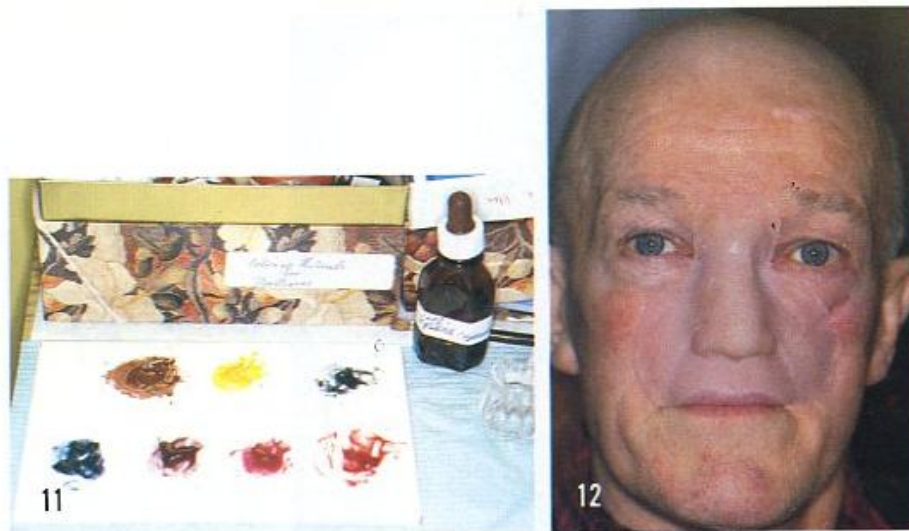


Fig. 11. Extrinsic coloring agents.

Fig. 12. Extrinsic coloration has been applied to facial prosthesis.

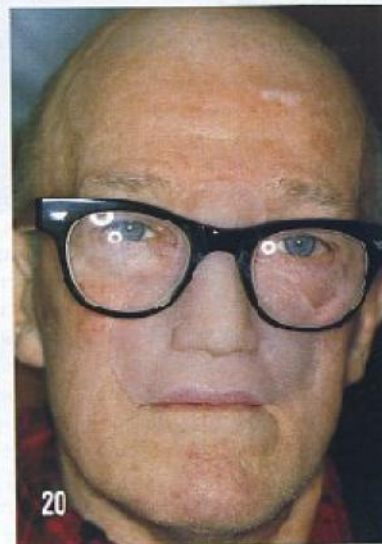


Fig. 13. Wax/irreversible hydrocolloid preliminary impression.

Fig. 14. Custom tray for final impression.

Fig. 15. Polysulfide rubber final impression.

Fig. 16. Master cast of maxillary arch.



**Fig. 17.** Prosthesis in place in patient's mouth. Obturator is visible at base of facial defect.

**Figs. 18 and 19.** Tissue surfaces of definitive facial prosthesis. Prosthesis is hollow, extends into undercuts of facial defect and makes contact with, but is not connected to, obturator portion of intraoral prosthesis.

**Fig. 20.** Definitive facial prosthesis. Spectacles may provide additional retention and make prosthesis less noticeable.

over the entire surface. Verbal and tactile communication is maintained with the patient during the entire impression procedure. After the impression plaster sets, the mouldage is removed and poured in dental stone (Fig. 5).

A layer of baseplate wax is adapted to the defect region on the stone cast. The wax is transferred to the

patient's face and the adaptation to the borders of the facial defect is evaluated to confirm the accuracy of the cast and to determine the extent of the margins of the prosthesis. The wax trial prosthesis is completed on the stone cast (Fig. 6). Old photographs may aid in the esthetic interpretation of the facial prosthesis (Fig. 7).

The wax trial prosthesis is tried on the patient's face.

Modifications of the wax carving are made until acceptable dimensions and contours are obtained (Fig. 8). The waxed prosthesis is then flaked (Fig. 9). The inner surface of larger prostheses can be hollowed to reduce their weight.

The flask is packed with poly(dimethylsiloxane) PDM and processed. After processing, the prosthesis is trimmed, placed on the patient's face, and the borders are further modified if necessary (Fig. 10). The prosthesis is stained with extrinsic coloring agents. The vehicle for the stains as well as the dilutant is a mixture of Dow Corning silicone type A and xylene. The colors are dabbed on with a brush, not painted (Fig. 11). After each stain is applied, the prosthesis is placed in an oven for 5 minutes at 100° C. When the prosthesis has cured to the slightly tacky stage, flour of pumice is applied with a brush to remove the sheen. The transitional facial prosthesis is delivered to the patient with complete instructions on placement, removal, and maintenance of the prosthesis (Fig. 12).

#### DEFINITIVE POSTSURGICAL PROSTHESES

Definitive prosthodontic treatment may be started after the surgeon has evaluated the healing of the defect and has decided that the patient may proceed for further prosthodontic treatment.

The preliminary impression for the definitive intraoral prosthesis is made with softened boxing wax in a modified stock tray. Two to three millimeters of wax are removed to allow for an impression of irreversible hydrocolloid (Fig. 13). The final impression is made with light-bodied polysulfide rubber in a border-molded custom impression tray (Fig. 14). The impression reproduces the residual palate, the defect region, the remaining teeth, and border structures (Fig. 15). The impression is boxed and poured in stone, producing a master cast (Fig. 16).

An acrylic resin record base and wax occlusion rim is fabricated on the master cast. A face-bow transfer and centric relation record are obtained to mount the master and opposing casts on a semiadjustable articulator. Artificial teeth are selected and arranged in wax. The waxed prosthesis is tried in. Esthetics, vertical dimension of occlusion, and centric relation are verified. The prosthesis is flaked and processed in poly(methyl methacrylate) resin. The processed denture is remounted and the occlusion is adjusted for dimensional changes. The prosthesis is finished and polished. Final occlusal adjustment is accomplished intraorally (Fig. 17).

The prosthesis is not delivered to the patient at this time because the transitional extraoral prosthesis will not fit the newly fabricated intraoral prosthesis. A new facial moulage is made with the definitive intraoral prosthesis in place in the patient's mouth. The definitive facial prosthesis is waxed, processed, and colored (Figs. 18 and 19). The prosthesis is secured on the face by

retention from existing undercuts and a medical grade adhesive on the borders. Spectacles may provide additional retention and make the prosthesis less noticeable (Fig. 20). The patient should be counseled in the use and maintenance of both prostheses.

Facial and intraoral prostheses should, if possible, not be connected to each other because this could cause embarrassing movements of the facial prosthesis during mastication and add to the difficulty of insertion and removal of either prosthesis.<sup>9</sup>

#### CONCLUSIONS

Rehabilitation of the maxillofacial patient with composite orofacial defects after cancer surgery involves a combined effort of the surgical, prosthetic, and social service teams.

The prosthodontist is limited by the materials available for facial restoration, movable tissue borders, difficulty in retaining large prostheses, and patient acceptance. Sound prosthodontic principles must be followed in the treatment of the maxillofacial patient.

Immediate prosthetic treatment designed to restore basic functions and a coordinated aftercare program including transitional and definitive treatment aids in the psychological well-being of the patient. Patients with complex orofacial defects following cancer surgery can be rehabilitated with a combination of intraoral and extraoral prostheses that results in adequate function and an acceptable appearance, allowing them to return as functioning citizens within their community.

#### REFERENCES

1. Beumer J, Curtis TA, Firtell DN. Maxillofacial rehabilitation. St Louis: The CV Mosby Co, 1979;311.
2. MacGregor FC. Transformation and identity—the face and plastic surgery. New York: Quadrangle/The New York Times Book Co, 1974;177.
3. Marunick MT, Harrison R, Beumer J. Prosthodontic rehabilitation of midfacial defects. *J PROSTHET DENT* 1985;54:553-60.
4. Valauri AJ. Maxillofacial prosthetics. In: Converse J. Reconstructive plastic surgery, vol 5, 2nd ed. Philadelphia: WB Saunders Co, 1977;2928.
5. Ackerman AJ. The prosthetic management of oral and facial defects following cancer surgery. *J PROSTHET DENT* 1955;5:413-32.
6. Birnbach S. Immediate surgical sectional stent prosthesis for maxillary resection. *J PROSTHET DENT* 1978;39:447-50.
7. Adisman IK. Prostheses in the treatment of malignant tumors of the paranasal sinuses. International workshop on cancer of the head and neck. New York: Butterworth and Co Ltd, 1965;247.
8. Metz HH. Maxillofacial prosthetic rehabilitation after mouth and facial surgery. *J PROSTHET DENT* 1964;14:1169-77.
9. Scannell JB. Practical considerations in the dental treatment of patients with head and neck cancer. *J PROSTHET DENT* 1965; 15:764-9.

Reprint requests to:  
DR. SEYMOUR BIRNBACH  
NEW YORK UNIVERSITY  
COLLEGE OF DENTISTRY  
NEW YORK, NY 10010