Management of the Maxillary Cancer Patient—What the General Dentist Should Know

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ABSTRACT

Background:

Maxillary defects are created following surgical treatment of patients with benign and malignant neoplasms, trauma or congenital defects. The size of these defects influences the degree of debilitation.

Case Description:

This patient lacks the conventional support, stability and retention when fabrication of the prosthesis is planned. The prosthesis that is used to close this palatal defect is called the hollow bulb obturator.

Clinical Outcomes:

It improves speech, deglutition, esthetics and function for the patient.

Introduction

One of the most challenging yet rewarding areas in dentistry is the treatment and restoration of patients with maxillary defects. The dental health status of these patients is the most significant consideration when planning for prosthetic rehabilitation.[1] It is imperative to note that success for these patients lies in the ability of the general dentist to recognize and refer these types of tumorous growths at an early stage and to pass this information onto the specialists for early treatment.[2] This early referral, will then allow the prosthodontist and the surgical team to intervene and initiate treatment immediately to provide the most ideal outcome. Despite the frequency at which the oral cavity is examined by dentists, approximately 60% of intraoral carcinomas are well-advanced at the time of detection and survival morbidity is quite high, with five-year rates as low as 30% in some instances.[3] An accurate and periodic soft tissue and hard tissue examination therefore becomes critical. The general dentist should thus be able to diagnose these conditions after careful study of clinical and radiographic findings. Early detection is always the key, but this article will deal with the treatment of an established lesion. The general dentist also plays a significant secondary role in the management of these patients. They will most often be involved in providing follow-up care for these patients, which may include dental prophylaxis, oral hygiene maintenance and minor prosthetic adjustments. Cancer patients are often treated with radiotherapy and usually suffer from signs and symptoms of xerostomia. This invariably complicates the treatment as these patients are more prone to caries and the loss of key abutment teeth becomes an issue and should be avoided. The delivery of fluoride trays and the periodic assessment of restorative needs should be addressed by the general dentist to help maintain oral health for these patients. They also serve to note any suspicious soft tissue changes that may occur in subsequent appointments.

Tumors of the maxilla may be benign or malignant originating from epidermoid, glandular or mesenchymal tissues. The majority of tumors in the palate and the paranasal sinuses are epidermoid carcinomas.[1] The signs and symptoms must be a significant warning to the dentist that a pathologic condition is in progress.

Signs and symptoms of maxillary tumors include dental pain and loosening of the teeth, and in progressive untreated cases, swelling around the cheeks and eyes can be visible. Nasal congestion, infection and bleeding also follow. Radiographs of the sinuses reveal cloudiness and erosion of the bony wall in more advanced cases. At this point, treatment is by surgical removal and followed or preceded by radiation therapy.[4] These tumors can be either benign or malignant which can affect the behavior of the palatal tumors. Benign tumors grow more slowly, cause minimal induration at the margins and do not penetrate the mucosa, unlike the malignant neoplasm that tends to be quite aggressive in nature.

Management is established by a combination of radiation and surgical treatment. Surgical removal of malignant tumors is accomplished by a maxillectomy, performed by an oral and maxillofacial surgeon. Surgical modifications are incorporated into the treatment plan to enhance prosthetic prognosis, and most maxillary defects can be restored to near normal function and appearance. Attempts are made to save as much hard palate as possible, and maintenance of the distal part of the maxillary tuberosity will aid in the support and retention of the prosthesis. Also, skin grafts may be incorporated into the resection site to improve the tolerance and the retention of the obturator prosthesis.[5]

When considering restoration, principles of retention, support and stability become paramount. This can be accomplished from the residual

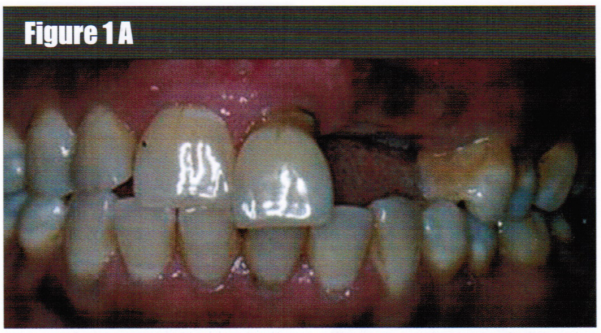
structures (hard palate, soft palate and the defect) as well as the remaining dentition.[6] Retention of key abutments becomes critical in the selection process of the removable partial denture (RPD) design. In 1978, Dr. Aramany introduced a classification system to outline postsurgical maxillary defects.[7] The classification also aided in grouping the surgical defects along with the remaining teeth and was used to develop a series of obturator designs in the partially dentate maxillectomy patient.

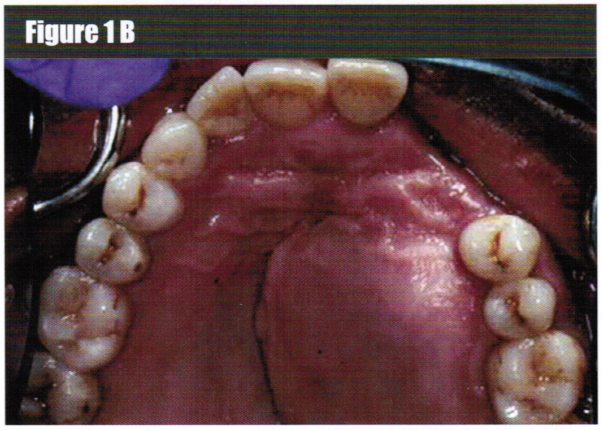
Principles of RPD design are incorporated into the design of the maxillary obturator prosthesis.[8] There is a need for a rigid major connector and guide planes to enhance stability and bracing. Designs must maximize support along the remaining oral structure as well as the dentition through rests. Direct retainers should be passive at rest but provide sufficient resistance to dislodgement forces when in function.[5] Stress to the remaining abutment teeth must be distributed evenly. Finally, the occlusal plane has to be controlled in the design.

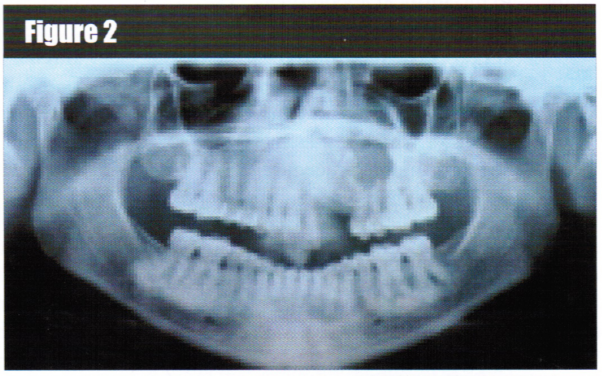
Patient Presentation and Diagnosis

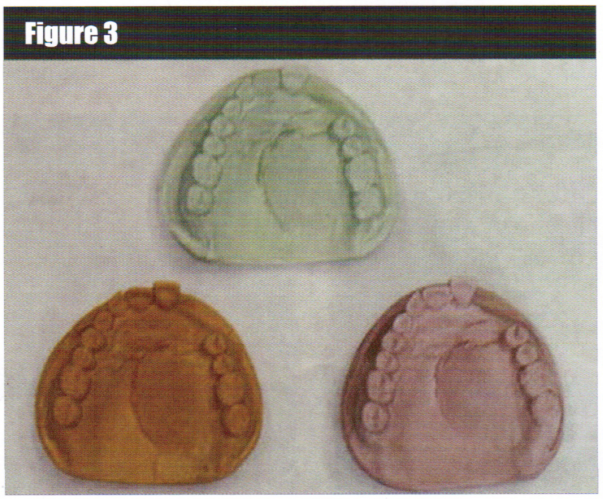
The patient presented with a large bony swelling of the left maxilla as illustrated in **Figure 1A** and **1B**. Clinical findings revealed extension of the expansile swelling in the region of the left maxilla extending from tooth #12 to #15 mesiodistally and extension just beyond the midline.

The radiographic examination in **Figure 2** revealed cloudiness and bony resorption within the left maxillary sinus and displacement of the maxillary dentition with loss of the alveolar lamina dura.









A biopsy was performed and determined to be a squamous cell carcinoma. This patient was treated with a combination radiotherapy (65 Gy) and surgical intervention. Surgically, a Class 1 curved arch form was introduced according to the Aramany classification system.[7] This classical maxillary resection unilateral defect involves removal of the hard palate, alveolar ridge and dentition to the midline. Resection at the midline was made through the socket of the alveolar process through a transalveolar approach.[8] The prosthetic phase of treatment was initiated as outlined.

Technique

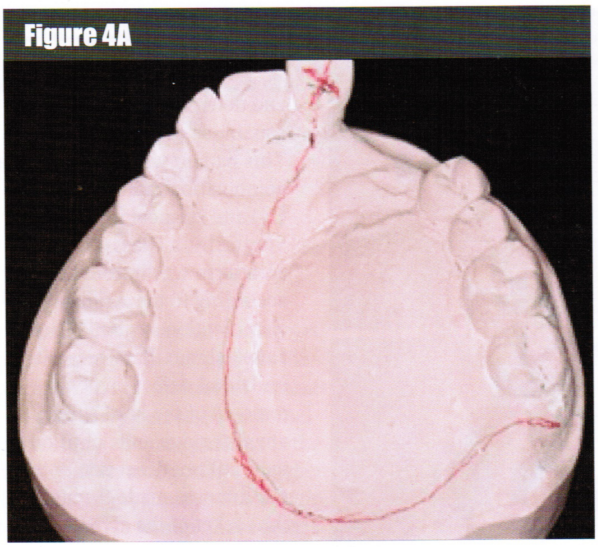
The technique of prosthetic construction was divided into the following stages: Pre-surgical; Surgical; Post-surgical; Definitive; Delivery and Follow-up.

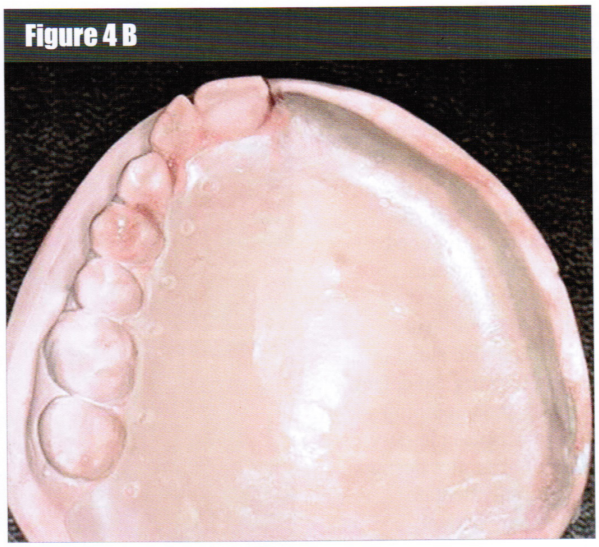
Pre-surgical Impressions

It is crucial that the presurgical impressions are accurate in recording the full vestibular depth and width of the site to be resected. Overextension of the soft tissue reflections in the vestibular area will allow maximum extension of the surgical obturator into the defect site and therefore provide maximal support for the surgical dressing.

Impressions were made using an irreversible hydrocolloid, and the resultants cast were duplicated as illustrated in **Figure 3**.

Three casts are required. The first cast was preserved as a record of the pre-surgical stage. The second cast was used in the design and fabrication of the surgical obturator. The third cast was used to fabricate the interim obturator prostheses.





The extent of the resection was discussed with the oral surgeon and marked on the cast for the fabrication of the surgical obturator. Care was taken to try to preserve the posterior extent of the maxillary tuberosity on the resected side so as to establish a tripod of support in the delivery of the final prosthesis.

Surgical Obturator Prosthesis

The surgical obturator affords several advantages for the dentate maxillectomy patient when the remaining dentition is suitable to retain the prosthesis. First, it supports the surgical dressing, which in turn supports the facial flap and the skin graft within the defect. Second, it provides a barrier between the defect site and the oral cavity which reduces oral contamination of the wound site.[9] The patient is also able to eat without the use of a nasogastric tube, and speaking is less severely compromised as normal palatal contours are reestablished. Equally important is the benefit afforded to the patient of a reduction in the psychological impact of the surgical procedure. The surgical obturator in **Figure 4A** and **4B** was fabricated on the second cast prior to the surgical appointment. This is to be left in place for 7 to 10 days following surgery. The placement of teeth on the obturator is contraindicated as this removes the visual advantage of the obturator which serves to act as a surgical stent during the procedure.[1]

The teeth in the area of resection were removed and the surrounding alveolar process in the defect site was also reduced by 2mm. This is done to allow the placement of teeth on the intermediate obturator without requiring excessive ridge grinding of the denture teeth. This requires removal at the alveolar process only and not at the buccal and palatal extremities.

Following the cast reductions, the interdental and soft tissue undercuts are blocked out and the cast duplicated.

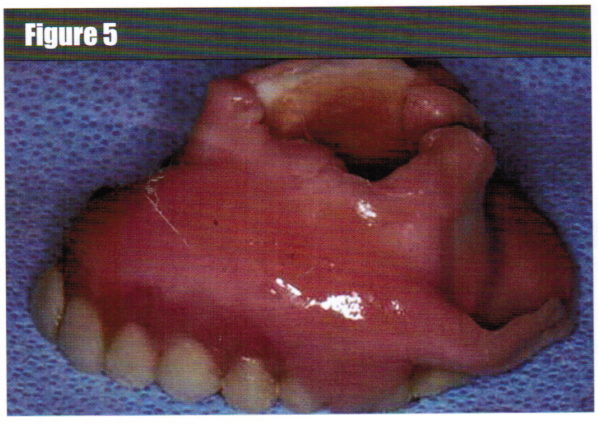
The casts are mounted and the surgical obturator is fabricated on the cast using clear triad. The clear Triad material is brought to the height of contour on the lingual surface of the remaining teeth.

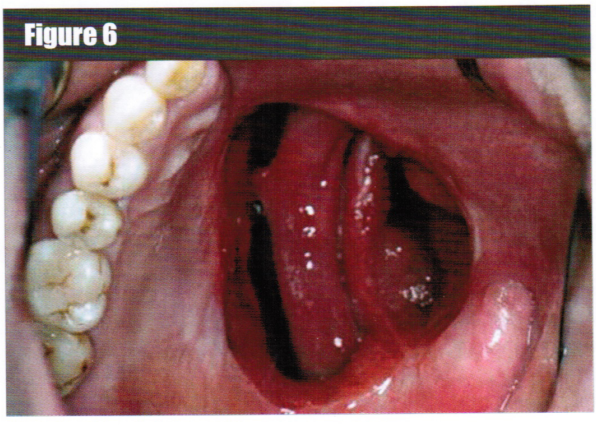
Multiple holes are placed at the periphery on the dentate side for dental suturing onto the remaining teeth interdentally.

Post-surgical Obturator Prosthesis

The third cast was mounted and used for the fabrication of the interim obturator prosthesis.

The cast was surveyed to determine the optimal placement of multiple wire retentive clasps. These clasps were positioned as close to the surgical defect as possible and at a maximum distance





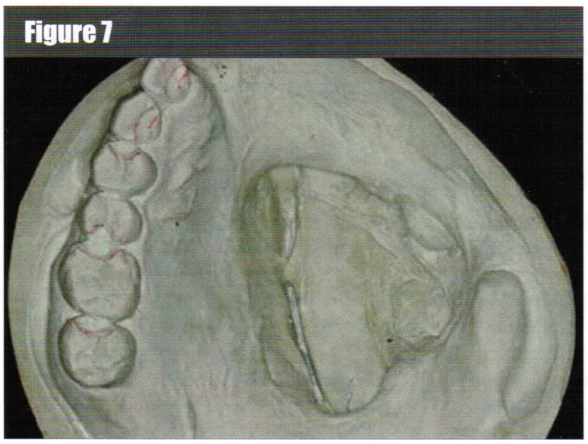


Figure 7

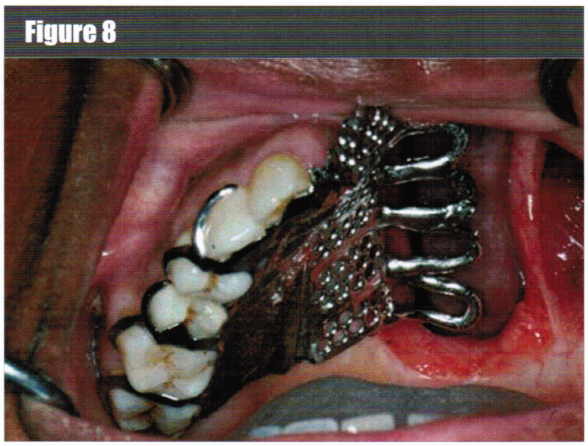


Figure 8

from each other.[7] The resin portion of the obturator prosthesis was made to contact the axial surfaces of the remaining teeth to try to increase stability and extend the principle of establishing broad coverage.

The prosthesis was then waxed and the dentition set to correspond to both the existing anterior and posterior occlusal planes.

The placement of posterior teeth was accomplished as illustrated in **Figure 5** to assist with the establishment of an occlusal stop which would help during the reline procedure.

At the clinical appointment 10 days post surgery, the surgical obturator and dressing was removed and the postsurgical obturator was tried in. At this point seating of the prosthesis was evaluated and modification in the area of the defect was initiated. This is critical to the function and comfort of the patient.

The obturator at this stage was relined with a soft reline material (Coe-Soft), and the patient was shown how to insert and remove the prosthesis, hygiene instructions given and should be worn during sleep and rarely removed. Continued relines were performed during the six-months post-surgical healing.[9]

Definitive Obturator Prosthesis

At this point postsurgical healing had been established as seen in **Figure 6**. The remaining dentition was maintained periodontally and restorations placed during the healing phase, if deemed necessary. A preliminary design was established and tooth modifications established to aid the design process according to the Class 1 Aramany Classification.

Preliminary hydrocolloid impressions were made using stock tray that was modified. Prior to the impression undercuts in the defect were blocked out with gauze lubricated with petroleum jelly. It is important to place sufficient impression material into the defect to record the lateral extension of the defect and a cast poured.

A custom tray was then fabricated in triad material. At the clinical appointment the extension of the tray was evaluated using disclosing wax and adjusted accordingly.

Conventional border molding was then carried out using greenstick compound. The patient was directed to make head and mandibular and swallowing movements. It is important to record the lateral aspect of the defect side and duplicate the indentation created by the lateral scar band.

The modeling plastic was cut back by 1mm, and the final impression was made in polyvinylsiloxane. **Figure 7** illustrates the master cast obtained. At this stage it is imperative to establish a good impression of the defect.

The master cast was made and mounted on a semi-adjustable articulator to assist in the fabrication of the metal framework, which followed the tripodal obturator design to establish support, retention, bracing and guide planes for the

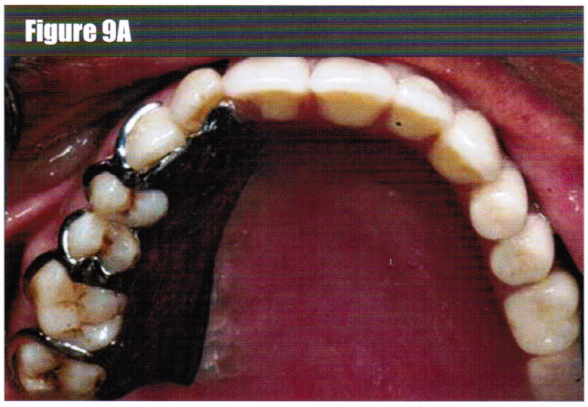


Figure 9A

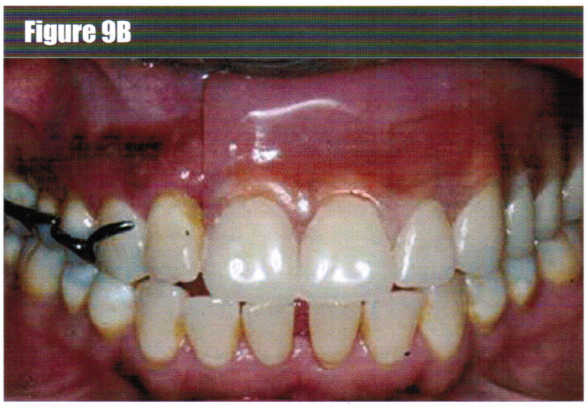


Figure 9B

definitive prosthesis.

The cast framework was then tried in the mouth and seating was verified as seen in **Figure 8**. An appropriate frictional fit should be established in the framework to resist the anticipated displacement forces that are common in this type of prosthesis. The framework was adjusted.

Following this, the teeth were set and waxed to full contour and processed.

On return the hollow tube obturator was inspected and any sharp area removed on the intaglio surface.

Delivery Appointment

The delivery appointment is usually quite brief as the patient is accustomed to the interim obturator at this point.

Pressure spots are evaluated using pressure indicating paste and adjustments made. The bulb portion was checked for functional pressure with a tissue conditioning material with contrasting color. **Figures 9A** and **9B** display the completed prosthesis.

Post-insertion instructions are given and instruction that the prosthesis should be worn for 24 hours a day. The finished denture was then custom tinted and the patient dismissed.

Post-insertion Follow-up

At 24 hours the patient returned for follow-up.

Disclosing techniques were used to identify areas of excessive pressure and adjusted accordingly. Should the patient complain of leakage from the nose and notice a change in their speech, this is usually an indication that the tissues that are contacting the obturator prosthesis are changing in shape.

Obturator bulb modification is required at periodic intervals to maintain patient comfort and function.

CONCLUSION

The treatment of maxillofacial defect prosthodontic patients is a challenging and protracted process that needs to be treated by the prosthodontst and the multidisciplinary team. The general dentist has a large part to play in identifying the signs and symptoms of clinical and radiographic changes in order to exact a swift referral. Also, the general dentist will be called upon to be part of the team in the after care of these patients. Understanding the treatment stages therefore becomes critical. The correct sequencing of clinical and laboratory steps as well as the management of the patient determine the success of the prosthesis. When done well, it can be a very satisfying experience for both the dentist and the patient.

Disclosure. The authors did not report any disclosures.

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1. Despite the frequency at which the oral cavity is examined, what percentage of intraoral carcinomas that are well advanced at the time of detection:
   a. 18%
   b. 30%
   c. 38%
   d. 60%

2. The majority of tumors in the palate and paranasal sinuses originate in which of the following tissues:
   a. Epidermoid
   b. Glandular
   c. Mesenchymal

3. What are some of the early signs and symptoms that a tumor may be developing in the maxilla:
   a. Nasal congestion
   b. Infection and bleeding
   c. Dental pain and loosening of teeth
   d. Swelling around the cheeks and eyes

4. After completion of periodic relines during the Postsurgical Obturator prosthesis phase, at what point can the construction of the definitive Obturator prosthesis begin:
   a. 3 months
   b. 6 months
   c. 8 months
   d. 12 months

5. The general dentist is responsible for all of the following in the detection of possible benign and malignant tumors EXCEPT:
   a. Being able to identify the signs and symptoms of clinical and radiographic changes that may occur
   b. Enforce a strict referral for those patients who show signs and symptoms of abnormal changes
   c. Being responsible for the aftercare and maintenance of these patients
   d. Responsible for the construction of the Obturator Prosthesis

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