PROSTHODONTIC MANAGEMENT OF MAXILLOFACIAL DEFECTS AFTER CANCER SURGERY

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SYNOPSIS

Surgery for maxillofacial cancer often creates a defect, which may affect speech, swallowing, mastication and facial appearance. The provision of a prosthesis is one method to help restore these physiologic and psychologic functions. Prosthodontic planning and rehabilitation should be an integral part of the team management to provide not just the preservation, but a quality of life for the patient. Various types of appliances are illustrated and the role of the dental surgeon is emphasised.

Key words: Maxillofacial obturators; Maxillofacial prosthodontics/prostheses.

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INTRODUCTION

Surgical resection is an established and common method of treatment for maxillofacial cancer. Such intervening surgery in this region may involve the destruction of antral, nasal, or orbital contents and the jaws. Normally, the end result is a defect which may affect speech, swallowing, mastication and facial appearance.

The replacement of lost parts caused by ablative cancer surgery is never easy to achieve by reconstructive surgery, especially when the initial operation is extensive and destructive. It would further subject the patient to another trying period. There is always the difficulty to reproduce the former shape, size and colour of the tissues.

Prosthodontic restoration of functions and facial form is an excellent method in the replacement of missing parts and restoration of contour. Familiarity with the potentials and techniques of prosthodontic rehabilitation is an important concern for the head and neck oncologist. Over the last twenty years, maxillofacial prosthodontics, has developed tremendously. Pertinent research in materials, designs and methods have resulted in a whole array of possible prostheses that can be provided to meet specific patient needs. No longer is the oncologist just concerned with the preservation of the life of the patient. The quality of life, after treatment, is emphasised.

The dental surgeon is an integral and important member of the oncology team in the multi-disciplinary management of cancer involving the oral and maxillofacial regions (1). The control of dental pathology and problems contributes to the immediate and long term success of cancer treatment and facilitates rehabilitation. Various specialties in dentistry are called on to provide the necessary treatment at different phases of management.

Prosthodontic management of maxillofacial defects after cancer surgery can be divided into three phases (2):

a. construction of a prosthesis pre-operatively and inserted at operation.
b. post-operative modification of the prosthesis during the recovery period.
c. construction of a definitive prosthesis employing all the established principles of prosthodontics, when the healing is complete and prognosis is not questionable.

A maxillofacial prosthesis is usually in the form of an obturator, held onto an acrylic base. Its primary role is to aid healing during the recovery period and to shorten long-term convalescence and rehabilitation. It supports the soft tissues, thus minimising scar contracture, protects the wound from trauma and contamination with food debris, maintains skin grafts in position and prevents excessive formation of haematoma. The initial obturation of the defect can be achieved by the filling in with materials such as ribbon gauze, gutta percha, silicone, silastic, tissue conditioners and acrylic. The definitive prosthesis furthermore improves speech, mastication, aesthetics and gives a psychological uplift to the patient.

CASE REPORTS

Case 1

A 47-year-old Chinese male had a left total maxillectomy for an adenocystic carcinoma of the left antrum (Figure 1a). There was partial removal of the zygomatic arch and conchae on the same side. The orbital floor and rim were left intact. The raw areas were skin grafted. The defect was obturated with ribbon gauze and a tissue conditioner, loaded onto a preformed acrylic plate. During this recovery phase, the obturator bulb was readjusted on several occasions to relate to the healing. Intelligible speech was possible and he had no fluid regurgitation through his nose when drinking. A definitive denture cum obturator (Figure 1b), on a chrome-cobalt base was issued three months post-operatively. This was secured onto his remaining teeth and other structrues (Figure 1c). A strict oral and dental health regime was instituted.

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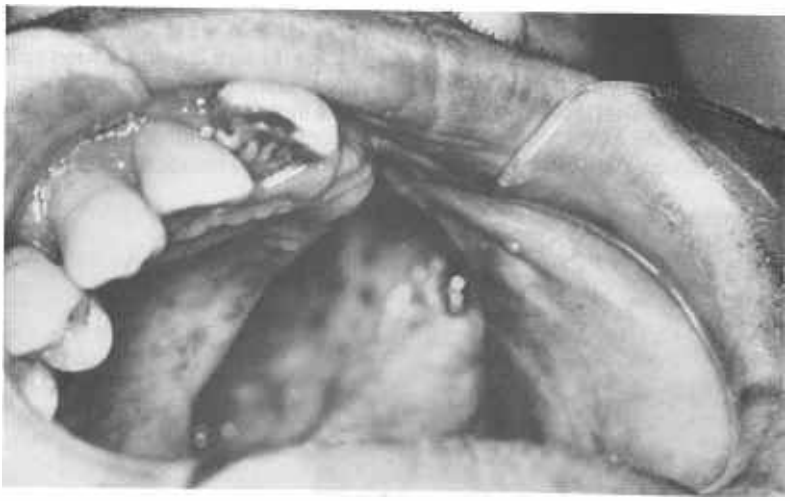

Figure 1(a) — Intra-oral defect following maxillectomy.

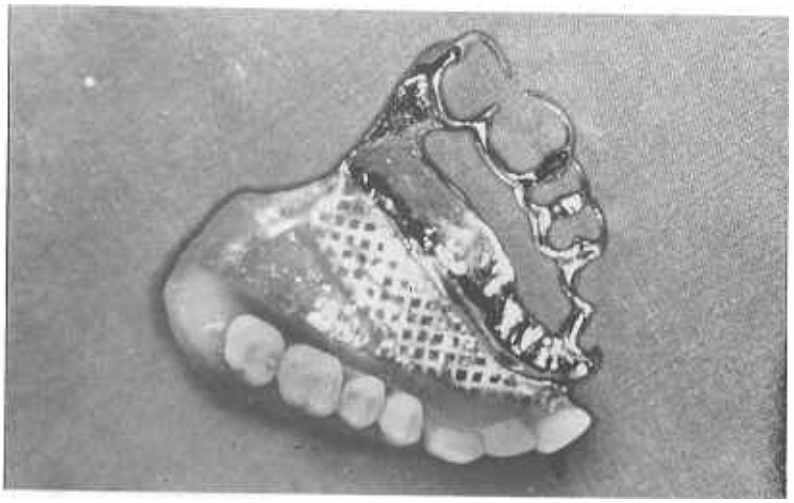

Figure 1(b) — Denture cum obturator, on a chrome-colbalt base.

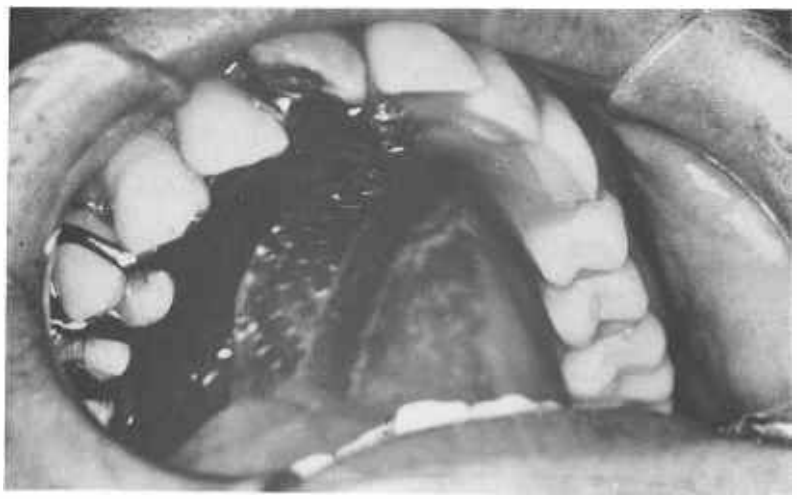

Figure 1(c) — Restoration of occlusion and provision of seal for oral functions.

Case 2

A 60-year-old Chinese male had a right maxillectomy and exoneration of the right globe of the eye for eradication of a papillary adenocarcinoma. Initial obturation of the intra-oral defect was similar to the first case. The external defect was covered surgically by a forehead flap (Figure 2a). Impression was taken for the construction of the eye prosthesis, made of silskin incorporated into the acrylic resin. This was to be attached to a pair of spectacles (Figure 2b) and issued subsequent to the intra-oral prosthesis. Retention was poor for both prostheses as it was indirect. The patient could move about without much notices from the public and he performed satisfactory speech and mastication (Figure 2c).

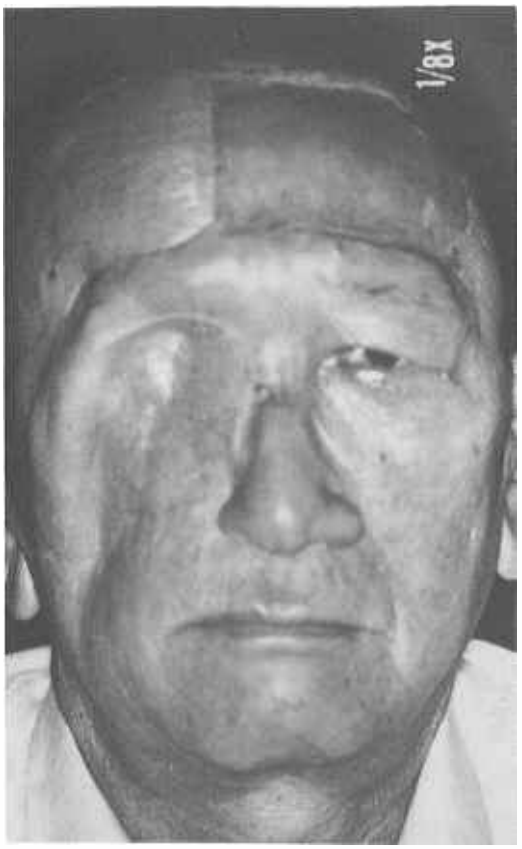

Figure 2(a) — Orbital defect covered by forehead flap.

Figure 2(b) — Eye prosthesis attached to a pair of spectacles.

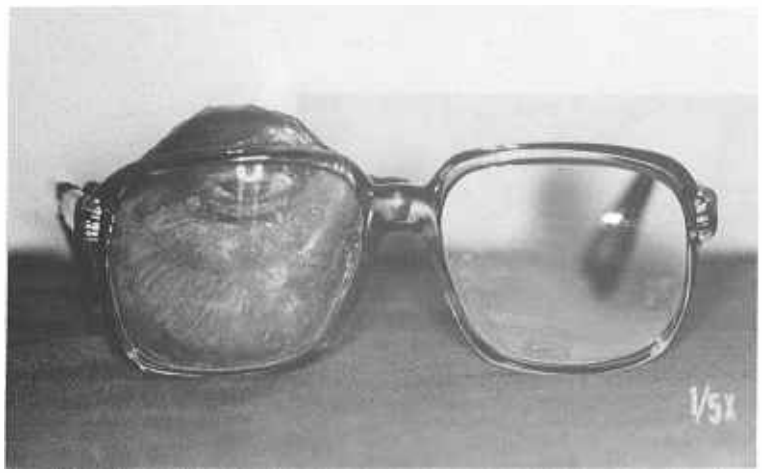

Figure 2(c) — Camouflage of eye defect when spectacles are worn.

Case 3

A 56-year-old Chinese female had a basal cell carcinoma affecting her nose. Surgical excision of the lesion led to a defect. A simple nasal prosthesis, colour-matched, was fabricated in the usual laboratory process (Figure 3a). This was issued for aesthetic purposes and retention was by means of adhesives (Figure 3b).

Case 4

A 68 year-old Australian man had squamous cell carcinoma of the nose, invading the palate and nasal septum. Resection led to a large facial defect involving the nasal, antral and palatal tissues (Figure 4a). Titanium implants were inserted to the facial skeleton for retention of a rigid bar framework and clip-on facial and denture prostheses. This is an example of a combined intra-oral and extra-oral devices. The implants, osseo-integrated, provided a firm base for direct attachment. Restoration of the facial form and functions were more than adaquately provided by this advanced form of prosthodontic management (Figure 4b).

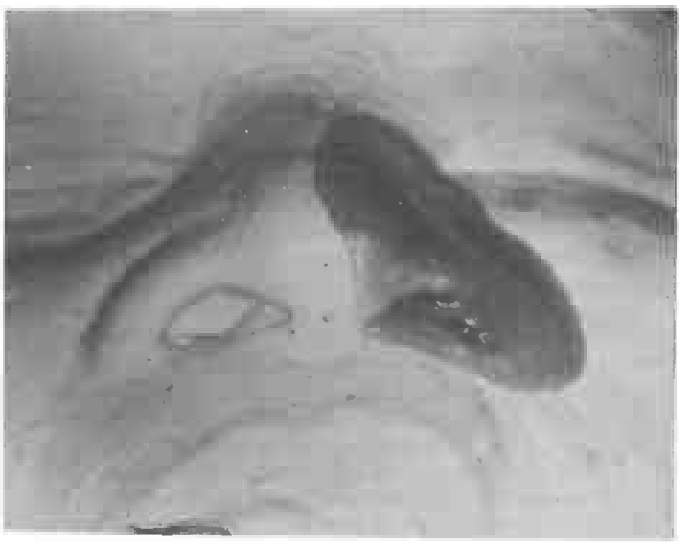

Figure 3(a) — Wax-up model of nasal prosthesis on plaster mould. Ready for processing.

Figure 3(b) — Nasal prosthesis attached by means of adhesives. There is a good colour match.

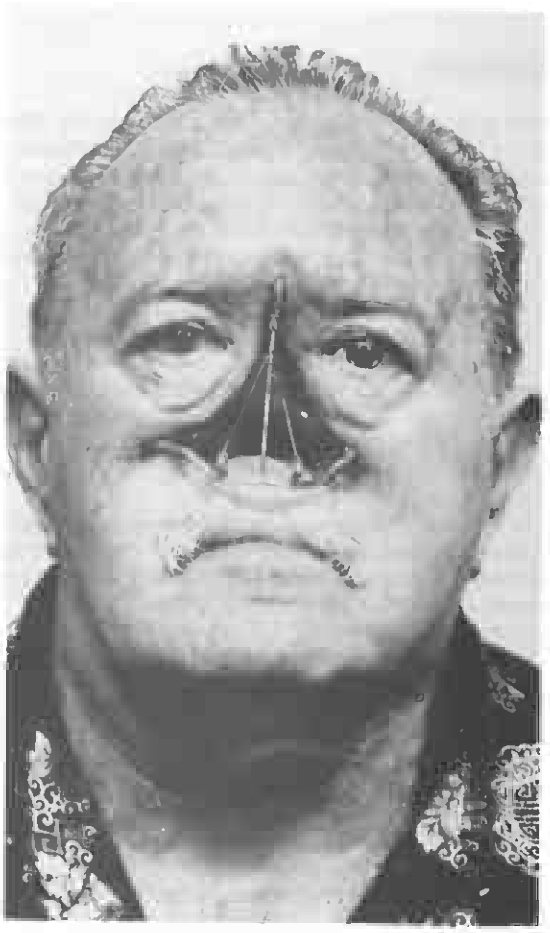

Figure 4(a) — Large facial and oral defects. Framework attached to adjacent facial bones through osseo-integration.

Figure 4(b) — Combined facial and oral prosthodontic management of defect.

DISCUSSION

Patient education is perhaps, the first step in the rehabilitation (3). Prior to surgery, it is important to familiarize the patient with the functional and cosmetic expectations and limitations of the maxillofacial prosthesis. He should be able to discuss the various possibilities of surgery and prosthodontics with all members of the team. The role of the dental surgeon is emphasised here. Good oral and dental health are paramount to the eventual success. Elimination of dental pathologies and sepsis, restoration of the dentition and its preparation for maximal retention of the prosthesis are some important pre-operative procedures. The art and science of the provision of a maxillofacial prosthesis lie within the skills of the dental surgeon. Good technical and laboratory support are obviously essential.

In the local Faculty of Dentistry, the authors together with some colleagues, are familiar with the techniques described in the case reports. The choice of materials and methods depend on the presenting facial form and the expectation of the patient. Although experienced in the use of osseo-integrated implants intra-orally, the opportunity has not arisen yet for its use on extra-oral appliances. We sincerely believe the thrust of maxillo-facial prosthodontics would move into this direction.

The extent of surgery should take into the consideration of providing a good foundation (skeletal and soft tissues) for the eventual prosthesis. One fundamental principle is to retain the hard palate and dentition, as much as possible. The excision can be outlined by the surgeon on a diagnostic cast, from which the extent of the surgical prosthesis can be determined and planned.

The first obturator (pre-planned) is inserted at the end of the operation. Normally it is secured in place with the help of intraosseous wiring to the surrounding bone. Teeth are not provided at this stage. The purpose of the obturator had been earlier outlined. An interim prosthesis is provided during the healing phase. It is fully extended to the margins of the defect with the use of a soft obturating mass. This is adjusted as the healing progresses. A definitive prosthesis is issued about 3-6 months post-operatively. Now it functions as a denture cum obturator. Intra-orally, the difficulty associated with an obturator relates to the soft palate region. Here, because of its movements during oral functions, seal and stability may be affected. Correct extension and the use of soft liners help to minimise the problems.

The restoration of good speech proves to be difficult in most cases. Besides the prosthesis, the patient has to learn to adapt to the new oral environment. Speech therapy is often suggested. Mastication and swalloing are quite adaquately provided by our present techniques.

In the case of extra-oral fixtures, they provide a prosthetic and cosmetic replacement, normally with no functional contribution. Restoration of surgically induced extra-oral defects have been illustrated. Two problems are encountered and they are attachment and camouflage. Retention can be provided by undercuts in the defect, the attachment to external appliances, eg. a pair of spectacles or by the use of adhesives. Skin grafted areas usually provide stable retentive surfaces. The challenge in our experience, lies in the production of a well colour-matched and toned prosthesis, to make it look life-like. Here, technical support and the use of good materials are essential.

The use of extra-oral osseo-integrated implants in maxillofacial prosthodontics is a new advance in this region (4), although its applications in intra-oral stituations are widely accepted and practised. They provide a much better improvement in the retention of the prosthesis without the aid of other appliances. These implants are usually made of titanium and their insertion into bone and the subsequent preparation of the prosthesis to attach to them are simple operations. Cost, however, to the patient, is substantial because of the materials used.

The ear and the nose are relatively immobile structures and their replacement can therefore look quite life-like, especially when it is well colour-matched and toned. Prosthodontic rehabilitation is far better than surgical reconstruction for aesthetics. The eyes move constantly and so do the eyelids. Here, cosmetic results are harder to achieve. The artificial eye could be camouflaged with tinted spectacles, and it is set in its appearance at central gaze for a natural look.

The materials that are used for the obturation and prosthesis are varied. There is great advancement in the material's science and technology. The choice of any of them depends on the operator's experience, technical and laboratory back-up.

Usually, ribbon gauze is used to pack into the defect immediately after the surgery. It is impregnated with flavine, Whitehead Varnish or other obtundent antiseptic. A considerable length is required for a large cavity. It is absorbent and can be foul-smelling in a few days. It also tends to stick to the wound. The use of gutta percha is also popular. It needs to be softened by hot water, kneaded and applied when it is rubbery. It tends to be retractile, hard and therefore has a poor peripheral seal.

Nowadays, functional tissue conditions are preferred (5). They come normally in the form of pre-packed powder (polyethylmethacrylate) and liquid (aromatic ester-ethyl alcohol). Examples of such products in the market are Viscogel, FITT, Tempo, Coe-comfort and Hydrocast.

The materials can be easily mixed and manipulated to a smooth consistency which can then be moulded easily to the defect. It sets to a firm mass but remains resilient for a long time. Its resilience allows easy insertion and removal. Most important, the material can actually flow under functional conditions, which can be useful for obturation in soft and mobile areas like the soft palate.

Addition and alteration (trimming) can be easily done. One good mehthod is to use it together with ribbon gauze, the latter is utilised to block off the undercuts. The ribbon gauze is removed in two weeks or so, and the elastic bulb is adjusted accordingly.

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