

Prosthetic Rehabilitation of Maxillectomy Cases***

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Facial harmony is directly dependant on the muscular tone and this in turn is dependant on the position of teeth and relation of adjacent anatomic structures namely, maxilla and mandible. When these are deranged due to any reason, facial deformity is noticed. Any facial deformity is of a handicapping nature because of the psychologic trauma imparted by it. A maxillary deformity can be of this nature if not rehabilitated. Leaving esthetics, derangement of the following also occurs.

1. Speech
2. Deglutition and
3. Mastication.

The aim in rehabilitating a maxillectomy patient is to improve the above-mentioned defects which are the normal surgical consequences.

Maxillo-facial prosthetics is defined as "the art and science of restoring lost parts of orofacial structures", by Adisman (1968). The prosthesis is commonly known as an obturator. It derives its name from the latin word 'obturae' meaning to 'stop up'.

The group of patients who need prosthesis can be classified either according to

the origin of the defect or by the anatomical nature of the defect.

A. By origin of defect :

1. Pathological—Neoplastic and other orofacial syndromes with defects in the palate.
2. Congenital —Cleft palate, Treacher Collin's, Pierre Robin's etc.
3. Traumatic—Injuries due to accident.
4. Growth and development—Jaw anomalies.

B. By anatomical location :

1. Cranial
2. Facial
 - (i) Orbital
 - (ii) Aural
 - (iii) Nasal
3. Intra-oral
 - (a) Maxillary
 - (i) Dental
 - (ii) Alveolar
 - (iii) Alveo-dental
 - (b) Palatal

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- (i) Hard palate
- (ii) Soft palate
- (iii) Hard and soft palate
- (c) Mandibular
 - (i) Dental
 - (ii) Alveolar
 - (iii) Alveo—dental.

Prosthesis are of two main types : (a) Extra-oral prosthesis and (b) Intra-oral prosthesis. Extra-oral prosthesis are used mainly to cover huge defects. Other small defects can easily be closed surgically. In those cases where surgical closure is not possible at the time of surgery, extra-oral prosthesis can be resorted to as an interim surgical prosthesis. It contributes greatly to the early psychologic rehabilitation of the patient. An intra-oral prosthesis is a dental maxillo-facial prosthesis i. e., the dental and bony parts are reconstructed. It can be divided into :

- (a) Interim surgical prosthesis and
- (b) Post-surgical prosthesis.

In recent years, the principles of construction of maxillary prosthesis have not varied greatly from those established prior to 1875, says Lang. Olinger and Axt (1936) say that the technique of surgical prosthesis was practised in the 15th century. The earlier ones were mainly used for closing congenital defects, namely, cleft-palate. Hollerius (1552), has used wax or sponge to stop up apertures in the hard palate and has described them in "Observ ad calcem de Morbis Internis." Alexander Petronius (1565), in "De Margo Gallico" describes usage of gold plate to close clefts and emphasises that it should reproduce the same concave form as that of the normal palatine

vault. Ambrose Pare (1679), has used plates of silver or gold fabricated with a modern cuff-button like arrangement by which the larger plate is inserted into the cleft for good retention and the smaller one screwed to it from outside. Piere Fauchard (1728), in his book, "Le Chirurgien Dentiste", describes a winged convex-concave plate with screws. The wing portion is passed into the cleft first and then opened by the screws. He is also the first to construct them with artificial teeth. Snell (1828), was the first to use a model to construct an obturator.

Lang (1967) describes three phases of treatment :

1. Pre-surgical construction.
2. Post-surgical modification.
3. Long term prosthesis.

These are though termed differently, by Riley, (1968), Miglani and Drane (1959) as (a) Immediate (b) Temporary (c) Permanent, but both emphasise the same principles.

Lloyd and Braund (1947) say that most authors agree that methyl methacrylate is the material of choice for construction of the maxillary prosthesis. Brown (1969) says that the weight of the maxillary obturator is a dislocating factor and the most important one because the prosthesis acts on the cantilever principle. He says that every possible mechanical advantages should be utilised. El Mahdy (1969) agrees with him and has also described the technique of hollow-bulb obturators. Bruno (1947) is of the opinion that for stability of the prosthesis, it is better to under contour rather than over contour them. He also describes hollow obturators

with bulbs and teeth. Ampil, Ellinger and Rahn (1967) described a prosthesis with an acrylic resin base and a pliable, hollow silicone bulb. The pliable silicone bulb, permits placement into greater undercut areas of the defect, thus providing better mechanical retention and seal for the prosthesis. The silicone also resists sliding and skidding of the prosthesis. There is one disadvantage with this. The silicone bulb is cemented to the acrylic base with a silicone adhesive. The permanent bonding of the silicone material to the acrylic resin presents an occasional problem and it is sometimes necessary to rebond the joint between the two materials after the prosthesis had been in use.

Robinson (1963) used magnets (Freedman's magnetic stabilisers) to retain surgical prosthesis for patients who have had radical surgical treatment such as maxillectomy of both maxillae. A disman (1968) used, intermaxillary springs and sectional hinges also successfully in these cases.

Curtis (1967) says that treatment planning is a pre-requisite for the prosthetic management of patients who are undergoing surgery. He advocates that a successful treatment plan can be evolved only after careful and deliberate scrutiny of all biologic, mechanical and emotional factors and with recognition of the importance of these problems to these patients. The American Academy of Maxillo-facial Prosthetics recommends that the maxillo-facial surgical team should comprise of a surgeon, a prosthodontist and a therapist.

In this paper prosthetic rehabilitation of maxillary defects due to surgery of

pathological origin is presented. Although various types of surgical procedures are used depending upon the nature of the tumour, the surgical approach is either intra-oral or extra-oral. If an intra-oral approach is used, the problem of scar in the face is alleviated.

The simplest procedure used is fenestration. This is done as a post-radiation procedure for cases of malignancy of the antrum, mainly carcinoma, by an intra-oral approach. The second one is hemi or sub-total maxillectomy. This can be carried out either by intra or extra-oral approach. This third type of surgical procedure used is total maxillectomy. The maxilla is exposed through the classical Weber-Ferguson approach. After excision, the raw surface of the cheek is covered by skin grafting. This makes it more vulnerable for contraction due to both contraction of the graft and non-support by maxillary bone.

Irrespective of which procedure is used, there is always loss of the alveolar and palatal part of the maxillary bone of the affected side. This causes a depression in the cheek of the operated side. This depression is more pronounced since it is on the upper face. The corresponding lower face is of normal size and shape. This causes pseudo-disproportion of the face. It is aggravated by the loss of teeth on the operated side which is easily visible. The cheek tissue also loses its support. These can be overcome easily by using the prosthetic appliance.

A. Interim Surgical Prosthesis :

I. Immediate prosthesis : This is inserted at the time of surgery. The patient

is sent to the dental department as soon as the decision regarding the type of surgical procedure is decided upon. An impression of the upper jaw is taken, which shows the normal as well as the affected side. If the affected side causes a deformity in the continuity of the alveolar arch, the plaster model is shaped so as to resemble the normal side. Now an acrylic prosthesis is made which will cover completely the affected side with support from the unaffected side. This prosthesis covers the palatal surface of the maxilla and a part of the alveolar bone. It resembles the negative of the affected side if it is normal (Fig. 1).

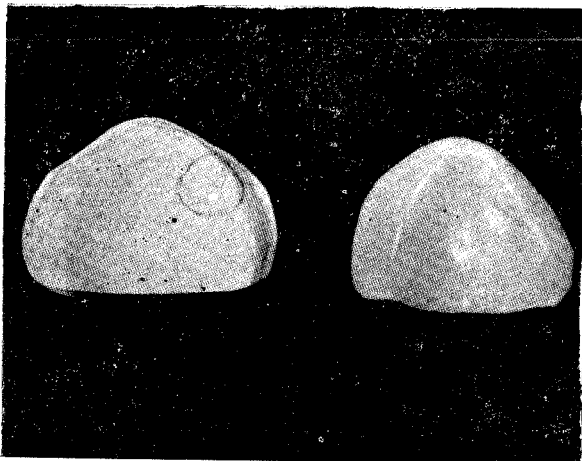


Fig 1—Plaster model with the lesion marked and the immediate acrylic prosthesis.

After surgery, the maxillary region is packed with Bipps pack tightly so as to reach the normal level of the palate. Now the plate is inserted. It contains two small holes, one on the labial aspect and the other in the lingual aspect near the midline to allow the stainless steel wire to pass through. If there are teeth present on the unoperated side, a stainless steel wire is passed through the holes and ligated with the adjacent teeth as in intra-maxillary

wiring. Further retention can be given by the addition of clasps. If the patient is edentulous, the stainless steel wire is passed directly through the normal maxillary bone and ligated as in direct wiring. The appliance is inserted and wired, covering the Bipps pack.

(B) Post-surgical prosthesis :

1. Temporary permanent prosthesis : This is also an acrylic appliance and is used during the post-operative period. The prosthesis is made usually after 6 weeks of surgery. By this time the oral wound would have healed completely. An impression of the upper jaw is taken which extends deep into the surgical defect. The prosthesis is made so as to reach the borders of the surgical defect. This is observed as a shallow in the prosthesis on the palatal aspect of the operated site. The prosthesis also extends to the borders of the normal side. The palatal view of the appliance shows a hollow cavity. This needs to be covered so that there is no defect felt by the tongue. If it is closed completely by acrylic, the appliance becomes quite heavy. To obviate this, a lid is made in acrylic which completely covers the hollow cavity in its palatal surface only. This lid is fixed over the already prepared acrylic prosthesis. This reduces the weight of of the appliance and the hollow cavity contains only air now. This synchronises with the natural maxillary sinus but there is no escape of air in the prosthesis. Now the Bipps pack is removed and the prosthesis inserted (Fig. 2).

2. Permanent prosthesis : This is inserted after 6 months of use of she temporary permanent prosthesis, provided the

patient does not show any signs of recurrence of the tumour. The appliance is of the same type as that of the above-mentioned



Fig. 2—Post operative (6 weeks) maxillectomy plaster model and the temporary permanent acrylic prosthesis.

one except that the teeth are also incorporated into it. This eliminates not only the bony abnormality but also the dental one (Fig. 3).

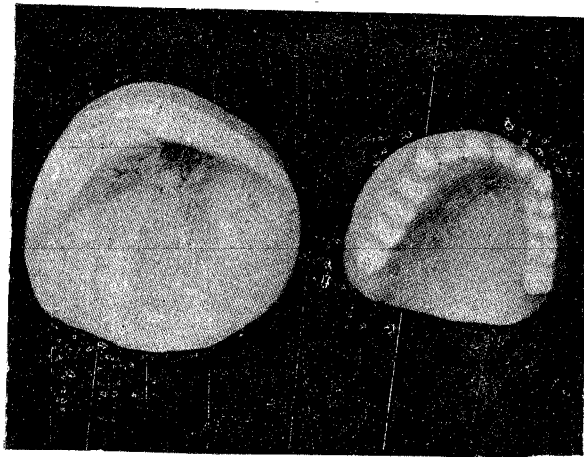


Fig. 3—Post operative (6 months) maxillectomy plaster model and the permanent acrylic prosthesis.

Discussion

The advantages in using the prosthetic

appliances are :

I. Immediate :

a) Serves as a support for the Bipps pack. A tight pack can be inserted at the operated site and maintained in position with ease. This helps in arresting haemorrhage also.

b) In cases where skin grafting is done, this helps indirectly in maintaining the graft in position since pressure pack can be given.

c) In cases where maxillectomy is carried out, the pressure pack also prevents the contents of the orbital cavity from drooping down.

d) As soon as the patient recovers from anaesthesia the face does not show any defect, since the Bipps pack gives the normal facial contour. During the normal movements of the tongue, it does not encounter either a defect or a pack but only a

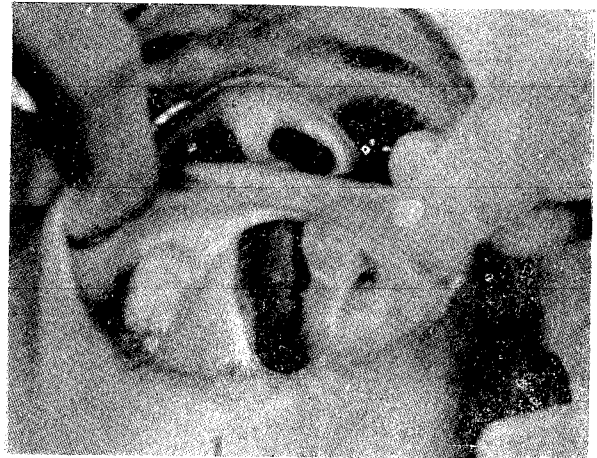


Fig. 4—Intra-oral view of the maxillectomy patient after 5 years of surgery showing the surgical defect.

hard surface which resembles the normal palate. This minimises the psychic trauma which the patient may encounter otherwise.

e) Ryle's tube feeding can be abandoned and either pharyngeal or oral feeds can be started immediately, since there is no communication between the oral cavity and nasal passages.

f) Prevents the pack and thereby the wound from getting infected by contamination of the oral fluids.

g) The pack can be changed and reinserted with ease during the post-operative period.

II. Temporary Permanent

a) Esthetics : This does not warrant any discussion since it is obvious.

b) Mastication : The patient can have normal diet and there is no regurgitation of food through nasal passages.

c) Prevents collection of food in the operated area.

d) Speech : Normal speech requires positive air pressure in the mouth. In

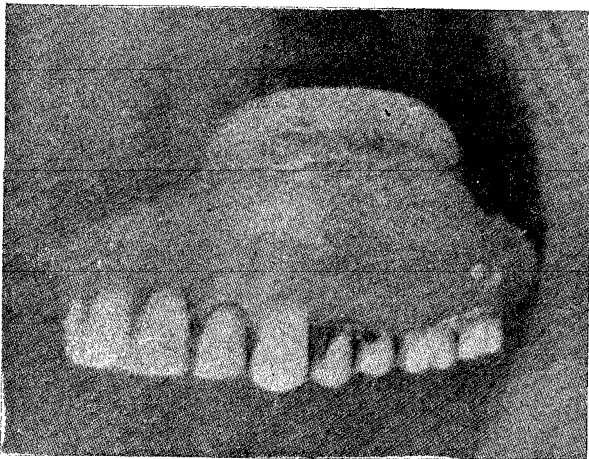


Fig. 5—Intra-oral permanent acrylic prosthesis.

cases where surgery is carried out without prosthesis, there is a direct communication between the nasal and oral cavities. This

allows the air to escape through the nose, leading to lack of air pressure in the mouth. Added to this, there is loss of a part of the palate along with the teeth. This makes difficult the use of all palatal and dental sounds. These two coupled together makes normal articulation impossible. The prosthesis, when inserted, prevents nasal air escape and makes it possible to maintain air pressure in the mouth. The palatal sounds can be produced easily since the palate is replaced by an acrylic one, making articulation clear. Resonance is also added because of the air contained in the hollow of the appliance.

e) Hygienic : Can be washed and reinserted by the patient.

f) Prevents shrinkage of the graft.

III. Permanent

a) Esthetics : Since teeth are also added to the appliance the defect is not noticeable at all.

b) Mastication : Patient can chew on the operated side also.

c) Speech : Is further improved since the dental sounds can also be produced. Clinically, no defect is noticeable in speech. It returns to the normal level.

d) Hygienic.

There is one advantage with the temporary-permanent and permanent prosthetic appliances, not mentioned so far. Whenever the patient comes for follow-up the appliance can be removed and the area examined thoroughly. If, by chance, there is a recurrence, the patient, will not be able to

wear the appliance because of ill-fit. So the patient is forced to attend the dental clinic for some adjustment of the appliance. Here, the reason for the sudden ill-fit or pain can easily be ascertained. If it is found that the tumour has recurred, the same prosthetic appliance can be used as a radium carrier. This is distinctly an advantage since radiation can be more localised and hence effective

All these appliances are made of methyl methacrylic acid. Methyl methacrylic is used as the material of choice for prosthe-



Fig. 6—Profile view of the same patient with the prosthesis in place,

tic appliances because of the following reasons :

1. The appliance is light in weight.
2. It possesses enough strength to withstand the pressure encountered in the mouth.
3. It resembles the natural gingiva in colour.

4. It does not react with saliva or any other food substances.
5. It does not change in shape in the mouth.
6. It is easy to repair, if broken accidentally.
7. It is tasteless, odourless, non-toxic and non-irritating to the mouth tissues, and
8. Economic.

If the patient can afford, the base of the acrylic prosthesis can be replaced by chrome-cobalt alloy, making the prosthesis still lighter.

The rehabilitation by prosthetic means should be undertaken as early as possible, i.e., from the time of surgery. If there is any delay in it, there is also a delay in the rehabilitation of the patient. To explain this more clearly Metz (1964) cites the case history of a 87 year old man. No prosthetic reconstruction was planned for this patient both prior to and after surgery. The patient came for reconstruction after 1 year. He reports that it took nearly 1 year to rehabilitate the patient.

Summary & Conclusion

Methods of prosthetic rehabilitation from the time of surgery—fenestration, partial or hemi-maxillectomy and maxillectomy and literature review are presented. The various types of prosthetic appliances used for rehabilitation are classified and the advantages of each discussed.

It is stressed that a closer co-operation between the prosthodontist and the surgeon should be developed if proper rehabilitation of these cases be achieved successfully.

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