An Update on Retentive Aids in Maxillofacial Rehabilitation

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Abstract

The field of maxillofacial prosthetics is embracing the rapid explosion of technology. Use of retention magnets simplify the clinical and laboratory phase retains the denture and makes it stable and comfortable for the patients. Magnets provide a useful method for attaching dental prostheses to either retained roots or osseointegrated implants. Implant supported prosthesis are most sensitive to this factor though implants are one of the best possible means to achieve retention, stability and support particularly for extra oral prosthesis and in many situations. The field of maxillofacial prosthetics is embracing the rapid explosion of technology. The present article tries to describe different types of retentive aids in maxillofacial prosthesis.

Keywords: Maxillofacial, Retentive, Stability.

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INTRODUCTION

Body abnormalities or defects that compromise appearance, function and render an individual incapable of leading a relatively normal life have usually prompted responses that seek to bring the person to a state of being acceptable normally. Surgery is the first choice for early cancers and for cancers that do not respond to radiation and chemotherapy, resulting in cosmetic, functional and psychological impairment, greatly affects the patient’s quality of life.⁵ Rehabilitation of such patients is quiet challenging and requires multidisciplinary team for comprehensive care and optimal post treatment functional outcomes. The head is arguably one of the most important anatomical regions of the human body, accommodating the brain, eyes, ears, nose, mouth and muscles of facial expression. Facial prosthesis were described by Ambrose Pare in 15010-1601.⁶ Retention is a major factor for long term success of facial prosthesis. According to the condition of the defect surroundings the prosthesis can be retained by anatomical anchorage, mechanical anchorage, chemical and surgical anchorage. Medical products that involves adhesives to the skin or adhesives that attach human skin are known as pressure-sensitive adhesives (PSA), defined as viscoelastic materials, which in their dry state at room temperature can adhere strongly to a wide variety of substrates by application of slight pressure for a short period of time without activation by water, heat, or solvent.⁷ Magnets are also used in some cases but Despite of their many advantages when casings of magnets are breached, contact with saliva rapidly brings about corrosion and loss of magnetism.⁸ The Prosthodontist is limited by inadequate materials available for facial restorations, movable tissue beds, difficulty in retaining large prosthesis, and the patient’s capability to accept the final result. The knooks and cones of every available retentive aids for Maxillofacial prosthesis will be discussed in detail in article.

CLASSIFICATION

Maxillofacial prosthesis is the branch of prosthodontics concerned with the restoration and replacement of the stomatognathic and craniofacial structures with the prostheses that may not be removed on a regular or elective basis.⁹
According to the Glossary of Prosthodontics\textsuperscript{5}

According to Dr. Harsh Mahajan and Dr. Sandeep Mahajan\textsuperscript{6}, the retentive aids of maxillo-facial prosthesis can be broadly classified into extra-oral prosthesis and intra-oral prosthesis.

According to Cordil Riley\textsuperscript{7}, the maxillofacial prosthesis can be of four types in the head and neck cancer patients.

1. **External Facial Prosthesis**: The external facial defect may involve a single entity like eyes, nose, ears, nose or a combination of the structures.

2. **Radiotherapy appliances**: The prosthodontist can assist a radiotherapist by fabricating various devices like,
   a. Tongue shield to deflect it from the irradiation area.
   b. Carriers to position the radium needle
   c. Cone locators to locate the cone over the lesion.
   d. Follow-up treatment and post-radiation dentures- The denture base over the irradiated region should be lined with a soft vinyl or silicone in order to minimize trauma.

3. **Artificial Implant Prosthesis**: In the cases of hemi-mandibulectomy, Vitallium mesh, acrylic resin, stainless steel, and tantalum have been used with varying degrees of success in reconstructing the faces of these patients. Also for the complete fixation of temporo-mandibular joint these vitallium cast implants can be successfully used.

4. **Intra-oral Removable Prosthesis**: The intraoral removable prostheses used in the treatment of cancer victims vary in design with each
individual but there are three types of maxillary obturators. These are (a) immediate, (b) temporary, and (c) permanent.

Table 1: Meta analysis of Literature

<table>
<thead>
<tr>
<th>AUTHOR</th>
<th>YEAR</th>
<th>FINDINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beherman JS</td>
<td>1960</td>
<td>Two important qualities of a magnet functioning as an implant are strength and permanence. The most powerful permanent magnetic material available was alnico V, an alloy of aluminum, nickel, cobalt, and iron.</td>
</tr>
<tr>
<td>Brown K.E. and Commander D.C.</td>
<td>1969</td>
<td>The total weight of the appliance is a most important consideration, especially when the obturator has a cantilever suspension.</td>
</tr>
<tr>
<td>Parel Stephen M</td>
<td>1980</td>
<td>Most modern prosthetic replacements are secured with adhesives. But in orbital prosthesis the prosthesis needs accompanying mechanical retention along with the available anatomical retention for prolonged life of the prosthesis and comfort to the patient.</td>
</tr>
<tr>
<td>Pack M., Roser K and Eufinger H</td>
<td>1999</td>
<td>High rates of non-integration and implant loss have been reported for extraoral implants, especially for those in the periorbital region following irradiation.</td>
</tr>
<tr>
<td>Weischer T and Mohr C.</td>
<td>1999</td>
<td>The cumulative success rate was approximately 75% after 7 years for group 1 patients and about 86% after 10 years for group 2 patients.</td>
</tr>
<tr>
<td>Samira K., Salehi I., D.Calder and David J.h.</td>
<td>2007</td>
<td>To retain conventional dentures, two implants can be placed, One on either side of the jaw. The dental implants must be parallel, otherwise the divergent paths of insertion of the retaining elements will hinder engagement of the prosthesis.</td>
</tr>
<tr>
<td>Aydin C., Karakoca S., Yilmaz H.</td>
<td>2008</td>
<td>The overall cumulative survival rate for the first prosthesis was 70% after 18 months. The mean survival time is 17 months.</td>
</tr>
<tr>
<td>Gumieiro E.H., Dib L.L., Jahn RS.</td>
<td>2009</td>
<td>Results indicated good postoperative healing, healthy peri-implant tissue, good hygiene and there was no loss of implants. the prosthesis resulted in minimal complication due to good hygiene combined with thin and immobile peri-implant soft tissues.</td>
</tr>
<tr>
<td>Dostalova T., Kozak J., Hubacek M</td>
<td>2011</td>
<td>Implants gives better retention to the prosthesis so that the patient can were it more confidently and the prosthesis will not irritate the soft tissue around it.</td>
</tr>
<tr>
<td>Bibb R., Eggbeer D. And Evans P</td>
<td>2015</td>
<td>The research indicates where RP has demonstrated potential clinical application and where further technical developments are required.</td>
</tr>
</tbody>
</table>

DISCUSSION

Intraoral defects include mandibulectomy and maxillectomy defects, these can be categorized as limited, partial, medial, subtotal, total, radical, or extended. The anatomic retention in the intraoral prosthesis cannot be classically achieved but some acceptable amount of engagement in the defect area can be considered for the engagement of the prosthesis. There are five intrinsic areas...
which are within and around the defects that may provide retention to the obturator itself. The residual soft palate, the residual hard palate, the anterior nasal aperture, the lateral scar band, the height of lateral wall. Maxillary defects are mainly obturators. Obturators can be divided into three types according to the post-surgical period it is to be used:

**Surgical Obturators:** The surgical obturator provides a matrix on which the surgical packing can be placed. The obturator maintains the packing in the proper relationship thus ensuring close adaptation of the skin graft to the raw surface of the cheek when grafting is used.

**Intermediate Obturators / Intermediate Prosthesis:** They are used for interim purpose.

**Definitive Obturator / Permanent Prosthesis:** There is one more maxillary defect called velopharyngeal disorders, caused due to incomplete closure of palatopharyngeal sphincter. This kind of inability will lead to hypernasality and decreased intelligibility of speech.

The different types of retentive aids are:

**Cast Partial Dentures:** Retainers are probably the most important components contributing to the success of the obturator prosthesis. Properly designed retainers reduce the stresses transmitted to the abutment teeth while retaining the obturator in place.

**Magnets:** Magnets have been effectively used for retention, maintenance and stabilization of combined maxillofacial prosthesis, and they are effective for this purposes. The main magnetic material used is the rare earth material neodymium iron boron (Nd-Fe-B) which is the most powerful commercially available magnet material.

**Implants:** Endosseous implants may be used as an alternative anchorage system for the diminished retention, stability and support. Efficacy of implant support has been established in the restoration of edentulous and partially edentulous jaws, and it appears that similar responses are possible in congenital, developmental and acquired maxillofacial defects.

**Extraoral Prosthesis:** Patients with craniofacial anomalies present with a variety of complex facial deformities that require the expertise of many individuals in the health science disciplines. Many of these deformities are best treated with surgical reconstruction. Few example of these prosthesis include nasal prosthesis, orbital prosthesis etc.

**CONCLUSION**

A variety of technique and equipments are available to retain a maxillofacial prosthesis. To chose the right retentive aid the prosthodontist needs to be familiar to all the available options because he carries the responsibility to plan the prosthetic rehabilitation that suits the patient. Optimum results may be difficult to achieve in all cases of maxillofacial defects but thorough evaluation of the situation and careful judgment and treatment planning can give acceptable quality of prosthesis improving the patient's quality of life. The advent and increasing availability of 3-D cone beam computerized tomography (CT) and 3-D digital panoramic imaging machines makes it easier, timely and less costly to obtain images C.T. images are extremely useful as a visualization and diagnostic tool.

**REFRENCES**


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