



Review Article

Occlusion in obturators: A literature review

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ABSTRACT

Maxillary Inadequacies originate due to various aetiologies. Prosthetic restoration of the defect often includes use of a surgical obturator, interim obturator and definitive obturator. Prosthetic design has been discussed by many authors. A search of dental literature through April 2020 was undertaken by use of PubMed. The focus of the search was on occlusion concepts and schemes incorporated in the designing of a maxillary obturator prosthesis for partially edentulous hemimaxillectomy patients. In addition, some common textbooks on removable and maxillofacial prosthodontics were scrutinised for additional documentation. The significance of occlusion should be emphasized in the support of maxillary obturator prostheses. Till date there is no literature review on the the array of concepts of occlusion incorporated in maxillary obturator fabrication.

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1. Introduction

Maxillary defects are created after surgical treatment of patients with congenital defects, trauma, or tumours.¹ Prosthetic rehabilitation of maxillectomies is the treatment of choice in most hospitals over autogenous reconstructions. This kind of rehabilitation gives satisfactory results with regard to aesthetics, speech, and mastication when the collaboration of the prosthodontist begins as early as possible before surgical treatment and the long-term management of the patient is maintained meticulously.²

To re-establish the midfacial contour of a maxillectomy patient, the prosthetic rehabilitations seals the separation of oral and nasal cavities to allow sufficient phonation and deglutition, in order to achieve satisfactory aesthetic results and contribute to the patient's discernment of a better quality of life.³ Acceptable prosthetic care for a patient with acquired maxillary defect should include careful prosthesis designing, combined with routine maintenance and abundant care to provide comfort, function, aesthetics and minimum changes to the remaining compromised tissue

structures.

Prosthetic design relative to all phases of prosthodontics has been discussed by many authors. The need for support, retention and stability in designing any prosthesis should be understood if the objectives of prosthodontic care are to be achieved. For the patient with an acquired maxillary defect it is often necessary to modify, and sometimes violate, some of the basic principles of prosthetic design owing to the basic nature of the defect. The remaining structures most often are unilateral, thus encouraging movement of the prosthesis with associated stress direct to these remaining structures. This stress can increase bone resorption and may jeopardise the remaining support for an obturator prosthesis. The frequent location of unilateral remaining structures suggests that the obturator portion of the prosthesis, in addition to the residual structures, must contribute significantly to the support, retention, and stability of the prosthesis to fulfil the basic prosthodontic objectives.

The aim of design is to incorporate the most appropriate components to resist the various forces acting on the obturator prosthesis without applying undue stress on the remaining teeth and soft tissue structures. There are an array of forces acting concurrently on the prosthesis.

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Restoration of occlusion in patients with maxillary defects is a challenging situation as every case is unique in itself. There is a great apprehension involved in reconstructing mutilated dentition due to widely divergent opinions regarding the choice of an appropriate occlusal scheme.

This article reviews the various occlusal concepts during rehabilitation the acquired defects of the palate due to trauma, tumor or surgical intervention.

A search of dental literature through April 2020 was undertaken by use of PubMed. The focus of the search was on occlusion concepts and schemes incorporated in the designing of a maxillary obturator prosthesis for partially edentulous hemimaxillectomy patients. Along with the articles found in PubMed, those found by a hand search of older references were also considered. The following keywords such as design principles for maxillary obturator, occlusion for maxillary obturators, occlusal schemes for definitive obturators and occlusal concepts for definitive obturators were used to identify all relevant studies.

In addition, some common textbooks on removable and maxillofacial prosthodontics were scrutinised for additional documentation.

2. Discussion

2.1. Occlusal schemes proposed by different authors

2.1.1. George Albert Zarb (1967)⁴

During the interim obturator fabrication the prosthodontist should not be in too great a hurry to provide teeth for the obturator. The soreness following radiotherapy usually prevents wearing anything more elaborate than the simplest appliance. At this stage, the mucous membrane seems to be particularly fragile and subject to ulceration by dentures. Edentulous patients manage to use their lower dentures very efficiently against a simple obturator.

While fabrication of the definitive obturator, maximum number of teeth should be incorporated into the partial denture framework design in order to achieve maximal stability.

2.1.2. Ronald Desjardins (1978)⁵

The most important aspect of stability is occlusion. An unstable prosthesis results if the occlusal relationship does not maintain intimate prosthesis contact with the supporting and retentive structures of a residual maxilla and its defect during occlusal function. Maximal distribution of the occlusal force in centric and eccentric jaw positions is imperative to minimize the movement of the prosthesis and the resultant forces to individual structures. The patient with an acquired maxillary defect should not masticate over the defect.

Although some support is provided within the defect it is usually minimal when compared with that provided by

the residual maxilla. The partially edentulous patient is not likely to have a problem with unilateral mastication, and existing occlusal relationships may dictate many aspects of the occlusal scheme. For example, steep vertical overlap of the anterior teeth will prevent occlusal balance in the eccentric position. The edentulous patient, however, can expect a less stable prosthesis during mastication, and a balanced occlusal scheme should be provided. Occlusal balance remains a prime concern relative to the parafunctional occlusal contacts used at times.

2.1.3. Aramany (1978)⁶

Stress created by lateral forces is minimized by the correct selection of an occlusal scheme, elimination of premature occlusal contacts, and wide distribution of stabilizing components.

2.1.4. Curtis & Beumer (1979)⁷

In edentulous patients, nonanatomical and/or functional posterior teeth are arranged according to neutrocentric or lingualized occlusal concepts. Both concepts minimize lateral forces and deflective occlusal contacts and thus improve prosthesis stability. The teeth are set in centric relation and adjusted to eliminate lateral interferences.

If teeth were included in the resection, the addition of anterior and, possibly, posterior denture teeth to the obturator can be of great psychological benefit to the patient. If retention and stability are inadequate, reestablishing occlusal contact on the defect side may improve these aspects.

2.1.5. Gay (1980)⁸

As with conventional removable partial dentures, the occlusal scheme is of prime importance. Though some support is provided by the residual palate, none is provided in the defect to resist occlusal forces. Some clinicians advocate using the bones superior to the maxillary defect for support. However, this is neither desirable nor necessary. The support gained could not withstand direct occlusal forces. The occlusion should be designed to provide contact in the patient's centric occlusion with no contact in the eccentric positions. The inclusion of artificial teeth posteriorly past the second premolar on the defect side is not advisable as this would increase the weight of the obturator and the potential for the patient to function there. The patient should be instructed to avoid masticatory function on the defect side.

2.1.6. Stewart / Parel (1983)⁹

In the Definitive obturator reducing the number of posterior occluding artificial teeth will reduce the rotational tendencies of the prosthesis, where as in an interim obturator posterior occlusion should be totally avoided to reduce abutment stress and movement of the acrylic resin extension

against healing tissues.

2.1.7. *Academy of denture prosthetics (1989)*¹⁰

1. Changes in the tissues supporting a maxillofacial prosthesis may be more rapid than in those supporting a more conventional prosthesis. Therefore, the occlusion and base adaptation must be reevaluated frequently and corrected by selective grinding of the occlusion or refitting the base of the prosthesis.
2. All occlusal patterns in maxillofacial reconstructions must be physiologically compatible with the patient's residual anatomic structures and functional capabilities.
3. Occlusal stress should be minimized for the irradiated patient requiring complete dentures. Acrylic resin teeth with a reduced occlusal contact area may be indicated.
4. Altering the cusp angle of posterior teeth may influence the stability of the prosthesis placed on an edentulous resected maxilla.
5. It may be necessary to accept an occlusion that is not bilaterally balanced in eccentric occluding positions for an edentulous maxilla or mandible.
6. In edentulous patients, nonanatomic posterior teeth are preferred. The teeth are set in centric relation and adjusted to eliminate lateral deflective occlusal contact.

2.1.8. *Gregory R. Parr, Gregory E. Tharp and Arthur O. Rahn (1989)*¹¹

1. Occlusion on the defect side is important because the occlusally directed forces can be destructive. Occlusal schemes with fewer, smaller teeth, located further toward the anterior and devoid of premature or deflective contacts is desirable.
2. Reduced posterior occlusion (size and number of teeth is also a useful suggestion.

2.1.9. *Michael R. Arcuri & Thomas D. Taylor (2000)*¹²

As with the surgical obturator, the addition of teeth to the postsurgical obturator should be limited to satisfying esthetic needs and assisting in speech production. Occlusal function on the obturator should not be encouraged during the early healing period because it will likely result in movement of the obturator into and out of the defect with resultant irritation and abrasion of the tissues contacting the obturator.

During teeth arrangement for the interim obturator the aim of the prosthodontist should be to create a cusplless occlusal scheme in an attempt to reduce lateral occlusal forces.

Patients should continue to wear the maxillary prosthesis or the interim prosthesis at night because sinus secretions and saliva cannot be managed at night without it. If the prosthesis is removed overnight, the soft tissue periphery of the surgical site will change due to tissue edema, and

patients will report that it often requires an hour of wearing the prosthesis in the morning before it fully seats into position.

Mastication is also often difficult for patients with large surgical defects and must be accomplished on the non-surgery side of the arch. Patients soon learn the limitations of their diets.

The significance of occlusion should be emphasized in the support of maxillary obturator prostheses. The addition of teeth, which provides function to the obturator, places greater stress on the wound area, and the response of the tissue to minimal stress must be known before additional stress can be applied. The occlusal plane of the artificial teeth for the prosthesis with the jaw defect should be favoured. The mandibular teeth should be restored as ideally as possible to eliminate occlusal discrepancies for the maxillary prosthesis, restoring a maxillary defect. The stability of the maxillary prosthesis would be enhanced if the forces of occlusion in mastication would direct the prosthesis upward, inward, and posteriorly in bilateral simultaneous posterior teeth contact.

3. Summary & Conclusion

As far the authors are aware this is the first literature review to evaluate the array of concepts of occlusion incorporated in maxillary obturator fabrication. The major points derived from this review are:-

1. The occlusion should be planned in a way to provide contact in the patient's centric occlusion with no contact in the eccentric positions. The inclusion of artificial teeth posteriorly past the second premolar on the defect side is not advisable.
2. The partially edentulous patient is not likely to have a problem with unilateral chewing, and existing occlusal relationships will dictate many aspects of the new planned occlusal scheme.
3. In edentulous patients, nonanatomical and/or functional posterior teeth are arranged according to neutrocentric or lingualized occlusal concepts as both concepts reduces lateral forces and deflective occlusal contacts.
4. The mandibular teeth should be restored as ideally as possible to remove any occlusal discrepancies for the maxillary prosthesis, restoring a maxillary defect.

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5. Conflict of Interest

The authors declare they have no conflict of interest.

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