

Occlusal Concepts in Complete Denture Prosthodontics: A Literature Review

Rohit Raghavan¹, Shajahan P A², Poornima Purushothaman³,
Ambili Ravindran P³

¹Head of the Department, ²Professor, ³Post Graduate Student,
Department of Prosthodontics and Crown and Bridge, Royal Dental College; Chalissery

Corresponding Author: Rohit Raghavan

ABSTRACT

Complete denture occlusion, when put into a wider concept, is the mechanism involving closure of the maxillary and mandibular teeth in centric relation. It occurs throughout the range of functional and non-functional movements of the mandible. Occlusion is considered to be developed to function efficiently causing the least amount of trauma to the supporting tissues. This article aims at providing a review to the concepts of occlusion involved in complete denture Prosthodontics.

Keywords: Complete denture Prosthodontics, Occlusal concept, Occlusion

INTRODUCTION

Balanced occlusion involves a definite arrangement of tooth contact in harmony with the mandibular movements¹. The concept of occlusion chosen for complete denture construction depends mainly on the esthetic requirements, masticatory efficiency and most important of it, the stability of the dentures. There are numerous concepts, techniques and philosophies put forward by different authors, of which the appropriate one has to be judiciously selected, to achieve the satisfactory occlusion in a completely edentulous patient. Keeping abreast with the changes in this area is a challenging task.

COMPONENTS OF OCCLUSION

The components of occlusion as interpreted by Prosthodontics are:

(1) the temporomandibular joint, (2) the musculature, (3) the tissue support for the denture bases, and (4) the teeth

Occlusion may be discussed from two viewpoints. It may be discussed in its static relations or in its dynamic relations². The static relations in occlusion are those which occur in the many possible contacts of teeth without the interposition of food. The dynamic or functional relations are those which occur in the mastication of food.

Static concept:-

Static relations in occlusion include:

- Centric occlusion,
- Protrusive occlusion,
- Right and left lateral occlusion
- Intermediate occlusion

These static relations have to be balanced with the simultaneous contacts of all the teeth on both sides of the arch at their very first contact. There should be proper cuspal inclines so that the teeth can glide from a more centric occlusion to eccentric position without interference and without the introduction of rotating or tipping forces.

Dynamic concept:-

Opening and closing movements involved in mastication

Gliding movement of teeth one jaw over the teeth of opposing jaw.

Movements of the mandible which occur when the teeth are not in contact are termed as free movements

CONCEPTS FOR COMPLETE DENTURE OCCLUSION

BALANCED OCCLUSION

It is unique in complete dentures and does not occur with natural teeth. If it occurs in natural teeth, it is considered to be a premature contact on working side and is considered pathologic.

1. *Gysi*³ in 1914 advocated a 33 degree cusp form for arrangement of teeth in complete dentures for attaining balanced occlusion. The cusps were made to contact bilaterally in order to enhance stability of the denture.

2. *French*⁴ in 1954 illustrated flat incisal guidance, for teeth with greatly reduced cusp height which can be used with a flat incisal guide plane. The occlusal table of lower posterior teeth is reduced to increase stability. The upper posterior teeth have slight lingual occlusal inclines of 5 degrees for the first bicuspid, 10 degrees for the second bicuspid, and 15 degrees for the first and second molars, so that a balanced occlusion could be developed laterally as well as antero-posteriorly by the arrangement of the teeth on a curved occlusal plane (Figure 1).

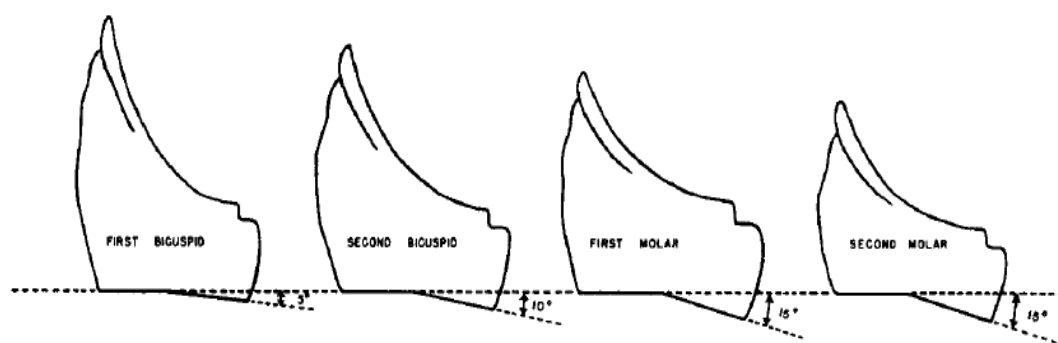


Fig. 1: Variations in the inclination of the lingual cusps of French's upper posterior teeth.

3. *Sears*⁵ in 1927 introduced a modified anatomic posterior tooth called 'Channel Tooth'. These teeth had a restricted acceptance at first. Modified nonanatomic tooth patterns from the early types have been accepted much more extensively since then. A balanced occlusion can be developed by a curved occlusal plane anteroposteriorly and laterally or with the use of the second molar ramp.

4. *Pleasure*⁶ in 1937 employed a posterior reverse lateral curvature except for the second molar which is set with the customary lateral curvature (Wilson curve) to provide a balanced occlusion.(Figure 2)

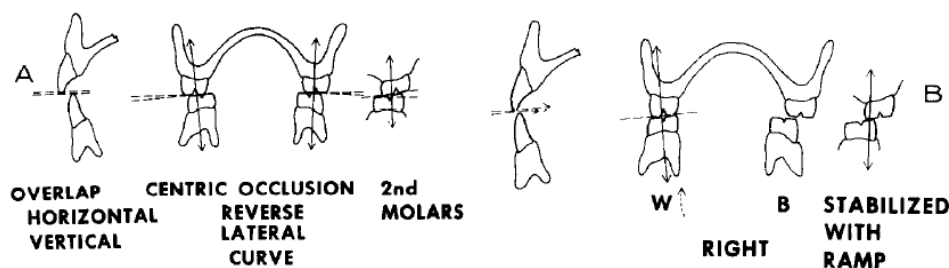


Fig. 2: (A)An arrangement of teeth with a reverse lateral curve through the first molars. (B)Gliding surfaces will direct contact forces toward the lingual side of the lower ridge on the working side

5. *Frush*⁷ in 1967 employed an arbitrary articulator balance, followed by intraoral corrections to obtain balance, and it illustrated a linear occlusion which was intended to

give a one-dimensional contact between the opposing posterior teeth set at a slight angle to the horizontal.(Figure 3)

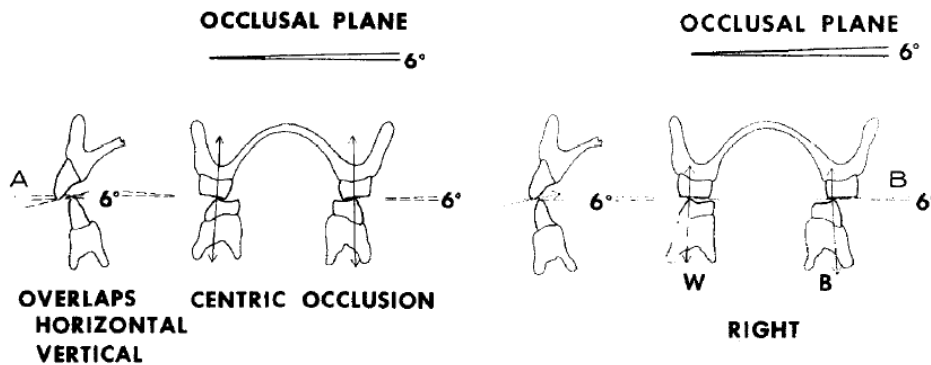


Fig 3: (A) In a linear occlusal concept the contact force would be directed toward the ridges and slightly toward the buccal side at the given inclination of 6 degrees. (B) From a right lateral movement, the directions of contact forces would be maintained toward the ridges and slightly toward the buccal side of the lower ridge.

NON BALANCED OCCLUSION

1. *Pound*⁸ incorporated sharp upper lingual cusps in opposing widened fossae of the lower teeth in centric occlusion, the reduction of the buccal cusps of the lower posterior teeth, and the elimination of deflective contacts by the use of occlusal adjustment wax on the completed dentures.
 - The occlusion is lingualized by the elimination of contacts on the buccal cusps.⁹
 - The anteroposterior arrangement of the lower posterior teeth is in such a way so that their lingual surfaces are on or within the lingual side of a triangle from the mesial area of the lower cuspid to the sides of the retromolar pad.
2. *Hardy*¹⁰ advocated a contemporary occlusal design which is used extensively.
 - It utilizes nonanatomic teeth in a straight occlusal plane, usually horizontal, when the

- casts are mounted horizontally in an instrument.
- All-porcelain or all-plastic posterior teeth may be used, or combinations of posterior teeth of porcelain upper and plastic lower teeth, or metal shearing blades may be incorporated in a block of the upper posterior teeth occluding against lower porcelain teeth.

LINGUALIZED OCCLUSION¹¹

Lingualized occlusion is an attempt to maintain the esthetic and food-penetration advantages of the anatomic form while maintaining the mechanical freedom of the nonanatomic form. The lingualized concept utilizes anatomic teeth for the maxillary denture and modified nonanatomic or semianatomic teeth for the mandibular denture (Figure 4). Lingualized occlusion should not be confused with placement of the mandibular teeth lingual to the ridge crest, as suggested by several authors.

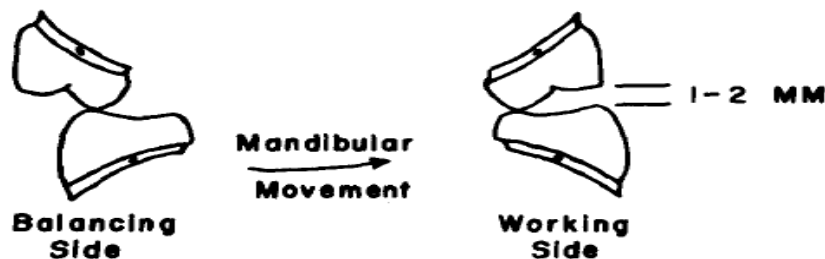


Fig 4: In lateral excursive movements, only the maxillary lingual cusps make contact. Selective grinding of the maxillary buccal cusps may be needed to create clearance between the maxillary and mandibular buccal cusps.

The basic concepts of lingualized occlusion were first suggested by *Payne*. It is particularly helpful :

- when the patient places high priority on esthetics (figure 5) but a nonanatomic occlusal scheme is indicated by oral conditions such as severe alveolar resorption,
- a Class II jaw relationship is present, or
- a displaceable supporting tissue is present.



Fig 5: improved esthetics

NEUTROCENTRIC CONCEPT¹¹

In 1954, De van formalized guidelines for using flat teeth in flat occlusal surfaces. The term “neutrocentric” is suggested to denote a concept embodying two key objectives in the making of a denture: (1) neutralization of inclines and (2) centralization of occlusal forces acting on the denture foundation.

The five factors involved in the relation of the teeth to the denture foundations are *position, proportion, pitch, form and number*. Dentures made according to the neutrocentric concept will minimize the degree of mucosal displacement.

OCCLUSAL ARRANGEMENTS

Three occlusal schemes widely used excluding the traditional anatomic and balanced arrangement which give the desirable freedom for centric contact are¹²:

- a) **MONOPLANE OCCLUSION:** The concept was put forward by *Jones* (figure 6), but *Sears* introduced it with a balancing tooth or ramp at the distal part of the lower arch which comes into contact only in eccentric excursions. *De Van* has used and taught the same principles but without the balancing ramp.

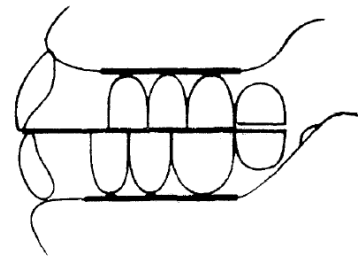


Fig 6: The principles of monoplane occlusion except the positioning of the posterior teeth on or lingual to the crest of the mandibular ridge are demonstrated.

- b) **CUSP-TO-FOSSAE OCCLUSION:** *Payne* described an occlusion which utilized anatomic teeth with modifications. The mandibular teeth were modified by flattening the ridges and reducing the cusps to make the lower occlusal table a V-shaped trough. The upper posterior teeth were modified by reducing the buccal cusps (taking them out of occlusion) and making the lingual cusps more conical in all directions. This created an occlusion in which only the lingual cusps of the upper posterior teeth contacted the lower teeth (Figure 7).

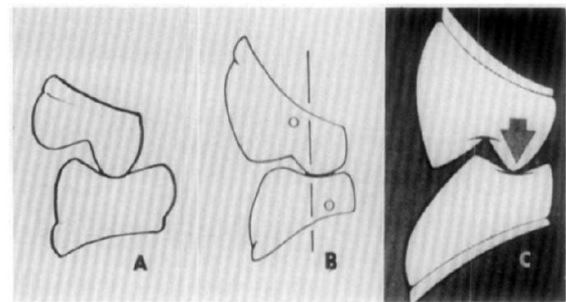


Fig 7: Various versions of the cusp-to-fossae concept: A, the Payne version as illustrated in his 1941 article; B, the Gerber-Swissedent version from an illustration supplied with the Swissedent Condyliform posterior teeth; C, the Murrell version.

- c) **CURVED OCCLUSAL PLANE WITH ZERO-DEGREE TEETH.** Although violating one of the precepts of monoplane occlusion, zero-degree teeth can be set on a curve harmonious with the condylar inclination to attain reasonable balancing contacts in lateral excursions and excellent continuous contact in protrusion.

An arbitrary curve is undesirable. Hughes and Reglil taught a technique which utilized the Paterson "grind-in" to establish an individual curve for each patient.

Zero-degree teeth are then set to this curve. This is an excellent technique, especially for patients with great variation in closure in centric occlusion for patients with great variation in closure in centric occlusion.

CONCLUSION

Occlusion in complete dentures-the type of occlusal form and the arrangement of the posterior teeth-has long been one of the more bitter controversies in dentistry¹³. Presently it is not known which concept of occlusion is more favorable for continued maintenance of oral tissues and the long term comfort of patient. The dentist must therefore rely on his clinical judgments and experience in the choice of occlusal concepts for edentulous patients¹⁴.

REFERENCES

1. Kurth, L. E.: Balanced Occlusion, J Prosthet Dent. 1954 Feb 4(2): 150-67
2. Boucher CO. Occlusion in prosthodontics. J Prosthet Dent. 1953 Sep 1;3(5):633-56.
3. Gysi, A.: Research in Denture Construction, Journal of American Dental Association 1929; 16 .199-223
4. French, F. A.: The Problem of Building Satisfactory Dentures, J. Prosthet. Dent. 1954 Nov 4: 769-81
5. Sears, V. H.: Thirty Years of Nonanatomic Teeth. . J Prosthet Dent 1953 ;3: 596-617
6. Pleasure, M. A.: Anatomic Versus Nonanatomic Teeth, J, Prosthet. Dent. 1953; 3: 747-54.
7. Frush, J. P.: Linear Occlusion, Glendale, Calif., 1967, Swisshedent Corporation.
8. Pound, E.: Utilizing Speech to Simplify a Personalized Denture Service, J. Prosthet. Dent. 1971;24: 586-600
9. Beck HO. Occlusion as related to complete removable prosthodontics. . J Prosthet Dent. 1972 Mar 1;27(3):246-56.
10. Hardy, I. R.: The Developments in the Occlusal Patterns of Artificial Teeth, J. Prosthet Dent. 1951;1: 14-28
11. DeVan, M.M. Concept of Neutro-centric occlusion. JADA 1954; 48:165- 9
12. Kelly E, Centric relation, centric occlusion, and posterior tooth forms and arrangement, J Prosthet Dent. 1977 Jan 7(1):5-11
13. Becker CM, Swoope CC, Guckes AD. Lingualized occlusion for removable prosthodontics. J Prosthet Dent 1977;38: 601-608
14. Rangarajan V, Yogesh PB, Gajapathi B, Ibrahim MM, Kumar RG, Karthik M. Concepts of occlusion in prosthodontics: A literature review, part II. J Indian Prosthodont Soc 2016;16:8-14.

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