Review Article

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OCCLUSION: THE FOUNDATION OF DENTISTRY: A REVIEW

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ABSTRACT:

With the advent of various materials and newer techniques, coupled with individual's awareness towards oral health, the popularity of restoring teeth rather than its removal is increasing day by day. All the teeth have specific form and alignment which helps in performing the optimal function of mastication, phonetics and esthetics maintaining the integrity and longevity of individual tooth and stomatognathic system. This review article throws a light on occlusion and its consideration in restorative dentistry.

Keywords: Occlusion, Stomatognathic system, Temporo-mandibular joint.

INTRODUCTION:

Occlusion literally means closing. In dentistry, the word "Occlusion" means the contact of teeth in opposing dental arches when the jaws are closed (static occlusal relationships) and during various jaw movements (dynamic occlusal relationships). [1]

The occlusion of teeth is the key to oral function; unfortunately, it is frequently overlooked (or) taken for granted in the treatment of patients. Successful restoration of the mouth with any restoration is dependent upon the maintenance of occlusal harmony.

Occlusion involves a multi-disciplinary presentation of the scientific and clinical factors underlying our understanding of mandibular function and dysfunction. This goal is consistent with the view that the primary purpose of dentistry is to maintain the functional integrity of the masticatory system.

Dental occlusion is much more than the physical contact of the biting surface of opposing teeth or their replacements. Occlusion is more comprehensively defined biologically as the coordinated functional interaction between the various cell populations forming the masticatory system as they differentiate, model, remodel, fail and repair. Morphologic variations are very common and represent the normal.

Treatment of the occlusion should be considered on an individual basis based on the specific physiologic needs of the various tissue systems within the masticatory system rather than on a preconceived and universal basis.

Historical perspectives: As early as 4th century B.C, Hippocrates (367 to 420 BC)

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has noted that the deciduous teeth were formed before birth and described the function and periods of eruption of the teeth. But it was John Hunter (1971) who gave a clear description of the various developmental periods of teeth and their changing relations in his book called "Natural History of Teeth".[1,2]

Hunter's description of occlusion needs no revision and it was over a century later that the final points of occlusion were worked out in detail. The position of the teeth in the jaws and the relationship of the jaws to each other in the foetus are the first step in the development of occlusion.

Eruption dates for Deciduous Dentition [3]

	MAXILLARY	**MANDIBULAR**
Central incisor	7 ½ months	6 months
Lateral Incisor	9 months	7 months
Cuspid	18 months	16 months
First molar	14 months	12 months
Second molar	24 months	20 months

Eruption dates of Permanent Dentition [3]

	MAXILLARY	**MANDIBULAR**
Central incisor	7 - 8 years	6-7 years
Lateral Incisor	8 - 9 years	7-8 years
Cuspid	11 -12 years	9-10 years
First Bicuspid	10 – 11 years	10-12 years
Second Bicuspid	10 – 12 years	11-12 years
First molar	6 - 7 years	6-7 years
Second molar	12 - 13 years	11-13 years
Third molars	17 – 21 years	17-21 years

Types of occlusion

1. Static
2. Dynamic
3. Balanced
4. Morphologic
5. Physiologic/ Functional

Static: Occlusal contact points vary with position of the mandible is termed as static occlusion relationship. eg: bruxism.

Dynamic: Tooth contact during mandibular movement is termed as the dynamic occlusal relationship. eg: Gliding or sliding contacts.

Balanced: It is that type of occlusion in which the working and balancing cusps of all posterior teeth are in contact with their antagonist in all mandibular movements.

Morphologic: In this type of occlusion,the cusp interdigitation pattern of the first molar teeth is used to classify anterior-posterior arch relationships using a system developed by Edward H. Angle. The location of the mesio-facial cusp of the maxillary first molar in relation to

mandibular first molar is used as a marker in this classification.He classified it as:

*Class I:*The most common molar relationship, where the maxillary mesio-facial cusp is located in the mesio-facial development groove of mandibular first molar.

*Class II:*The mesio-facial cusp of the maxillary molar contacts the facial embrasure between the first molar and second premolar.

*Class III:*When the mesio-facial cusp of the maxillary first molar settles in to the disto-facial groove of mandibular first molar.

Physiologic / Functional: This is mostly followed in restorative dentistry.An occlusion that is free of interference to smooth gliding movements of the mandible, with absence of pathology.

Potential contact areas of the occlusal surface [4] (Figure 1)

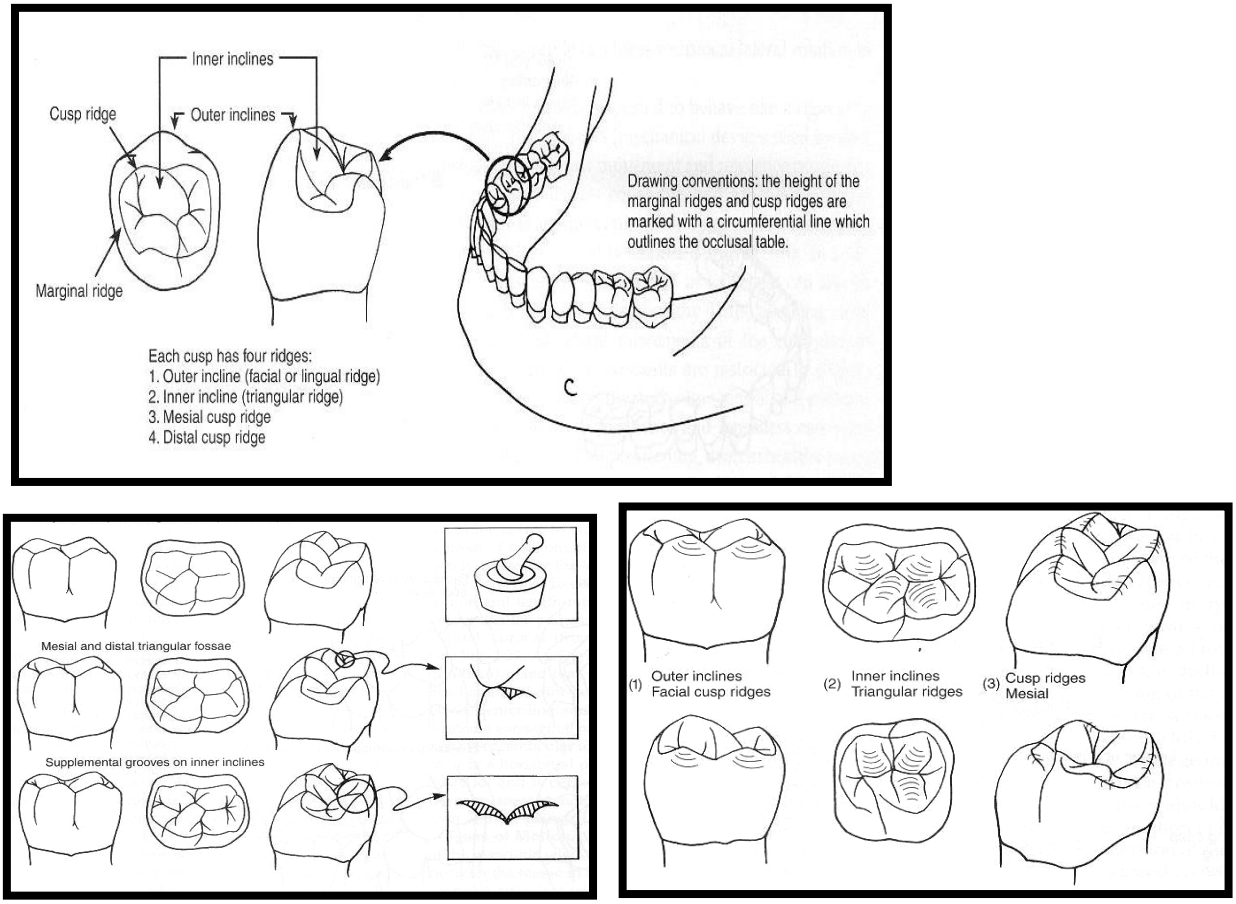

Figure 1. Normal marginal ridge, fossa and cusp relationship.

In an ideal arrangement of teeth, the facial to lingual zones of potential contact of maxillary posterior teeth can be [1,5]:

Zone 1 Lingual inclines of the facial cusps – lateral functional contact (Facial range)

Zone 2 Central groove area – centric contact (facial range)

Zone 3 Facial inclines of the lingual cusps – lateral non-functional contact

Zone 4 Lingual cusp tips – centric contact (Lingual range)

Zone 5 Lingual inclines of the lingual cusps – lateral functional contact (Lingual range)

In an ideal arrangement of the teeth, the facial to lingual zones of potential contact of mandibular posterior teeth are [1,5]:

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Zone 4 Central groove area – centric contact (lingual range)

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Centric relation

It is the position of mandibular condyle in articular fossa in an unstrained position where anterio-superiour surfaces of the condyle are in contract with the concavities of articular disc. It is the most superior position of the condyles that can assume in the glenoid fossa. In centric relation, the mandibule rotates around a fixed horizontal axis termed as terminal hinge axis. The condyles rotate around the terminal hinge axis and the lower incisor arc 22-25mm around the midpoint. The arc of movement is termed as the terminal arc of closure.

Centric occlusion

It is also termed as intercuspal contact position. Upon closure of mandible in centric relation, the mandible slides forward to a position where the maxillary and mandibular teeth intercuspate maximum in centric occlusion.

Inter-arch tooth relationships

The overlap is characterized in two dimensions, horizontal overlap (overjet) and vertical overlap (over bite).

Guidance of occlusion [6]

It is the influential effect of the TMJ and dental occlusion on the direction of the mandibular movements. The following features help in guidance of occlusion:

1) Supporting cusps/centric holding cusp/stamp cusps
2) Non supporting cusps/non centric holding cusp/ shear cusp
3) Guiding inclines
4) Incisal guidance
5) Condylar guidance: Three components of the condylar guidance influences articulation of the teeth: (a) The contour of the articular eminence of the temporal bones, (b) Bennett shifts and (c) Inter condylar distance (Bennett angle)
6) Cusp angle
7) Plane of occlusion
8) Curve of spee
9) Curve of willson

Supporting cusps	Non-supporting cusps
♦ Synonym– Stamp cusps, centric holding cusps, functional cusps	♦ Non centric cusps, gliding cups, non-holding cusps
♦ These cusps contact the opposing teeth in their corresponding facio-lingual center on a marginal ridge or a fossae.	♦ Are located in the anterior-posterior plane in facial (lingual) embrasures or in the developmental groove of the opposing teeth, creating an altering arrangement when the teeth are in intercuspal position.
♦ They are subjected to the highest forces and longest duration of contact at intercuspal position during chewing. ♦ They also serve to prevent drifting and passive eruption of the teeth, hence the tenure holding cusp. ♦ They are generally more robust and better suited to crushing food than non-supporting cusps. The lingual tilt of the posterior teeth increases the relative height of the supporting cusps with respect to non-supporting cusps. ♦ The central fossae contacts of the supporting cusps are obscured by the overlapping non-supporting cusps.	♦ They are located further from the facio-lingual center of the tooth than supporting cusps. ♦ Maxillary premolar non-supporting cusps also play an essential role in esthetics. ♦ They have sharper cusp ridges that apparently serve to shear food as they pass close to the supporting cusp ridges during chewing strokes. ♦ The overlaps of the non-supporting cusps helps to keep the soft tissue of the tongue and cheeks out from the occlusal tables, preventing self injuryduring chewing.

Occlusal schemes [7]

Three types of occlusal schemes from this position are accepted today:

1. The mutual protected occlusion/ canine protected occlusion.
2. The group function.
3. The balanced occlusion.

Occlusal considerations in restorative dentistry [8]

Before the restorative procedure is started, the operator should determine if the patient's occlusal relationship are adequate ad merit perpetuation in the restorations or appliances. Caries, inadequate restorations, periodontal disease, loss of teeth all predisposes and often lead to disturbed occlusal relationship. The use of the best articulation or functionally recorded occlusal wax pattern is meaningless, if unharmonious occlusal relationship in the dentition is being reproduced by the use of these methods. In some instances, the functional part of a patient's occlusion may be free of occlusal interferences while other teeth not participating in occlusal function may have drifted into malposition because

of the loss of antagonists or from other causes. The occlusions with such interferences require correction before optimal functional relation can be established between replacement of the lost teeth and the remaining opposing teeth. Occlusal adjustments prior to restorative procedures should therefore go beyond elimination of the actual occlusal interferences at the time of the adjustment and include corrections of deviations from an acceptable plane of occlusion. Standardized occlusal templates are in most cases unacceptable as indicators of the plane of occlusion since there is an individual optimal occlusal pattern for each patient.

Amalgam Restorations

Amalgam restorations are the most commonly used restorations for restoring carious or broken posterior teeth. Prior to cutting the preparation of a tooth its opposing occlusal surfaces should be examined. Plunger cusps and over erupted teeth may be reduced and any premature contacts or cuspal interferences may be eliminated in order to avoid their duplication in the new restoration.

Tooth preparation: The depth of a cavity provides this bulk and should be at least 2mm. Missing cusps may be restored in amalgam. An amalgam, cusp must be at least 2mm high. The tooth structure of the remaining cusps should be strong enough to support occlusal forces.

Retention for large amalgam restorations may be achieved with retention grooves and pins in addition to divergence cavity walls.

Carving Amalgam: Buccal and lingual surfaces may be contoured by following the contour of the remaining buccal and lingual walls.

Carving the Occlusal Surface: The restoration may be carved by passing a sharp carving instrument back and forth along the cavo-surface angle between enamel and amalgam. Buccal and lingual inner inclines the point at which the two surfaces join will be the central fossae and groove.

Marginal Ridge: The occlusobuccal and the occlusoligual contours should be followed from both sides till they meet, thus formatting the contour of the marginal ridge.

Checking the Occlusion: A piece of articulating paper will show points of contact on supporting cusps, marginal ridges and central fosse. These should all be carefully reduced until simultaneous supporting cusp contacts exists between the restoration and the other posterior teeth.

Centric Relation Contacts: Premature contact in centric relation should be removed. These occur on the distal inclines of the mandibular teeth and on the mesial inclines of the maxillary teeth.

A major problem is the possibility of the fresh amalgam fracturing during adjustment of centric occlusion and eccentric contacts. For this reason the amalgam should be allowed to undergo an

initial set after the gross contouring has been completed. Over carving results in permanent loss of supporting cusp contact and should be avoided.

Cast Restorations:

The position of the cusps, fossae and marginal ridge of the teeth opposing the proposed restoration should be examined. If these are in unfavourable relations due to over eruption or migration they should be re-contoured.

Premature contacts or cuspal interferences from teeth opposite the required restoration should be removed in order to prevent their reintroduction in the final restoration.

Tooth Preparation: Inlay margins should not be placed at the occlusobuccal line angles of the mandibular teeth or at the occlusopalatal line angles of the maxillary teeth. Placement of margins in these areas will leave these cusps weak and liable to fracture. Onlay restorations employ the principle of overlying the supporting cusps. The minimum amount of occlusal reduction necessary to overlay a supporting cusp is 1 to 1½ millimeters. Occlusal reduction should be checked in centric occlusion, centric relation, working, non-working and protrusive movements.

Occlusal Adjustment by Selective Grinding: Selective grinding is not the same as spot grinding. Spot grinding employes the principles of grinding away all articulating paper markings until the patient feels that the tooth in no longer "high. As a result the restored tooth may be non-functional and completely out of contact.

It may feel "high" in centric relation, centric occlusion, working, non-working, and protrusive relations. By being able to distinguish between the terminal and eccentric contacts of the "high" filling, the undesirable premature contacts and occlusal interferences may be removed by selective grinding and the desirable contacts in centric occlusion left intact.

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