

Occlusal Concepts





The objective of full mouth rehabilitation is not only the reconstruction and restoration of the worn out dentition, but also maintenance of the health of the entire stomatognathic system.

Full mouth rehabilitation should re-establish a state of functional as well as biological efficiency where teeth and their periodontal structures, the muscles of mastication, and the temporomandibular joint (TMJ) mechanisms all function together in synchronous harmony



Various classifications have been proposed to classify patients requiring full mouth rehabilitation, however, the classification most widely adopted is the one given by Turner and Missirlian

According to them, patients with occlusal wear can be broadly classified into three categories:

Category 1:



Excessive wear with loss of vertical dimension of occlusion (VDO)

The patient has some loss of facial contour and drooping of the corners of the mouth.

Treatment: All teeth of one arch must be prepared in a single sitting once the final decision is made. This makes the increase in VDO less abrupt and allows better control of esthetics.

Category 2:



Excessive wear without loss of VDO but with space available.

Patients typically have a long history of gradual wear caused by bruxism, oral habits, or environmental factors but the occlusal vertical dimension (OVD) is maintained by continuous eruption.

It might be difficult to achieve

Retention and resistance form because of shorter crown length and gingivo-plasty may be needed. Enamelo-plasty of opposing posterior teeth may provide some space for the restorative material.

Category 3



Excessive wear without loss of VDO but with limited space

There is excessive wear of anterior teeth over a long period, and there is minimal wear of the posterior teeth. Centric relation and centric occlusion are coincident with a closest speaking space of 1 mm and an interocclusal distance of 2–3 mm.

In such cases vertical space must be obtained for restorative materials. This can be accomplished by orthodontic movement, restorative repositioning, surgical repositioning of segments, and programmed OVD modification.

Occlusal Approach



Occlusal approach for restorative therapy can be either conformational approach (often advisable) or a reorganised approach.

In **conformational approach**, occlusion is reconstructed according to the patient's existing intercuspal position. It is adopted when small amount of restorative treatment is undertaken.

It includes two situations:

1. Occlusion is untouched prior to tooth preparation although small changes can be made on restorations such as elimination of the non-working contacts.
2. Occlusion is modified by localized occlusal adjustments before tooth preparation that is shortening of an opposing cusp, elimination of non-working side interferences and removal of a deflective contact on tooth to be restored.



In reorganised approach, new occlusal scheme is established around a suitable condylar position which is the centric relation position. The patient's occlusion may be

Re-organised if the existing inter-cuspal position is unacceptable and needs to be changed or when extensive treatment is to be undertaken to optimize patient's occlusion.

Indications for re-organised approach are:

1. Loss of vertical dimension,
2. Repeated fracture/failure of teeth or restorations.
3. Severe bruxism.
4. Lack of interocclusal space for restorations,
5. Trauma from occlusion.
6. Unacceptable function and esthetics.
7. Presence of temporomandibular disorders or developmental anomalies.

Occlusal Schemes



The ideal occlusion for eccentric movements can be classified by three schemes according to the tooth contact condition;

- mutually protected articulation.
- group function.
- balanced articulation.



The balanced occlusion concept is applied to complete denture patients while mutually protected occlusion and group function are applied for natural dentition.



There has been a search for the ideal occlusal scheme to be followed during full mouth rehabilitation that would provide optimal muscle and joint function besides aiming at restoring the occlusal surfaces of teeth.

Gnathological Concept



An early concept of comprehensive dentistry originated from the **gnathologic society** founded by McCollum in 1926. Their observations led to the development of mandibular movements, transverse hinge axis, maxillo-mandibular relationships, and an arcon fully adjustable articulator.

They believed that anterior guidance was independent of the condylar path and described condylar path as a fixed entity in adults.

The concept of balanced occlusion which included the idea that the most posterior position of the condyles was the optimal functional position for restoring denture occlusion was applied to restoration of the natural dentition by McCollum, Schuyler, and others



Schuyler supported balanced occlusion during his early clinical years but later began to observe clinical failures.

Similar failures were observed by Stuart due to unequal wear of the buccal and lingual cusps causing deflective occlusal contacts with a loss of centric-relation closure, causing patients to bite their cheeks and tongue.



Stuart and Stallard observed that the upper lingual cusps stamp into lower fossae and lower incisors, canines and buccal cusps stamp into the upper fossae. They observed that canines discluded all other teeth in laterotrusion (working) excursion which was similar to the observation of D'Amico .

In their report in 1960, they adopted the concept of mutually protected occlusion canine-protected which replaced the concept of balanced occlusion.

In mutually protected articulation, the anterior teeth protect the posterior teeth in eccentric movements and conversely have the posterior teeth protect the anterior teeth in maximal intercuspation without any deflective occlusal contacts or interferences in speech.



Requirements for a mutually protected occlusion included

1. the cusps of posterior teeth should close in centric occlusion with the mandible in centric jaw relation.
2. in lateral excursions only opposing canines should contact.
3. in protrusion only the anterior teeth should contact.



D'Amico in 1958 studied the significance of cuspid teeth and presented the Concept of **Canine Guidance** (Canine disocclusion) in which the maxillary canine teeth serve to guide the mandible during eccentric movements and when in functional contact with the lower canines and first premolars, determine both lateral and protrusive movements of the mandible. Thus preventing any force other than along the long axis to be applied to the opposing incisors, premolars and molars



Schuyler first introduced the Concept Of ‘Freedom in Centric’ and supported the theory that centric relation was rather a biological area of the TMJ than a point.

In this concept, “there is a flat area in the central fossae upon which opposing cusps contact which permits a degree of freedom (0.5–1 mm) in eccentric movements uninfluenced by tooth inclines”. It relies on cusp-to-surface mechanics.

Schuyler suggested that incisal guidance without freedom of movement from a centric relation occlusion to a more anterior tooth intercuspation will “lock-in” the posterior occlusion.



Dawson used the term 'long centric' for freedom in centric. Long centric accommodated changes in head position and postural closure.

The measurable amount of long centric needed is the difference between centric-related closure and postural closure which is rarely more than 0.5 mm.

Pankey–Mann–Schuyler



An organized approach to oral rehabilitation was introduced by Pankey utilizing the principles of occlusion advocated by Schuyler, known as the **Pankey–Mann–Schuyler** (PMS) Philosophy of Oral Rehabilitation.

Their philosophy was pertinently based on the spherical theory of occlusion, and on the importance of cuspid teeth as discussed by D'Amico.

As a modification of canine disocclusion, the PMS philosophy was to have simultaneous contacts of the canine and posterior teeth in the working excursion (group function), and only anterior teeth contact in the protrusive excursive movement.



Early gnathologic concepts focused primarily on the condylar path and it was believed that anterior guidance was independent of the condylar path.

Hobo and Takayama revealed that anterior guidance influenced the working condylar path and concluded that they were dependent factors.

Hobo adopted the concept of posterior disocclusion and gave the Twin-tables Technique. According to him, posterior disocclusion is dependent on;

- the angle of hinge rotation created by the angular difference between anterior guidance and condylar path,
- inclination and shape of posterior cusps which helps in controlling harmful lateral forces.



On literature review it was found that occlusal schemes were also formulated for oral rehabilitation in patients with periodontal diseases. Youdelis in 1971 proposed an occlusal scheme for advanced periodontitis cases. The aim was to achieve simultaneous interocclusal contact of posterior teeth in centric relation position (usually coincident with intercuspal position) with forces directed axially. Anterior disclusion is provided for protrusive excursions and canine disclusion for lateral excursions. Cuspal anatomy is so arranged that if the canine disclusion is lost through wear or tooth movement, the posterior teeth drop into group function. Both fully and semi adjustable articulators can be used.



Of all the concepts discussed in the literature, two have found acceptance for natural dentitions and fixed prosthesis:

- the “gnathologic” and
- the “freedom-in-centric” concepts.

The bilateral balanced occlusion scheme was applied for natural dentition by McCollum but later mutually protected occlusion was adopted by Stuart and Stallard as clinical failures were observed with bilateral balance.

occlusion:



- 1. The teeth in natural dentitions are retained by periodontal tissues that are innervated by proprioceptive fibres. In edentulous mouths, both occlusion and proprioceptive feedback mechanism are lost. In complete denture occlusion all the teeth are on bases seated on movable tissues.
- 2. In natural dentitions the teeth receive individual pressures of occlusion and can move independently to adjust to occlusal pressures. The artificial teeth move as a unit on a base.
- 3. Malocclusion of natural teeth may be uneventful for years. Malocclusion of artificial teeth evokes an immediate response and involves all of the teeth and the base.
- 4. Non vertical forces on natural teeth during function affect only the teeth involved, are usually well tolerated, whereas in artificial teeth, the effect involves all of the teeth on the bases and is traumatic.
- 5. Incising with the natural teeth does not affect the posterior teeth whereas incising with artificial teeth affects all of the teeth on the base.
- 6. In natural teeth, the second molar is the favored area for masticating hard foods, owing to more favourable leverage and power. Heavy pressures of mastication in the second molar region with artificial dentition will tilt the base.
- 7. In natural teeth, bilateral balance is rarely found, and if present it is considered balancing side interference. In artificial teeth bilateral balance is generally considered necessary for base stability.
- 8. In natural teeth, prematurities are avoided due to neuromuscular system control and establish stable habitual occlusion away from centric relation. In artificial occlusion any prematurity causes instability due to lack of feedback.

BALANCED OCCLUSION



- The simultaneous contacting of maxillary and mandibular teeth on right and left and in the posterior and anterior occlusal areas in centric and eccentric positions.”
- This type of articulation helps to maintain the stabilizing forces as mandible moves the teeth to and from centric occlusion and eccentric occlusion. When artificial cusp form teeth are arranged for complete denture it is possible that the occlusal surface of the teeth should be altered to allow freedom of tooth movement in harmony with the rotation when it occurs in fossae



- **REQUIREMENTS OF BALANCED OCCLUSION**

- 1. All the teeth of working side should glide evenly against the opposing teeth.
- 2. No single tooth should produce any interference or disocclusion of other teeth.
- 3. There should be contacts in balancing side, but they should not interfere with the smooth gliding movement of the working side.
- 4. There should be simultaneous contact during protrusion.

FACTORS AFFECTING BALANCED OCCLUSION



Rudolph.L.Hanau 1930 described nine factors that govern the articulation of artificial teeth .These nine factors are called the

laws of balanced articulation

Hanau later condensed these factors to 5 articulation factors and named it the

articulation Quint



- **LAWS OF BALANCED ARTICULATION**
- 1. Horizontal condylar guidance
- 2. Compensating curve
- 3. Protrusive incisal guidance
- 4. Plane of orientation
- 5. Buccolingual inclination of the tooth axis
- 6. Sagittal condylar pathway
- 7. Sagittal incisal guidance
- 8. Tooth alignment
- 9. Relative cusp height



- **HANAU'S QUINT**

- 1. Condylar guidance
- 2. Incisal guidance
- 3. Orientation of occlusal plane
- 4. Inclination of the cusps
- 5. Prominence of the compensating curve