



Research Article

MASTERY ON BALANCED OCCLUSION

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ARTICLE INFO

Article History:

Received 4<sup>th</sup> February, 2020

Received in revised form 25<sup>th</sup>

March, 2020

Accepted 23<sup>rd</sup> April, 2020

Published online 28<sup>th</sup> May, 2020

ABSTRACT

The success of any prosthesis depends how well it is into function. The function of a prosthesis is to help in mastication, speech, esthetics without effecting the neuromuscular system. Occlusion is the main determinant of the functioning of prosthesis. Occlusion has been, and still is to some extent, a controversy issue in what is now called conventional removable and fixed prosthodontics. The range of opinion in the dental profession as to the importance of occlusion is enormous. The aim of this paper is to bring out the role of balanced occlusion in complete denture and factors influencing it.

Key words:

occlusion , balanced occlusion, hanau quint, compensating curves, artificial dentition

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INTRODUCTION

According to GPT-9,<sup>1</sup> Occlusion is defined as the static relationships between the incising or masticating surfaces of maxillary and mandibular teeth or tooth analogues. But teeth either natural or artificial are not immobile so occlusion can never be considered a purely static relationship. The word "Articulation" refers primarily to the dynamic movements of the teeth in relation to each other. It also refers joint relationships, relationships of jaws / casts, the arrangement of teeth and enunciation of speech.<sup>1</sup>Term occlusion is derived from the Latin word, "occlusio"defined as the relationship between all the components of the masticatory system in normal function, dysfunction and parafunction. An ideal occlusion is the perfect interdigitation of the upper and lower teeth, which is a result of developmental process consisting of the three main events, jaw growth, tooth formation and eruption occlusal development can be divided into the following development periods: neo-natal period. (lasts up to6months after birth). primary dentition period(from around the 6<sup>th</sup> month to 6years) mixed dentition period(around 6years – 12 years) permanent dentition period (12 years onwards).<sup>1,2</sup> Restoring a completely edentulous condition is entirely different from restoring a partially edentulous condition as there are no teeth to guide in completely edentulous state. This difference or difficulty in treating a completely dentulous

patient is because of the differences in the natural and artificial dentition. (Table 1).

Table 1 Differences between natural and artificial dentition.<sup>3,4,5,6</sup>

Table with 2 columns: Natural dentition and Artificial dentition. Rows compare various aspects like tooth function, malocclusion, forces, incising, molar area, balance, proprioceptive impulses, and forces of mastication.

Concepts of complete denture occlusion (balanced occlusion)

Balanced occlusion is defined as "The bilateral, simultaneous occlusal contact of the anterior and posterior teeth in excursive movements." (GPT- 9)<sup>1</sup>

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**Static concept:** The static relations in occlusion include centric occlusion, protrusive occlusion, right and left lateral occlusion. All of these relations must be balanced with the simultaneous contacts of all the teeth on both sides of the arch at their very first contact. The cuspal inclines should be developed so that the teeth can glide from a more centric occlusion to eccentric positions without interference and without the introduction of rotating or tipping forces.

**Dynamic concept:** The dynamic concept of occlusion is primarily concerned with opening and closing movements involved in mastication. Jaw movements and tooth contacts are made, as the teeth of one jaw glide over the teeth of the opposing jaw. Movements of the mandible which occur when the teeth are not in contact are termed as free movements.

Requirements of complete denture occlusion:<sup>1</sup>

1. Stability
2. Balanced occlusion
3. Functional lever balance by tooth to ridge position
4. Cutting penetrating and shearing efficiency of occlusal surfaces
5. Anterior incisal clearance during posterior masticatory function
6. Minimum area of occlusal contacts to reduce the forces.

**Concepts Proposed To Attain Balanced Occlusion:**<sup>2,3,4,5,7,8</sup>

**Many authors proposed different concepts for obtaining balanced occlusion.**

1. Gysi's concept
2. French's concept
3. Sears's concept
4. Pleasure's concept
5. Frush's concept
6. Hanau's quint
7. Trapozzano's concept
8. Boucher's concept
9. Lott's concept
10. Levin's concept

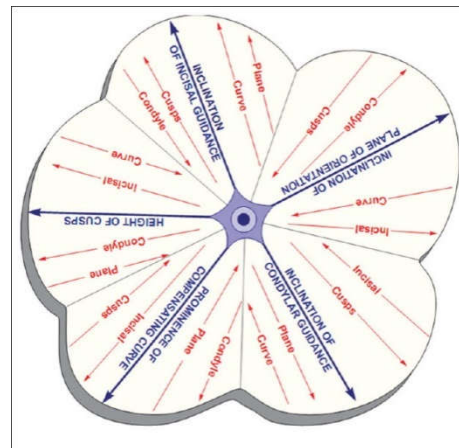
**Rudolph L Hanau proposed nine factors that govern the articulation of artificial teeth. They are:**<sup>2,3,8</sup>

1. Horizontal condylar inclination
2. Compensating curve
3. Protrusive incisal guidance
4. Plan of orientation
5. Bucco-lingual inclination of tooth axis
6. Sagittal condylar pathway
7. Sagittal incisal pathway
8. Tooth alignment
9. Relative cusp height

These nine factors are called the laws of balanced articulation. Hanau later formulated five factors, which are commonly known as Hanau's quint.

**Hanau's quint includes**

1. Condylar guidance
2. Incisal guidance
3. Compensating curves
4. Relative cusp height
5. Plane of orientation of the occlusal plane



**Fig 1 Hanau's Quint**

The outward arrow in the hanau's quint indicates the increase of the factor and the inward arrow in the hanau's quint indicates the decrease of the factor.

Thielemann subsequently simplified Hanau's factors in a formula for balanced articulation.

$$[K \times I] / [OP \times C \times OK]$$

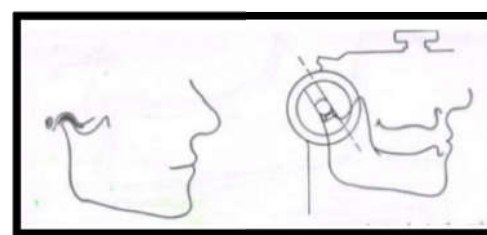
Where, K = Condyle guidance. I = Incisal guidance. C = Cusp height inclinations. OP = Inclination of the occlusal plane. OK = Curvature of the occlusal surfaces

**Factors That Influence The Balanced Occlusion:**<sup>3,7,8</sup>

1. Inclination of the condylar path or condylar guidance
2. Incisal guidance
3. Orientation of the plane of occlusion or occlusal plane
4. Cuspal angulation
5. Compensating curves

**Inclination of the condylar path**

- also called as the first factor of occlusion.
- can be recorded from the patient.
- it is registered using protrusive registration



**Fig V Condylar Guidance**

- Increase in the condylar guidance will increase the jaw separation during protrusion.
- In patients with a steep condylar guidance, the incisal guidance should be decreased to reduce the amount of jaw separation produced during protrusion and vice-versa.

**Incisal Guidance**

- This is defined as "the influence of the contacting surfaces of the mandibular and maxillary anterior teeth on mandibular movements"
- second factor of occlusion

- determined by the dentist and customized for the patient during anterior try-in.
- it acts as a controlling path for the movement of the casts in an articulator
- it should be set depending on the desired overjet and overbite planned for the patient

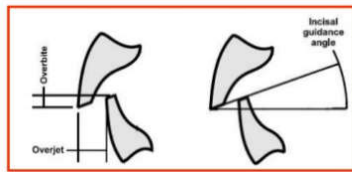


Fig VI Incisal Guidance

If overjet increases, the inclination of the incisal guidance decreases. If overbite increases, the inclination of the incisal guidance increases.

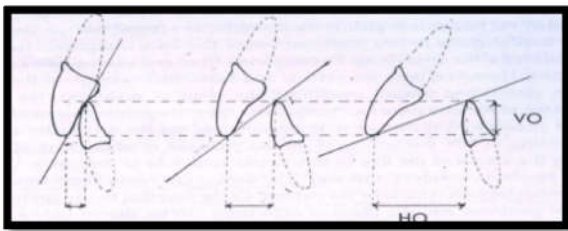


Fig VII effects of incisal guidance Plane of occlusion or occlusal plane

- It is defined as “ an imaginary surface which is related anatomically to the cranium and which theoretically touches the incisal edges of the incisors and the tips of the occluding surfaces of the posterior teeth. It is not a plane in the true sense of the word but represents the mean curvature of the surface”
- it is established anteriorly by the height of the lower canine, which nearly coincides with the commissure of the mouth. Posteriorly, it is established by the height of the retromolar pad. It is also related to the ala tragus line.

### Cuspal Inclination/ cuspal angle

The angle made by the average slope of a cusp with the cusp plane measured mesiodistal or buccolingually. This has effects on the occlusal plane and the compensating curves. The cusps of the teeth or the inclination of the cusps are important factors that modify the effect of the plane of occlusion and the compensating curves.

- In cases of shallow overbite, the cuspal angle should be reduced to balance the incisal guidance
- In cases with deep bite, the jaw separation is more during protrusion. Teeth with high cuspal inclines are required in these cases to produce posterior contact during protrusion.

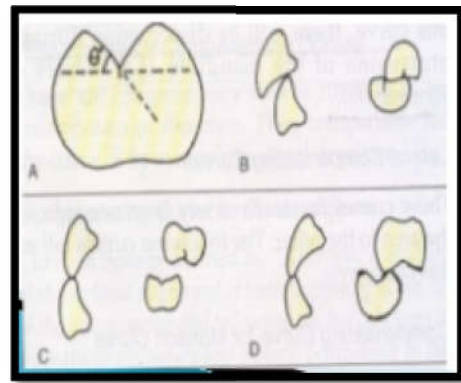


Fig VIII A. cusp angle B. deep bite C. Deep bite condition causes more jaw separation D. deep bite condition needs teeth with high cuspal inclines.

### Compensating Curves:<sup>6</sup>

Defined as “the anteroposterior and lateral curvatures in the alignment of the occluding surfaces and incisal edges of artificial teeth which are used to develop balanced occlusion”. It is an important factor for establishing balanced occlusion. it is determined by the inclination of the posterior teeth and their vertical relationship to the occlusal plane. The posterior teeth should be arranged such that their occlusal surfaces form a curve. This curve should be in harmony with the movements of the mandible guided posteriorly by the condylar path.

#### 2 types of compensating curves

- anteroposterior curves
- lateral curves

#### Anteroposterior Compensating Curve:<sup>6</sup>

Compensates for Curve of Spee. It is an imaginary curve joining the buccal cusps of the mandibular teeth starting from the canine passing through the head of the condyle.

#### Significance

Anteroposterior compensating curve is incorporated in complete denture to avoid Christensen’s Phenomenon.

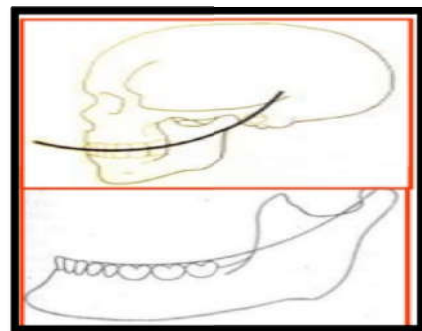


Fig IX: Anteroposterior compensating curve

#### Lateral Curves:<sup>6</sup>

#### Compensating curve for Monsoon

Curve of Monson has its concavity facing upwards

This curve runs across the Palatal and Buccal cusps of the maxillary molars During lateral movement,

1. the mandibular lingual cusps on the working side should slide along the inner inclines of the maxillary buccal cusp.

- the mandibular buccal cusps in the balancing side should contact the inner inclines of the maxillary palatal cusp.

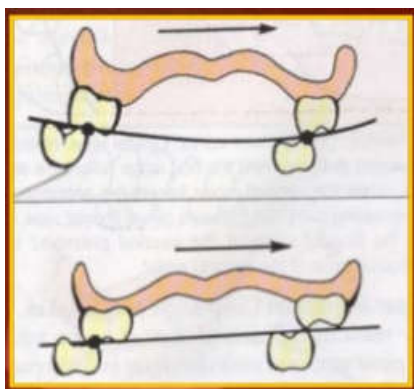


Fig X curve of monsoon

**Compensating Curve for Wilson:<sup>6</sup>**

- Seen in mandibular posterior teeth
- The lower teeth are inclined lingually, giving prominence to the buccal cusps and bringing them into contact with the upper buccal cusp during lateral movements on working side.

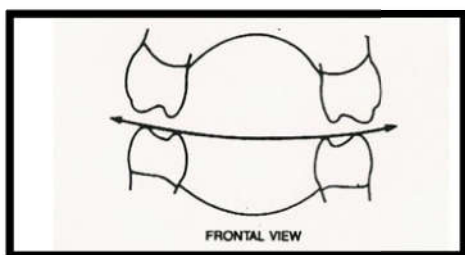


Fig XI Curve of Wilson

**Pleasure Curve:<sup>4,6,8</sup>**

“A curve of occlusion which in transverse cross-section conforms to a line which is convex upward except for the last molars”

- Proposed by Max Pleasure. He proposed this curve to balance the occlusion and increase the stability of the denture.
- This curve runs from the palatal cusp of the first premolar to the distobuccal cusp of the second molar.

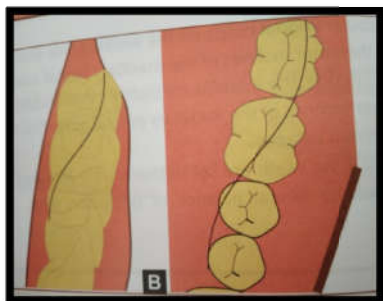


Fig XII Pleasure Curve

**Table II** Differences In Anterior Teeth Arrangement

Conventional teeth arrangement	Balanced teeth arrangement
Semi-anatomic teeth are used	Anatomic teeth are used
Overjet of 2-4mm	Overjet as minimal as possible
Overbite Of 2-4mm	Overbite as minimal as possible

**Prerequisites of Balanced Occlusion (Posterior Teeth):**

The MANDIBULAR posterior teeth must be set

- With horizontal occlusal surfaces
- the plane of occlusion must have proper orientation
- a compensating curve must be set
- no interlocking transverse ridges
- The MAXILLARY posterior teeth must be
  - no buccal cusp contact
  - static centric occlusal contact
- no buccal cusp contacts in lateral excursions

**CONCLUSION**

Complete denture occlusion is apart of the stomatognathic system and not just merely arranging of maxillary and mandibular teeth. The first and foremost concern is about the health and the preservation of the supporting structures. We need to consider all the factors such as biologic, physiologic, and mechanical that favor the stability of the denture base to avoid deflective or excessive forces transmitted to the underlying structures.

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**How to cite this article:**

Sruthi YSS1, Rao BL, Dr. Satyanarayana S V Tammineedi, Chakradhar V and Parvathi PSHL (2020) 'Mastery on Balanced Occlusion', International Journal of Current Advanced Research, 09(05), pp. 22193-22196. DOI: <http://dx.doi.org/10.24327/ijcar.2020.22196.4373>