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Review Article

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THE ENIGMA OF DISCLUSION SIMPLIFIED

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ABSTRACT

Disclusion has been one of the most important determinants for musculoskeletal equilibrium. Mandibular movement is a complex movement involving various neurological integration and precise muscle coordination. Any defective eccentric occlusal interference may lead to muscular instability and malfunction. This article describes the integrated mechanics of disclusion in eccentric mandibular movements, which guides the uninterrupted functioning of complex stomatognathic system.

KEYWORDS: Disclusion, Christensen Phenomenon, Curves Of Occlusion

INTRODUCTION

Disclusion has been one of the most debatable and unsolved mystery ever since the origin of the branch Prosthodontics. Earlier authors unknowingly omitted the importance of disclusion and incorporated balanced occlusal scheme in any types of oral rehabilitation. This kind of occlusion without disclusion in full-mouth rehabilitation leads to musculoskeletal instability and failed restorations.

HISTORY AND DEFINITIONS

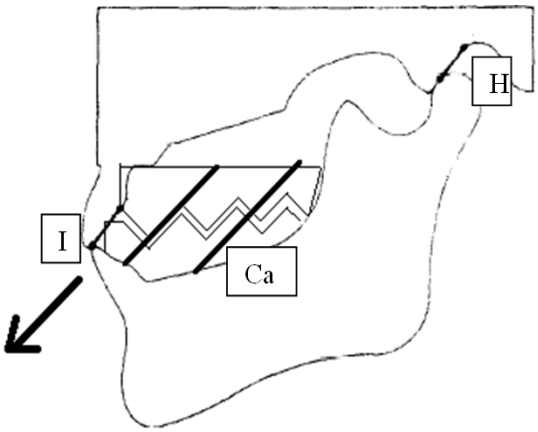
The GPT9 defines Disclusion as 'the separation of opposing teeth during eccentric movements of the mandible.[1] The disclusion thus can generate Christensen phenomenon posteriorly, and take part in mutually protected occlusion. In early 1920s Hanau[2] introduced the major components of balanced occlusion being condylar guidance, anterior guidance, compensating curves, cuspal height and orientation of plane of occlusion. McCollum and Stuart[3] believed that anterior guidance was independent of the condylar path and considered anterior guidance just as an "extension" of the condylar path. Later 'Amico[4] disproved this theory and rejected it.

CONCEPT OF DISCLUSION

In reality the mandibular movement during protrusion is not merely dependent on the condylar guidance alone. The eccentric movement of mandible is guided by the vector component of condylar guidance, anterior guidance along with cuspal height, difference in curvatures of spee in maxilla as well as in mandible and occlusal plane orientation. Hobo[5] proved that the condylar path was affected by anterior guidance; and both condylar guidance as well as the anterior guidance was dependent, rather than independent factors. The mandible rotates around the inter-condylar axis during eccentric movements, when anterior guidance is steeper than the condylar path. The factor that compensates for the difference in steepness is called as the angle of hinge rotation. The angle of hinge rotation acts as a resultant vector and guides the advancing mandible along that direction, resulting in disclusion.

CONDITION I

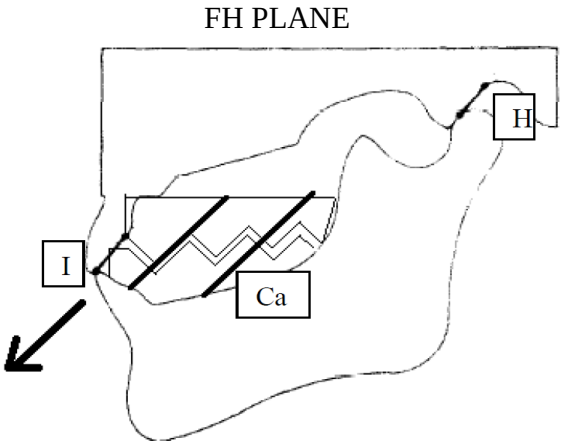
I = Ca = H FH PLANE



I-incisal guidance angle; Ca-Cuspal angle; H – Condylar guidance angle

When cusp inclination of molars is parallel to incisal Guidance (I) which in turn parallel to condylar path ((H); Mandible translates without rotation

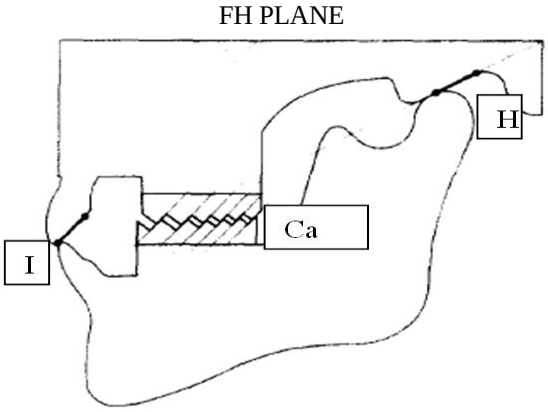
CONDITION II
I = Ca > H



I-incisal guidance angle; Ca-Cuspal angle; H – Condylar guidance angle

When cusp inclination of molars is parallel to incisal Guidance (I), there is no posterior disclusion even though incisal guidance steeper (I) than condylar path ((H).

CONDITION III
H = Ca < I



I-incisal guidance angle; Ca-Cuspal angle; H – condylar guidance angle

Posterior disclusion occurs when cusp inclination of molars is parallel to Condylar path and Incisal Guidance (I) is steeper than Condylar path ((H).

MATHEMATICAL EQUATIONS

Relation between Christensen phenomenon can be connoted as
Sine [(H ÷β) +C] =Sine (H÷ β) +P/ B× sine (H)
Where H is the inclination of the condylar guidance, β is the Balkwill angle, C is the Christensen angle, P is the length of protrusion, and B is the height of Bonwill's triangle.

The simplified formulae may be written as
Sine C= P/B ×Sine (H)[6]

DISCUSSION

Disclusion eliminates the unwanted lateral forces on posterior teeth during eccentric movement of mandible. The posterior teeth disclusion may occur when the cusp inclination of the molar is parallel to the condylar path and anterior guidance is steeper than the condylar path. To establish posterior disclusion, the molar cusp inclination should be parallel to the condylar path, and not to anterior guidance. The degree of disclusion is directly proportional to length of protrusion and Condylar guidance angle, and inversely related to Height of Bonwill's triangle. A difference in radii and depth of curve of spee between both arches can also mechanically bring up a posterior separation provided with proper condylar guidance and anterior guidance. Hui Xu[7], et al evaluated the depth and radii of curve of spee in maxillary arch as well as mandibular arches and concluded a significant mismatch in depth and radii of curves of spee between maxilla and mandible. Graf Spee only evaluated, defined and propagated an independent curve in mandibular arch in a median plane. In Complete Denture cases, protrusive disclusion is unfavorable, and thus can be avoided by equalizing the depth and radii of curves in both arches to achieve balanced contacts and can be called as Compensating Curves. A mathematical effect of orientation of Occlusal plane and Curvature differences between both arches on disclusion should also be discussed, which is out of the scope of this article.

CONCLUSION

Disclusion occurs when anterior guidance is steeper than condylar guidance with proper cusp factor.

Disclusion is directly proportional to condylar guidance angle and length of protrusion and inversely proportional to height of Bonwill's triangle.

Disclusion may directly be related to the difference in curves in maxilla and mandible.

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