ALIGNMENT OF THE OCCLUSION

Reference Texts:


Power Point Presentation 1

Power Point Presentation 2

I. Definitions:

Occlusal Plane- An imaginary surface, related anatomically to the cranium, which theoretically touches the incisal edges of the incisors and the tips of the cusps of the posterior teeth. It is not a flat surface! It is curved due to the varying degrees of inclinations of the teeth.

Bonwill's Triangle- An historical geometric theory of the "Science of Occlusion", developed by Dr. William Gibson Arlington Bonwill. As a dental apprentice, Dr. Bonwill developed the first anatomical articulator in 1858. He later enrolled into the Pennsylvania College of Dental Surgery and graduated in 1864. Dr. Bonwill believed that there was a geometric basis for occlusion and that a 4” equilateral triangle existed between the two condyles and anterior teeth of the mandible.

Ref. article: Ackerman, James L., Ackerman, Marc B, Kean, Martin, Kean R., A Philadelphia Fable: How Ideal Occlusion Became the Philosopher's Stone of Orthodontics, Angle Orthodontist, Vol. 77, No 1, 2007

Monson’s Sphere- A hypothetical sphere with a radius of 4 inches, which spatially describes the inclination of the mandibular teeth. The center of the sphere is equi-distant from the occlusal surfaces of the posterior teeth and from the centers of the condyles. Theoretically, each cusp and incisal edge touches or conforms to a segment of the lower portion of the sphere.

Ref. article: Ferrario, MD, Virgilio F.; Sforza, MD, Chiarella; Colombo, DDS, PhD, Anna; Ciusa, DDS, Veronica; Serrao, MD, PhD, Graziano. Three- Dimensional Inclination of the Dental Axes in Healthy Permanent Dentitions- A Cross-Sectional Study in a Normal Population.

Harmony- Theoretically, a relationship is believed to exist between Bonwill's Triangle and Monson's Sphere.

Note*: Bonwill's Triangle and Monson's Sphere were simplistic theories which do not apply to all cases. They are oversimplifications and they sparked controversy which led dentistry to the current theories on occlusion used today.
Curve of Spee- Antero-posterior curve - The curvature of the occlusal surfaces, beginning at the tip of the mandibular canine and following the buccal cusp tips of the premolar and molar teeth, continuing through the anterior border of the ramus. In complete dentures, the curve must be sufficiently high in the posterior to compensate for Christensen’s Phenomenon and maintain posterior tooth contact in protrusive excursions. In the natural dentition, the curve must be sufficiently low in the posterior to permit disocclusion of the posterior teeth during protrusive movement. The Glossary of Prosthodontic Terms, eighth edition, The editorial council of The Journal of Prosthetic Dentistry, Mosby, 1999

Curve of Wilson- Mediolateral curve- That curve, as viewed in the frontal plane, which is formed by an imaginary line touching the buccal and lingual cusp tips of similar teeth on each side of the mandibular arch. When the curve in the lower arch is seen as concave, it is also referred to as the curve of Wilson. In the natural dentition the Curve of Wilson should serve in harmony with lateral anterior guidance to provide disocclusion of the maxillary lingual cusps on the non-working side during lateral excursions. When the curve in the lower arch is seen as convex, as may occur in excessively worn dentitions, the curve may be referred to as a Curve of Pleasure or anti-Monson curve. The Glossary of Prosthodontic Terms, eighth edition, The editorial council of The Journal of Prosthetic Dentistry, Mosby, 1999

II. Factors and Forces that Determine Tooth Position

- Lips and cheeks
- Tongue
- Tooth size
- Proximal contact
- Occlusal contact
- Arch width

III. Intra arch Alignment- The relationship of the teeth to each other within the arch. The loss of any tooth will allow for the mesial drift in the same arch and for super-eruption of the opposing tooth.

A. Angulation of Teeth:

1. All teeth are mesially inclined except the distal maxillary molars
2. Anterior teeth are labially inclined
3. Inclinations of teeth allow them to fit into the Curve of Spee.

Form follows function: The arches fit a three dimensional plane. Not a flat surface.

4. Maxillary posterior teeth are inclined facially.
5. Mandibular posterior teeth are inclined lingually.

a. This is evident in relationship to the curve of Wilson.
IV. Anatomy of Posterior Surfaces

A. Centric Cusps (supporting cusps): Due the dynamic nature of the occlusion, the loss of a centric supporting cusp can lead to the super eruption of a opposing tooth if there is no other tooth to prevent its movement.

1. Lingual cusps of maxillary teeth
2. Buccal cusps of mandibular cusps.

B. Inner Aspect (Occlusal table): The inner aspect of a posterior tooth, between the cusp tips.

Note: Excessive decay or the loss of an occlusal restoration which provided sole contact with an opposing tooth, can lead to super eruption.

C. Non-Centric Cusps (Non-supporting cusps): They are "guiding cusps" since in group function the inner aspect of the cusp has a functional contact. However non-centric cusp tips are generally sharper than supporting cusp tips, because they are not usually in function.

1. Buccal cusps of maxillary teeth.
2. Lingual cusps of mandibular teeth

D. Outer aspect: The occlusal area outside the cusp tips.

Functional Outer Aspect: Small area of the centric cusp (~1mm). It is the only area in which an outer aspect has any functional significance. This small area functions against the inner incline of the non-centric cusp. This area assist in shearing of food during mastication.

Note: Where function occurs, wear occurs. As teeth wear they remain in contact due to the mesial drift and super eruption of adjacent teeth.

V. Inter arch Relationships

A. Angle's Classifications: Based on the position of the mandibular first molar.

1. Angle's Class I: In an Angle's Class I relationship, each mandibular tooth occludes with it's counterpart and the adjacent tooth mesial to it.

Occlusal Contacts on premolars occur between cusp tips and opposing marginal ridges, whereas contacts on molars occur on both cusp tips and fossae and cusp
tip and marginal ridges. (ie. centric cusps contact in central fossa areas and marginal ridge areas.

a) The mesiobuccal cusp of the mandibular first molar occludes in the embrasure area between the maxillary second premolar and the maxillary first molar.

b) The mesiobuccal cusp of the maxillary first molar is aligned directly over the buccal groove of the mandibular first molar.

c) The mesiolingual cusp of the maxillary first molar is situated in the central fossa area of the mandibular first molar.

2. Angle's Class II:

a. The mesiobuccal cusp of the mandibular first molar occludes in the central fossa of the maxillary first molar.

b. The mesiobuccal cusp of the mandibular first molar is aligned with the buccal groove of the maxillary first molar.

c. The distolingual cusp of the maxillary first molar occludes in the central fossa of the mandibular first molar.

3. Angle's Class III: ("cross-bite")

a. The distobuccal cusp of the mandibular first molar occludes with the embrasure between the maxillary first molar and maxillary second premolar.

b. The mesiobuccal cusp of the maxillary first molar is situated over the embrasure between the mandibular first and second molars.

c. The mesiolingual cusp of the maxillary first molar occludes with the mesial pit of the mandibular second molar.

VI. Occlusal Landmarks: These are three imaginary lines representing the general arch form of the arches.

A. Buccoocclusal Line (B-O line) is an imaginary line extended through all the buccal cusp tips of the mandibular posterior teeth.

a. It is the demarcation between the inner and outer aspects of the buccal cusps.
B. Central Fossa Line (C-F line) is an imaginary line extended through the central developmental grooves of the maxillary and mandibular posterior teeth

b. Proximal contacts areas are generally located slightly buccal to the C-F line.

1) Allows food to be shunted toward the tongue.

C. Lingual Occlusal Line (L-O line) is an imaginary line extended thought the lingual cusp tips of maxillary posterior teeth.

D. Landmark Rules of Occlusion: This is an Angle's Class I relationship.

1. B-O line of the mandibular arch Occludes with the C-F line of the maxillary arch.

2. L-O line of the maxillary arch occlude with the C-F line of the mandibular arch.

3. Centric cusps contact central fossa and marginal ridges.

VII. Common Anterior Inter arch Relationships of Teeth

A. Incisal edges of mandibular incisors contact the lingual surfaces of maxillary incisors in the lingual fossa.

B. Normally the maxillary anterior teeth overlap the mandibular anterior teeth almost 1/2 the length of the mandibular crowns.

C. Contacts of the anterior teeth are light relative to the posterior contacts in MI, since anterior teeth are not designed for heavy occlusal function.

D. Overlap: Horizontal versus Vertical Overlap. **Note common names in photograph link.

VIII. Functional Purposes of Anterior Teeth

A. To guide the mandible through eccentric or lateral movements which is called Anterior Guidance.

1. Anterior Guidance is affected by both horizontal overlap and vertical overlap.
B. To incise food

C. Speech, lip support and esthetics.