SMILE ELEMENTS ORTHODONTICS
NEWSLETTER

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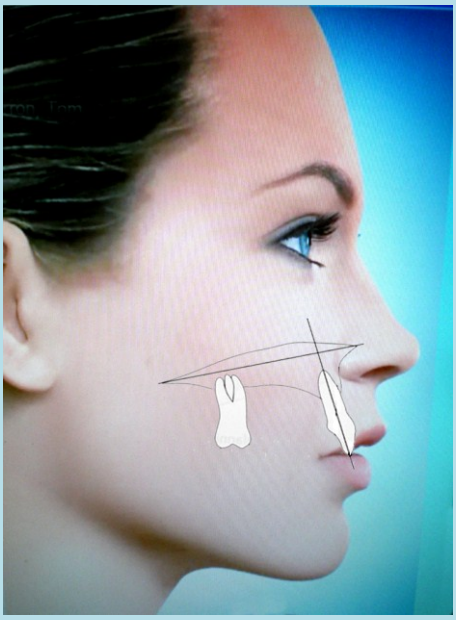
A Systematic Approach for Achieving Optimal Dental-Facial Aesthetics & Oral Function

Face First: A Paradigm Change in Orthodontic Diagnosis & Treatment Planning

Orthodontic diagnosis and treatment planning have undergone a period of remarkable change in recent years, away from a focus on dental and hard tissue relationships, toward a greater emphasis on soft tissue adaption and proportions of the face and mouth. In planning treatment, clinicians establish the appearance of the face that is desired as a treatment outcome and work backward to the hard tissue relationships that are needed to obtain these soft tissue proportions. This is the philosophy I have adopted in my private practice and the method that I teach in my lectures and presentations.



This modern view explicitly acknowledges the reality that the major goal of orthodontic treatment, for the great majority of patients, is the improvement of dental-facial aesthetics.

Planned Upper Incisor Position

The treatment plan begins with establishing the 3-dimensional maxillary incisor position that will achieve the desired lip support, tooth display and profile. Though some malocclusions can be corrected by accepting the existing position of the upper incisors in the face, the majority of orthodontic cases require changes in incisor position. In some cases, the planned upper incisor position will be a realistic treatment goal. In other cases, the ideal incisor position may not be a realistic goal. In such cases, the perceived ideal incisor position has to be adjusted to reflect the limiting features of the case. Often, it will become evident during treatment planning that there are major limiting features, such as skeletal disproportions, which cannot be resolved by orthodontics alone. It is important to identify these cases and consider an orthopedic solution in growing patients, or a surgical solution in non-growing patients. Biomechanics can then be designed to “build” the occlusion to fit to the planned upper incisor position.

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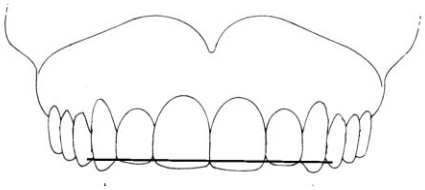
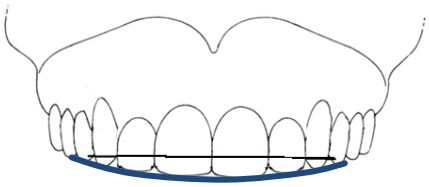
Upper Incisor Position: Smile Arc, Ideal Display & Guidance





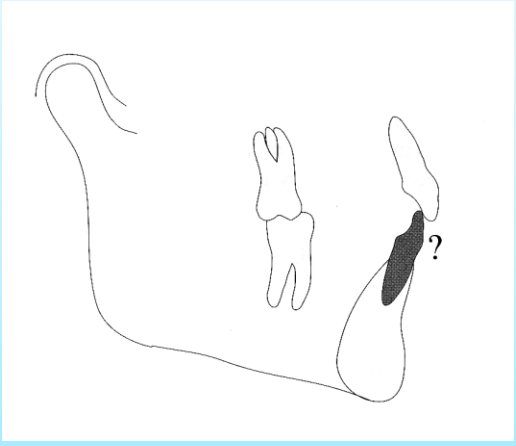
Before

After

The ideal smile arc occurs when the curvature of the incisal edges of the upper incisors follows the curvature of the lower lip when smiling. Ideally, nearly the full length of the upper incisor crowns should be displayed. This important incisor position is achieved by positioning the anterior braces in a progressively gingival position from the canines forward to the central incisors. Conversely, if excessive crown length is displayed with gum tissue showing, the incisor brackets can be positioned more incisally on the teeth to promote intrusion. An Aesthetically pleasing position must be achieved along with correct Overbite and Overjet. (See Fig. 6 last page)

Planned Lower Incisor Position

The next step in “building” the occlusion requires positioning the lower incisors in a proper relationship with the planned position of the upper incisors. In addition, the periodontal biotype must be considered when planning anteriorposterior movement of the incisors in the alveolus. In some cases, this position may not be feasible without modifying the planned position of the upper incisors, or without orthopedic movement of the mandible in growing patients, or jaw surgery in non- rowing patients.



Positioning The Remaining Dentition in Proper Static Occlusion

The next step in “building” the occlusion, is determining the space requirements and treatment mechanics necessary to fit the remaining posterior teeth to the desired incisor positions. An optimal relationship with the opposing arch is accomplished by achieving the traditional orthodontic **Six Keys to Occlusion.**

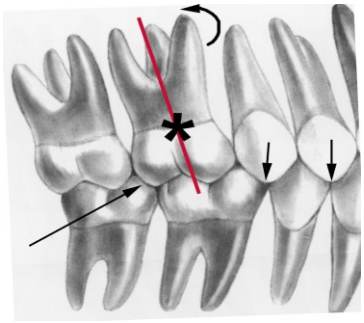


Figure 1

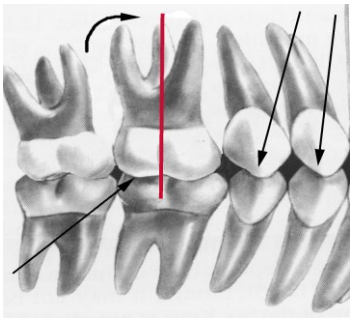


Figure 2

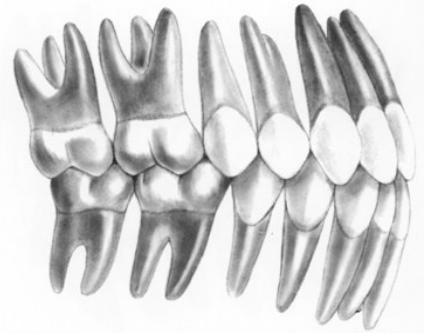


Figure 3

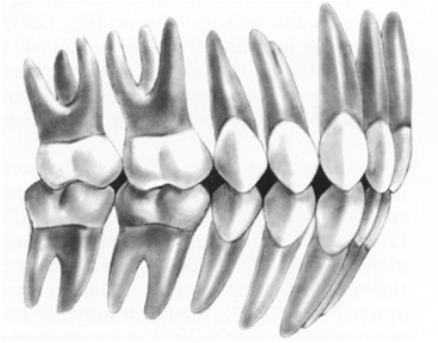


Figure 4

Occlusion Key #1 is molar / inter-arch relationship. The mesial-buccal cusp of the upper first molar should occlude with the central buccal groove of the lower first molar. The mesio-lingual cusp of the upper molar should occlude with the central fossa of the lower molar. The buccal cusps of the upper premolars should occlude in the embrasure spaces between the opposing lower teeth, and the lingual cusps of the upper premolars should occlude with the distal portion of the fossae of the opposing lower teeth. The cusp tips of the upper canines should occlude just slightly mesial to the embrasure space between the lower first premolar and canine. This slight mesial position ensures proper canine rise during lateral excursions of the lower jaw.

Occlusion Key #2 concerns proper angulation or tip. There should be a slight mesial tip to the axial inclinations of all teeth. The importance of this is illustrated in Figure 1 where the mesial tip of the upper first molar requires that the disto-buccal cusp occludes with the mesio-buccal cusp of the lower second molar. Figure 2 shows that when the upper first molar is too upright, it forces all the teeth mesial to it into a more anterior position preventing proper occlusion.

Occlusion Key #3 concerns proper torque. For example, when the anterior teeth are properly torqued as in Figure 3, the posterior teeth occlude correctly. Figure 4 illustrates the inability to achieve proper occlusion when the upper anterior teeth lack proper torque, or when the lower anterior teeth are excessively proclined.

Occlusion Key #4 requires that all teeth are free from rotations to fit properly in alignment with tight contacts (**Key #5**) and a relatively flat occlusal plane (**Key #6.**)

Positioning the Dentition to Achieve Optimal Functional Occlusion

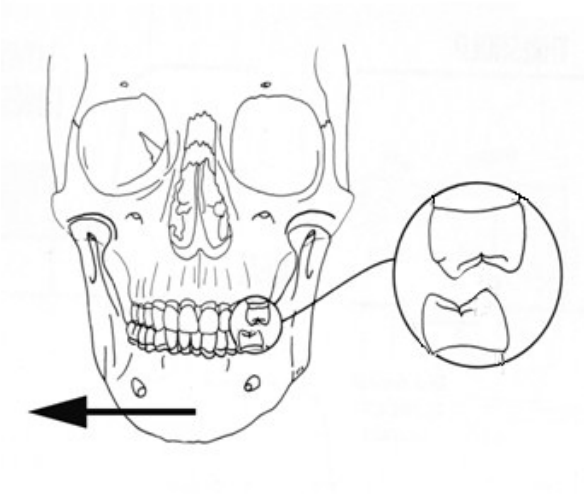
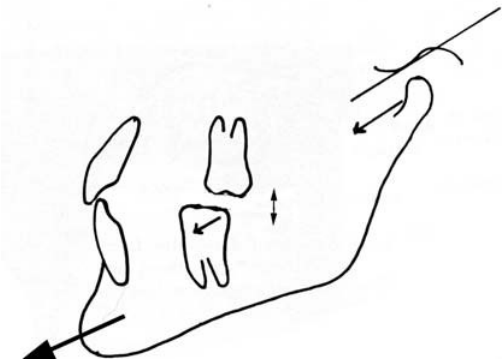


Figure 5



Guidance & Disclusion

In addition, to the proper static relationship of the upper and lower teeth, it is important to achieve an optimal dynamic or functional occlusion to promote long-term health of the periodontium and the related oral, cranial and mandibular musculoskeletal system. Specifically, in lateral excursions of the jaw (Fig. 5), the canine teeth should be of sufficient length and properly positioned so that the mesio-lingual surface of the upper canine makes contact with the tip of the disto-buccal surface of the lower canine to guide movement. As the canines ramp over one another on the side to which the jaw is moving, the upper and lower posterior teeth on the opposite side are discluded or separated to avoid detrimental sheering forces and deflecting contacts that can trigger neuromuscular reflexes injurious to the temporomandibular joints. When dental or periodontal conditions exist that do not permit canine disclusion, then a group of posterior teeth can provide guidance of the lower jaw on the working side in the direction of jaw excursion.

Occlusion & Temporomandibular Joint Health

Orthodontic treatment should include among its goals achieving a proper static occlusion with the condyles centered in the fossae with the condyle seated in the center of the articular discs. Furthermore, a proper functional occlusion should allow the condyles and their discs to move in unison down the eminence as the jaw opens, and move back together upon closing. An occlusal scheme that contributes to disc / condyle displacement can lead to degenerative and morphological changes. This naturally results in changes in joint function, which together with changes in jaw position, adversely affect the stability of the facial profile, the dentition and the periodontium.