Monograph of Dr. Anka’s presentation.

Treatment of Canted Occlusal Plane
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Introduction:
The treatment of canted occlusal plane has long been a challenging one in orthodontic treatment. The recent development of TAD offers solutions toward better symmetric results without surgery. The applications of the technique and the devices will be explained. The concepts of grower and non-grower treatments will be elaborated as well. Cases of the canted occlusal plane correction will be shown.

Aim:
There is need to innovate a way to correct the occlusal plane when it is canted, and to improve patients function whether or not it is a problem of the oral structures, which may have effect to the patient’s self-esteem or with the possibility of decreasing quality of life. Patients can be better corrected when they still have growth. (17) Some of them who have finished growth should be corrected with consideration beyond the growth adaptation factors. This is a preliminary proposal and report of the method that will contribute to the basis of future refinement techniques for the correction of occlusal plane discrepancies. These methods are additional steps regarding the present study of intrusion technique to correct the canted occlusal plane. (1, 2, 3) The technique will include a comprehensive frontal cephalometric analysis used to detect problems and 3D mechanics with control of the teeth and their alveolar bone within the boundary of the nasal bone.

Methods:
Temporary Anchorage Device (TAD), a mini-screw device is being used to as the anchorage source in applying force application to move a tooth or teeth, mainly within the vertical dimension. The Grummons Frontal Analysis (4) is one of the main criteria besides the lateral cephalogram, smile line and lip relationships at rest and dynamic smile positions, photographs and clinical findings including using dental floss examination.

Results and Conclusions:
Asymmetry of facial parts including a tilted cant of the occlusal plane is very common in most people, rather than being the exception. It is important to recognize and integrate asymmetry correction if possible during the routine orthodontic treatment. Recognition of the problem (awareness), and correction of such asymmetric disproportions will provide these benefits to the patient: Enhanced oral function, optimal symmetric esthetics, and increased quality of the orthodontic result.
We desire to provide our patients the best facial form and morphology no matter what problems they begin with. We have to understand the etiology of the skeletal pattern and degree of difficulty of each individual, whether dolicofacial or brachyfacial for instance. We have seldom questioned in the past whether a brachyfacial skeletal patient can be modified to become less brachyfacial, and whether the dolicofacial skeletal patient can decrease the vertical growth direction by adulthood. Such a treatment may have been initiated in the past, but with the introduction of the TAD in orthodontic treatment, it has improved the capability of such treatment.

The TAD offers an irresistible device that helps control a tooth or teeth in 3 dimensions. (12) In this paper, we will emphasize how the TAD can control and influence the vertical dimension as it relates to treatment of the canted occlusal plane. We believe in the possibility to apply this technique at a younger age, since earlier treatment of asymmetry confirms better chances to have it effectively corrected. (4)

Canted Occlusal Plane
A canted occlusal plane is a challenge during orthodontic treatment. Many such patients are difficult and the choice at maturity will typically be surgical orthodontics after the patient finishes growth. The use of a TAD provides the possibility to control the vertical areas in such a way as to influence the height of the alveolar process by alveolar modification, with a better result. The clinical approach with this technique has just begun. We need more cases to prove its stability and the long term conditions after treatment to prove its value. The present clinical findings are promising, with the technique having a very meaningful and yet practical approach in detecting and modifying asymmetry and cant of the occlusal plane. Using the frontal analysis of Grummons and Ricketts shows the specific region or quadrant of the problem. Compare this analysis with the clinical evaluation, and we can then choose the region to be effectively influenced and corrected.

Currently in the young patient, asymmetry is further treated using the fixed bite plate for increasing the vertical dimension and to relieve interferences that can be best cleared with fluoride releasing ionomer composites. These posterior composite bite lifters can be either on the maxillary or mandibular posterior teeth, selectively described by Grummons as a “turbo” (6), or also as an anterior fixed bite plate. (7) This technique is not related to the TAD, and will not be described in further detail in this paper.

In the non-growing patient, the strategy and focus is upon all four quadrants of the posterior alveolar bone so that asymmetry can be corrected, and with less effect or burden upon the temporo-mandibular joints. The decision where the TAD should be implanted depends upon whether there is enough inter-radicular space, which is a most important factor to be considered.

Examination and Evaluation of Asymmetry of the Occlusal Plane.
Evaluation of the facial asymmetry is adopted from the Grummons evaluation (4, 6, 8), which compares right and left facial components to distinguish the facial asymmetry. The patient is seated with the inter-pupillary plane horizontal with the floor. The use of dental floss on the mid-face (4) is
useful and a simple way to create a vertical line relating the upper facial third at the Crista Galli (Cg) area and soft–tissue Nasion (Na) region at the surface of the skin between the eye brows to the inferior part of the nose (sub-nasale) which represents the anterior nasal spine (ANS) point. This helps determine any mandibular shift and midline deviation of the maxillary teeth to facial midline as well as to the mandibular dental midline. A frontal clear “T” template is also a good tool to reveal which part is deviated. (4) A vertical and horizontal measurement can be done so the clinician can compare one side to the other. We can observe that an asymmetry involves both the horizontal and vertical aspects. The findings can be compared with patient photography and frontal cephalogram findings. The lateral aspects of asymmetry may affect the vertical asymmetry and visa versa, such as in a posterior unilateral cross-bite. In this kind of case, the lateral transverse aspect should be corrected to effectively help correct the vertical problem.

Model Analysis
The casts are mounted on an articulator, but it should be understood that the accuracy in this mounting depends on the location of the porions. When the porion itself is also not symmetric, then the anterior-posterior and the vertical positioning become deviated. Thus, the face-bow transfer and the mounted models really may not represent the true Frankfort Plane as an area that is normal, and to which other landmarks should be compared. However, models do permit good observation of inter-arch interferences, relationships between the upper and lower teeth in space, and relationships which can be reproduced outside of the mouth. Centric relation and centric occlusion differences influence the treatment plan. Unilateral cross-bite of the posterior region will tip the occlusal plane on one side. A removable bite plate can give an estimation of how the mandible will posture and relocate, and what is optimal mandibular position at rest. The use of a removable appliance can determine the position for a fixed posterior bite plate (7), while also correcting the transverse problem. (9, 10)

Next, comes the correction of the vertical alveolar height with the TAD. It is advisable to reduce the fixed bite plate gradually as the alveolar bone is corrected and asymmetry is lessened. It is useful to know the width of the mandibular molars planning the goals of treatment, such as the necessity to upright mandibular molars. It is advisable to make the mandibular arch as the target arch (4), since the maxilla can then be adjusted to the mandibular width. The transverse problem definitely affects the vertical problem; therefore, arch width and asymmetric relationships should be carefully observed.

Radiography:
Both measurements of lateral and frontal cephalograms are mandatory to detect the facial asymmetry. This data, combined with clinical evaluation recordings, will determine the treatment plan. The panoramic is a simple radiograph with much information about the ramus, condyle, and relationships between upper and lower teeth (when taken in ICP). The over-all condition of the nasal floor and its relation to the teeth, especially the posterior teeth, will be important as the TAD could penetrate the nasal cavity in a low portion of the maxillary sinus. This not a contra-indication; however, avoidance of such an incident is important to prevent or trigger a chronic sinusitis to an
acute one. The panoramic radiograph will also give information of the inter-radicular space available when it comes to choosing the TAD placement. The location of all first molars and canines are very important to compare original and post-treatment locations. In this method, we choose to reference Na-ANS (mid-sagittal plane) as described before. The line extension to the lower border of the mandible gives information about location of Me (Menton). First, determine the starting location from maxillary jugal processes, JR to JL. We analyze its location to a line perpendicular to the Na-ANS line, and whether tilted or not at this area. The areas of JR-JL would not be influenced with the present method, but it is important to know whether there is a problem in this region initially. Next, analyze the maxillary occlusal plane. This is the area which treatment will significantly influence. This method can decrease or increase the vertical height of this nearby alveolar bone, with a maximum of 3 mm impaction potential, and 1-2 mm possible in extrusion.

The mandibular occlusal plane maneuvering is less effective compared with the maxillae. TAD placement will be limited to the lower buccal side of the attached gingivae, the vertical dimension of which is limited. At present, we are able to intrude the lower occlusal plane (less than 2 mm) relatively less compared with the upper. However, intrusion can be done effectively with the SAS (Skeletal Anchorage Device), a mini-plate type of TAD that will be able to intrude lower molars with relative ease up to 3 mm, with a relapse of 25 percent. (11) Knowing this limitation, we must decide a realistic treatment plan after observing the problem areas.

The importance of frontal cephalometrics has been explained by Ricketts and other researchers. (16, 17) In spite of this, little has been done to utilize the frontal information compared with the popularity of the lateral cephalograph, possibly because of the limited applications which could be done clinically at that time. With the emergence of TAD in clinical practice, we can now emphasize the importance and gain more acceptance for its use.

The Grummons Frontal Cephalometric Analysis

![Grummons Frontal Cephalometric Analysis](image)

**Fig. 1.** Grummons Simplified Frontal Analysis
Mechanics Related to Management of the Canted Occlusal Plane

In the maxilla ~ TPA (Transpalatal Arch) plus hooks:
The transpalatal arch plus hooks is very effective in controlling the sagittal direction of the molars and premolars, and mesial-distal and/or intrusion-extrusion molar movements. (14, 19, 20)

Figure 2

The transpalatal arch consists of a lingual arch and a transpalatal bar design which depends on the movement intensions for the posterior teeth. This example demonstrates distalization of molars combined with slight intrusion, a typical Class II, Division I application. The position of the hooks are attached on the cervical area of the lingual arch, and the TAD placements are in the lingual alveolar process about 10 mm below the margin of cervical gingival line of inter-radicular bone. This area was chosen as the safest area since the distance of the root of the second premolar and the lingual root of the first molar provide the most distance. This location provides needed distalization of molars, without the necessity for re-implantation, and less problem of collision between the TAD and the roots during tooth movements. Extrusion and intrusion requirements determine location of hooks and the direction of force from the elastic chains. The hooks can be placed anywhere on the vertical portion of the transpalatal wire. The higher to the palate, the more extrusion force which will be created. In opposition, will be an intrusion force. The direction of the elastic chain can give a combination of distalization, and intrusion or extrusion.

The second important consideration is the location and placement of the TAD. Optimal location would be from 3-4 mm from the gingival cervical line up to about a 12 mm distance. This varies from case to case, and is based upon the amount of bone within the alveolar process, as detected with either panoramic or simple dental x-ray film. There is no doubt that the 3D CT imaging provides even more enhanced and important data information now. The mid-palatal area is the most superior part that can be used when pure intrusion is the primary objective. Pure intrusion involves a direct force from the palatal alveolar location to the first molar, or a point in front of the molar on the lingual aspect, as shown in Figure 2.
The third important consideration is that on the palate, we have better attached gingivae compared with the buccal regions. Thus, there is a higher success rate as a result. With this in mind, clinicians currently choose the palatal area as the preferred place of implantation. (18, 19, 20)

**Figure 3**

On the left side of the TAD, there are two engagements of elastic chain being used: One is to the lingual arch in front of the first molar, and the other is to the transpalatal bar. This provides intrusion and distalization of the left molar. On the right side, only the intrusion effect is desired. Extrusion of both molars can be done with engagement to the omega loop area of the transpalatal bar, as shown in Figure 3.

**Figure 4**

Figure 4 shows the engagement from both TADS on the palatal alveolar side to the omega loop of the transpalatal bar, resulting in extrusion of the molars with some distalization. Unilateral extrusion, as when one side needs more extrusion than the other, may require different construction of the TPA. Finger springs can be soldered to the band of the first molar, or simply connect the finger spring to the TAD and extrude the molar. This example is in Figure 4.
For the case in Figure 5, extrusion of the left and/or right sides can be controlled easily to adjust to the need for correcting the occlusal plane related to an asymmetry problem. The molars can be corrected relatively easy in this example. However, the anterior region will require a TAD on the buccal area of the incisors, canine or premolar area, depending on the degree of canted occlusal plane, the smile dynamics, and the extent of gingival exposure, etc. The intrusion of the anterior region is demonstrated in Figure 5.

Figure 6 shows intrusion of the anterior four incisors, with the forces applied on the right and left sides well controlled. Unilateral intrusion can also be done easily. The extrusion of the one area can be done either with a finger spring as explained in Figure 4, or with an extension finger open coil spring, which works for mesialization, distalization and/or extrusion as shown in Figure 6.

Figure 7 shows the extension compressed open coil spring made of a .016 by .016 rectangular wire
which has a coil spring that can be activated to propel and extrude the canine in this case as the spring elongates. The results are extrusion and mesialization of the right side canine and the adjacent teeth.

**Maxillary Expansion**

The transverse problem relates closely with the vertical problem. (4, 15, 16) The maxillary expansion can be:

1. On both sides of the maxillary alveolar process, with a Hyrax rapid expansion device on both maxillary first molars.
2. Directly on both sides of the alveolar regions, with the TAD and without tooth borne anchorage.
3. Combination methods, with one side tooth borne anchorage and the other side alveolar bone anchorage.

These options are necessarily based on where we prefer to expand. For example, to have less tip effect on the maxillary molar and the direct expansion of the upper alveolar region, the preferred device with the TAD is in Figures 7, 8 and 9. When we desire unilateral expansion, as in a one side posterior cross-bite, then on one side we prefer to have TAD as anchorage, and on the other side directly to the posterior tooth or teeth involved, as shown in Figures 10, 11.

**Figures 8, 9, 10**

After the use of a bite plate for a time of two to three weeks, the decision is made whether to use a removable of fixed bite lifters (composites) (the latter is more often used in our office). The use of palatal alveolar expansion is basically the same with the regular use of a Hyrax type expansion system. Rapid expansion usually is the choice, doing one or two turns a day to activate the expansion device to the treatment objective including transverse overcorrection (20-30%) for optimal stability.

**Figures 11, 12**
**Mandibular Intrusion**

In non-growing patients where adaptation of the condylar process and TMJ components is limited, there is necessity to influence the lower posterior teeth and alveolar height to follow the movement of the upper counter parts on the same side. So, if there is extrusion of the upper posterior maxilla, we will need intrusion on the same side of the mandible. (13)

The intrusion technique in the mandible has been demonstrated by Sugawara, et al (11), with the plate type the most successful. (11) However, it is limited with the use of screw type TAD since we only can work in the unattached gingival area. However, improvement in this area will come soon so that we can do intrusion effectively in the posterior region of the mandible. (Figure 12) With the screw type TAD, we also can have success which has been done by the clinician as follows. (12, 13, 14)

![Figure 13](image)

Figure 13 shows that an elastic is engaged to the TAD between the premolar and the molar. A lingual arch is necessary to prevent tipping of the posterior teeth.

**Mandibular Extrusion**

Extrusion in the mandible has been advocated by Dr. Park Young-Cheol, (15) which we have adopted to extrude the lower region of teeth as shown in Figure 14. Both intrusion and extrusion of the mandibular posterior teeth requires a lingual arch to stabilize the posterior teeth, and to prevent tippage toward the direction from which the force is applied.

![Figure 14](image)
Midline Asymmetry
Asymmetry influencing the midline can be a challenge during the correction of the occlusal plane, since the misfit of even one tooth to the opposite one will affect the whole occlusal table and the two arches which may function well. Cuspal interferences will often affect the lower jaw posture and the TMJ condylar position. This also affects the whole articulation and masticatory system of the patient.

Midline correction can be easier if there is space present such as in an extraction treatment plan. However, as the TAD is popularized, the clinical anchorage problems can be resolved easier. Molar distalization becomes a routine procedure. Non-extraction cases (with the exception of third molar extraction) are increasing in number. In non-extraction cases, we have more difficulty in correcting the midline.

The midline can be deviated prior to treatment due to a canted occlusal problem. The asymmetry of midlines can also happen during treatment efforts to correct the canted occlusal table. As the arch of teeth moves, the midline will move as well thus creating asymmetry of midlines, which probably were not asymmetric before. (Figures 15, 16) This phenomenon happens as the effect of our mechanic is limited to the alveolar bone area and not the basal bone itself. The center of resistance on the maxilla is on the mid-palate; we have to strive to correct the occlusal plane combine with lateral movement of the whole maxilla to the right side in this example situation. In the other hand there will be some but very limited approaches can be done on the lower to compensate.

Figures 15, 16

A technique to correct the midline includes the movement of all teeth within the arch from one side to the other. (18) It may involve one arch, and at other times both arches will have to be corrected. This depends on patient observation clinically and information from the frontal analysis. Maxillary midline correction is easier than correction of the mandible midline. The reason for this is mainly that in the maxilla, palatal bone has a larger area to place TAD devices and attachments.

Maxillary Midline Correction
The maxillary midline as well as mandibular midline on one side will have to move distally and the other side mesially as we relocate the whole dentition in one direction. This one direction movement can be achieved with indirect force applications. A simple method is a hook soldered on the band of a
molar, and usually the first molar is preferred. (Figures 17, 18) This can be done on the palatal side or the buccal side depending on the placement of the TAD itself. Palatal placement gives more range of movement with less frequent re-implantation or not necessary at all. Although the buccal placement is more popular at present, as we move the teeth toward the TAD, collision between the tooth approaching the TAD causes damage of the periodontal membrane and perhaps the cementum itself with potential for partial ankylosis. Most of the time, this will not cause fatal harm to the tooth if recognized early. In the premolar area and anterior regions (incisors), buccal placement is still the location of choice. Patients generally are more comfortable to have a TAD placed in the buccal side rather than the anterior maxillary area. Speech disturbance and irritation of the tongue are the main reasons to avoid placement in this area. The least obstacle against and the most accepted placement is in the palatal alveolar bone area. Placement in the upper retro-molar pad is a good choice; however, we also have to consider risk of TAD fracture during screw removal. The consequences of such problems are least on the palatal alveolar bone compared with other areas of the palate.

The simplest design for distalization is an extended arm. The length of the arm can be adjusted to the requirement of the elastic to be used for the power source. (Figures 19, 20) This method is effective for a short distance movement, but for a longer distance, rotation to the lingual side can happen unless the main arch wire is close to full slot size wire. The other technique that can be very effective is use of a transpalatal bar and hooks, which will maintain the width of the molars as movement occurs.
In the anterior region we may need an auxiliary open coil spring as described before, with the use of it in a more horizontal direction. (Figures 21, 22)

**Figures 21, 22**

**Mandibular Midline Correction**

In the mandible, the TAD is placed on the buccal area only since lingual placement would irritate the tongue for most of the patients. Use of the extended arm is the most frequent and simple compared to other devices. (Figure 23) The finger open coil spring yields high adaptation to the curvature of the arch, but needs modification on the main wire to keep the device from flaring to the buccal side and irritating the lower lip. (Figure 24)

**Figures 23, 24, 25**

Mesialization of molars in the mandible follows the same design as used in the maxilla, with hooks soldered on the molars and connected with a TAD placed on the buccal alveolar bone, and usually located between the canine and premolar, or between the second and first premolar. (Figures 23, 24, 25)
Case 1. Female 13y 8m

Chief complaint of upper crowding.

The primary problems after intra-oral observation are the upper left lateral incisor in lingual-version and dental compensations. The mandible has shifted to the left; interferences of the upper left lateral against the lower incisors have lead to asymmetric mandibular body growth. Difficulty in chewing has also affected the maxilla, as shown in Figures 26 and 27.

The antero-posterior or frontal cephalogram tracing is shown on Figure 28. The frontal facial photographs are in Figures 29 and 30.

The treatment was carried out with fixed appliances, and primary expansion with the upper and lower arch wires able to eliminate the crowding and the interferences. This expansion produced a slight bimaxillary protrusion, and the need to retract the upper and lower arches with the TAD, while controlling the upper maxillary occlusal plane with the TPA (transpalatal arch) plus hooks (Figure 31), with the left buccal side slightly intruded as shown in Figure 32.
Figures 31, 32
This case was finished at the age of 16y 4m. (Figures 33, 34, 35, 36, 37) The result is significantly better as shown in Figures 33 and 34, and in the frontal cephalogram. (Figure 35) Oral function has been optimized for chewing and with better appearance. (Figures 36, 37)

Figures 33, 34

Figures 35, 36, 37

Expansion and correction of the cant of occlusion has been explained and documented in transverse appliance therapy. (4)

Case 2. Male 12y 2m
Chief complaint of crowding.
Problems: Follicular cyst of the maxillary right second premolar area (Figure 38), deviated midline and canted occlusal plane; severe anterior crowding. Poor function of the anterior and posterior teeth in mastication because of transposition of the upper canine and lateral incisor (Figures 39, 40), with occlusal plane tilted and lower on the right side. (Figures 41, 42)

Figure 38
Treatment was initiated to remove the cyst and close the extraction site by moving the posterior upper right quadrant mesially and anteriorly. It is a difficult task to move molars anteriorly especially when the occlusal plane is already canted. For this purpose, an open coil spring has been designed to prevent the cant of occlusion further. This preliminary use was not able to correct the whole occlusal plane because the attempt was only on one side. (Figure 43) Mesialization of the molars was achieved with hooks welded on the bands of the molars, as shown in Figures 44, 45.

A skeletal anchorage system (SAS) has been used to reinforce the anchorage, with a TAD between the upper right canine and first premolar as the main extrusion force used with the finger coil spring device. This approach closed the tilted occlusal area of the right side, corrected the midline, and aligned the premolars and molars together mesially. To prevent rotation on the palatal alveolar side, a TAD was implanted. The design of the molars hooks is in Figure 44. The banded design intra-orally is shown in Figure 45. The results are shown in Figures 46, 47.
Closure of the extraction areas is shown on the panoramic x-rays, with a long distance movement of the molars achieved to eliminate the necessity for prosthetic replacement since the space was closed. The molars are Class II relationship and the third molar is becoming occlusally positioned. The fixed appliances were taken off because the patient was concerned regarding the long treatment procedure and desired to finish with a fixed appliances.

**Case 3.** This 16y 2m female complained of TMD symptoms with pain. TMD clinical findings included: Reciprocal clicking on her right side, mandibular deviation to her right side upon opening and closing of the jaw; limited opening to 30mm; all masticatory muscles were painful to palpation, especially the left and right lateral and medial pterygoid muscles. MRI revealed an anterior disc displacement of the right condyle. (Figure 51) TMD splint therapy was used for one month with a fair to good result in dysfunction resolution.
In the non-growing patient, it is more difficult to correct the occlusal plane. The occlusal plane can be corrected by influencing both upper and lower quadrants on one side, though most of the time we have to deal with all four quadrants simultaneously on the left and right sides. The right molar had caries such that conservation of this tooth was considered difficult, so her dentist asked if we could move the second molar to replace it.

The AP (frontal cephalogram) is shown in Figure 52, and the facial photographs before treatment are in Figures 53, 54, 55, 56. A facial photograph is in Figure 53. Intraoral photographs are in Figures 54, 55, 56.

The molar relationship was Class I with a Class III tendency on both sides. Cuspal interferences on both second molars were caused by the upper second molar lingual cusps interfering during lateral excursion. Treatment is underway with both upper second premolars extracted. The lower right first molar and the lower left second premolar were removed. A fixed bite plate was added on the upper first molar occlusal table to reduce interference of the second molars, while aligning those teeth. (Figures 57, 58)
Treatment was carried out with intrusion of the upper right quadrant and extrusion of the lower right quadrant as shown on Figures 59 and 60.

The four TADs can be seen on the panoramic view which reveals the location of each TAD. (Figure 61) The upper right third molar was recommended to be extracted, although the patient was reluctant to remove it.
Treatment result: The occlusal plane was favorably corrected to a large degree. The opening and closing movements of the jaw improved and shows no limitation. Clicking was present, but without pain. There is no ongoing muscle tenderness and pain. This patient will finish her treatment very soon. (Figures 62, 63, 64, 65)

Conclusions:
The correction of a canted occlusal plane with TAD has been discussed. The indirect force application when using TAD is a valuable approach to control and direct the forces needed to correct the occlusal surfaces within three dimensions. This article advocates such devices as: TPA plus hooks, lingual arch plus hooks, extension arms, and finger open coil spring to share new ways to correct the plane with the assistance of TAD. Together, these can help the clinician control the teeth and their occlusal plane as demonstrated in Cases 1, 2 and 3. AP cephalometric (frontal) evaluation is emphasized as a valuable assessment in judging the difficulty and effective treatment of each case. A treatment plan then can be established and applied to the area of canted occlusion so it can be less conspicuous or fully corrected. The function may become normal despite some dento-alveolar compensations.

The development of TAD techniques, when used with the AP Grummons simplified frontal analysis, can specify and reveal how much the deviation is, and specifically in which direction the treatment should be directed to best improve upon asymmetries. This new technique now provides anchorage that was difficult to establish in the past, such as in asymmetric vertical dimension discrepancies. However, screw type TAD implantation on the attached gingival area of the alveolar bone has unfavorable weakness when we use TAD at an early age, with a relatively high failure rate considering the rapid cell turnover that takes place. (5) At present, the treatment is limited to patients having full dentition from first molar to contralateral first molar. The potential TAD patient should have finished the transitional period from mixed dentition to a permanent one.

The best result can be achieved by these factors evident: By knowing the problems involved; by using the frontal cephalogram combined with clinical findings; by knowing where the problem lies; by thoroughly evaluating treatment options and possibilities with the TAD; and by knowing any treatment limitations. All these will help guide the outcome of the case to best facial balance, symmetry and proportions. Hence, as asymmetry is resolved, there results a more attractive face and functional occlusion.
Bibliography:

15. Park Y.C. Extrusion of molars, personal communication.