# A Minimalist Approach to Orthodontic Therapy

by
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**Abstract:** The edgewise and ribbon arch brackets developed by Angle allowed the control of teeth in three dimensions, and this encouraged the engagement of the entire dentition with brackets. However, considerable numbers of orthodontists resisted this approach and continued to use appliances that minimized the use of bands and brackets or avoided bands and brackets altogether. This paper illustrates a patient therapy that used a minimal edgewise orthodontic appliance coupled with an accurate diagnosis and Visualized Treatment Objective to achieve reasonable treatment goals.

**Introduction**: Before Angle's development of the ribbon arch[1] and edgewise[2] brackets, clinicians seldom placed attachments on individual teeth since they had scant interest in precisely positioning each tooth in the dentition. Rather they relied upon a variety of removable appliances[3-6] that sought to alter the bite and/or enlist orthopedic changes via functional forces of the orofacial musculature. This approach relied on occlusal forces combining with relief from harmful muscular pressures to arrange the teeth in a natural bite.

Other competing strategies arrayed against Angle's 3-D precision appliances were the labiolingual appliance[7-9] and the Johnson twin arch appliance[10,11]. The labiolingual appliances relied on maxillary and mandibular molar bands with large soldered labial and lingual wires combined with smaller soldered finger springs for individual tooth movements. The Johnson twin arch appliance combined bands on the incisors as well as the molars and used doubled 10 mil wires to align the incisors, which they did with amazing speed.

Clinicians who used the nonbanded or the minimally-banded appliances offered plausible rationales for their use:

- ★ teeth could use the band space to naturally align and rotate;
- ★ fewer banded teeth improved molar anchorage;
- ★ reduced osteoclastic activity;
- ★ improved physiological activity of the the teeth and periodontium;
- ★ the teeth avoided the friction and binding of brackets on arch wires;
- ★ avoided orthogenic malocclusions that multi-banded teeth often caused (Figure 1 a & b).

*Figure 1a*


*Figure 1a & b: An orthogenic malocclusion caused by complete bonding of maxillary and mandibular teeth with subsequent alignment and leveling wires.*

Even today, some clinicians[12,13] advocate limited bonding of teeth because of the indeterminacy of forces with multi-bonded teeth and the inadequacy of finishing arch wires to position teeth optimally.[14] By releasing teeth from the constraints of arch wires, they have the freedom to settle quickly into ideal occlusion (Figure 2 a & b).

*Figurer 2a:*

*Figure 2b:*

*Figure 2 a & b: Posterior and anterior open bites resolved with maxillary and mandibular anterior sectional arch wires and posterior ⅛" light triangular elastics and a light anterior 5/16" box elastic to achieve optimal occlusion (two weeks of elastic therapy).*

However as multi-banded therapy illustrated its ultimate and predictable superior control, American orthodontists continued to endorse those techniques, and by the 1950s most clinicians had switched to full-banded edgewise techniques or the Begg light wire strategy.[15,16]

# Patient's Clinical Assessment and Problem List

This 8yr. female patient appeared with a chief complaint of:,"these teeth (maxillary central incisors) are behind my lowers." The clinical examination revealed the following (Figure 3):

- a pseudo Class III malocclusion;
- an anterior cross bite of the maxillary central incisors;
- Class I molars;
- insufficient space for the eruption of the maxillary lateral incisors;
- a small arch length discrepancy in the mandibular arch;
- incomplete eruption of the permanent dentition;
- a modest curve of Spee.

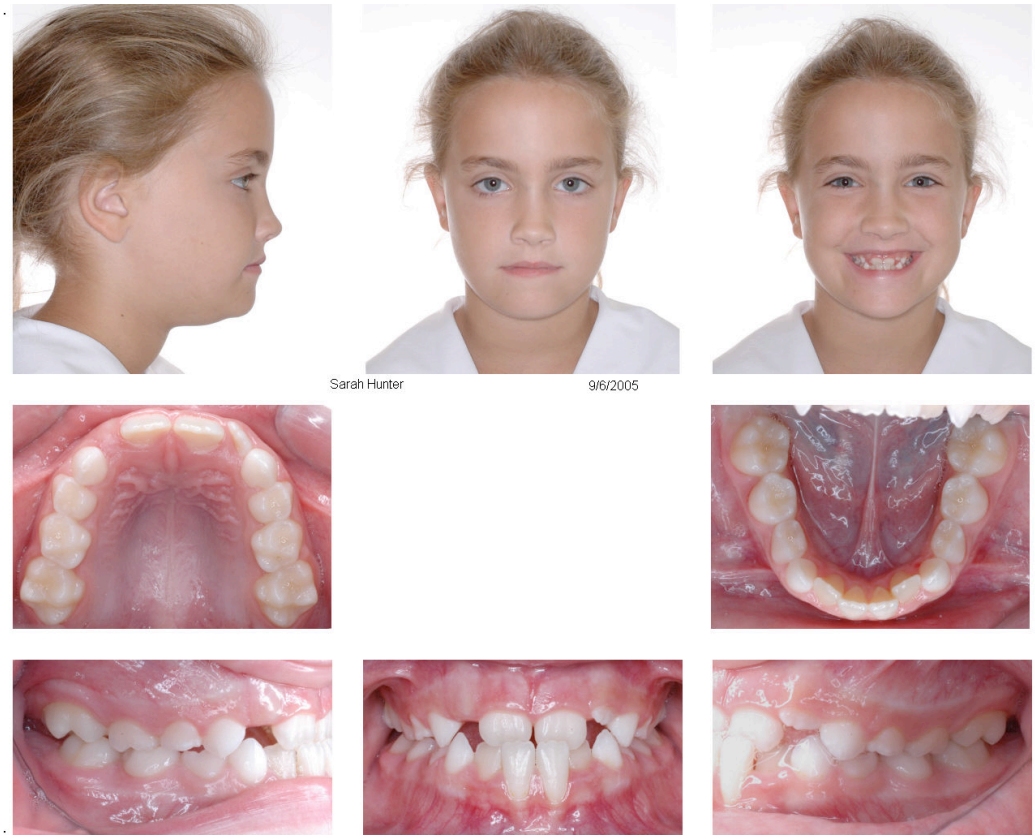


*Figure 3: Patient with anterior cross bite.*

## Static Occlusal Assessment

The patient displayed maxillary and mandibular arches with minimum arch length discrepancies, a slight curve of Spee, and an anterior cross bite involving only the maxillary and mandibular central incisors. The maxillary molars had slight mesial rotations but otherwise Class I occlusion, and the mandibular arch had only a slight curve of Spee. The mandibular central incisors displayed slightly recessed gingiva apparently influenced by the anterior cross bite

## First Phase Intervention

The first phase therapy involved nothing more than the removal of maxillary and mandibular primary canines to allow more space for the permanent lateral incisors and the correction of the anterior cross bite with a cemented mandibular anterior inclined plane, which was needed for only one month. This corrected malocclusion remained without further treatment for approximately 3 years (Figure 4).

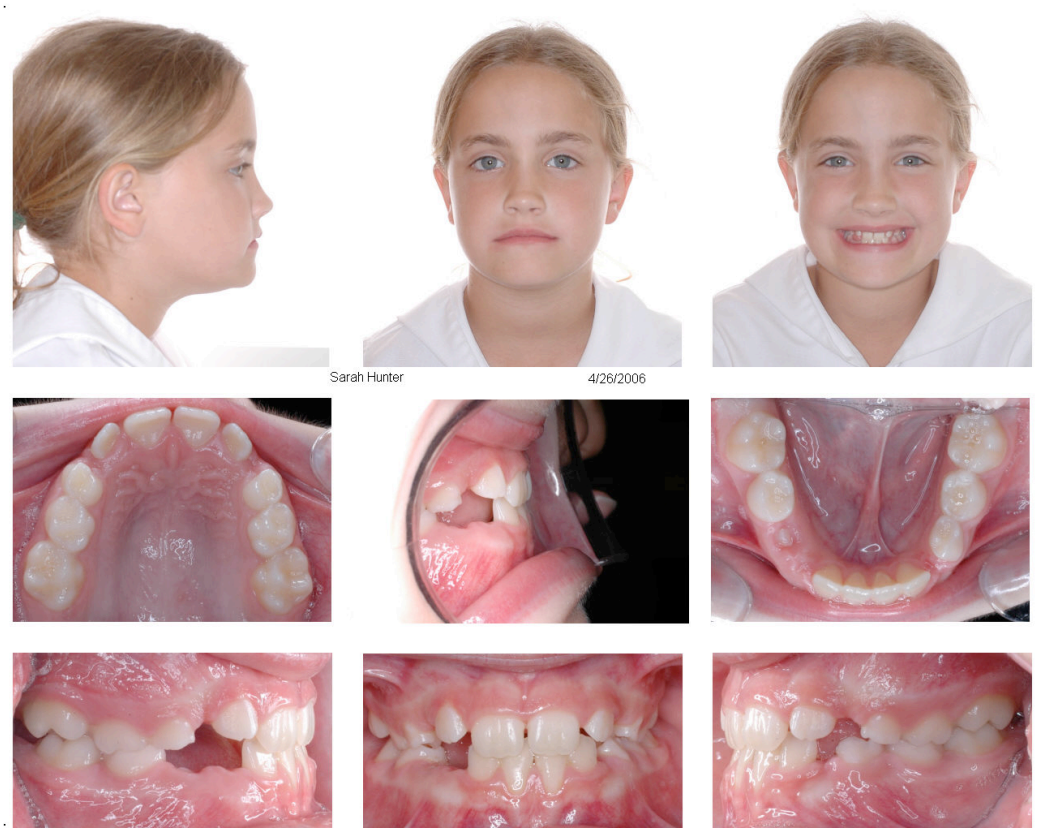


*Figure 4: Patient after the removal of the maxillary and mandibular primary canines and correction of the anterior cross bite.*

# Second Phase of Treatment

**Development of the Visualized Treatment Objective (VTO)**

Prior to starting the second phase of therapy, a Visualized Treatment Objective suggested first by Ricketts[32] and Holdaway[26,27] was completed. These clinicians developed the VTO as a way of forecasting the effects of growth and therapy on individual patients. Although VTOs can have remarkable accuracy for predicting treatment growth that extends no more than 15-18 months, chaos theory[33,34] explains why they have much less precision when used for longer treatment predictions. The therapists of this patient elected to use a non-growing, static VTO because of the 24 + months of anticipated treatment. This static VTO simply presumes what spaces the teeth should occupy immediately if they were to have ideal occlusion. Readers can download step-by-step VTO instructions at www.larrywwhiteddsmsd.com; Lectures, Chapter 1 Revised; user name: orthotx; password: orthotx.

This patient's VTO (Figure 5) was done only after the original anterior crossbite was corrected and she had more maturity. This VTO relied upon a synthesis of cephalometric diagnostic discoveries by Holdaway[26,27], Creekmore[28] and Alvarez[29]. Since this patient will grow throughout her treatment, the use of an occlusal plane that

lies only 3mm below the embrasure as suggested by Burstone[35] will run the risk of having the upper lip completely cover her teeth by the time she reaches middle-age. For that reason the VTO occlusal plane bisects the molars and lies 6mm below the lip embrasure. The maxillary incisor will lie exactly on this new occlusal plane and precisely against the A Line as defined by Alvarez; subsequently, it needs only a small amount of torsion to place its axial line at the distal margin of the orbit but no other changes. The maxillary arch displayed no arch length discrepancy.

The mandibular incisors, on the other hand, require intrusion to the point of lying 1mm above the newly constructed occlusal plane and advancement so that they occlude with the maxillary incisors. The mandibular arch did not have any arch length discrepancy.

Advancement of the mandibular incisor will leave 3mm additional space for the mesial movement of the mandibular molars and 1mm of space to compensate for correction of the Curve of Spee.

The lack of arch length discrepancy in the maxillary arch will obviate any special anchorage preservation. The Modified Steiner Box reflects all of these changes for the teeth and gives clinicians a quick summary of the treatment rationale and a mathematical manner of determining space needs, anchorage requirements and the changes in tooth positions (Figure 5).

| | Max | Man |
|---|---|---|
| Arch Length Discrepancy | 0 | 0 |
| Arch Development | | |
| Relocation Incisor | **0** | +4 |
| Mesial Molar Movement | | -3 |
| Distal Molar Movement | | 0 |
| Curve of Spee | | -1 |
| Interproximal Reduction | | |
| Extractons | | |
| Relocation of Max. 3s | | |
| | | |
| **Total Net** | 0 | 0 |

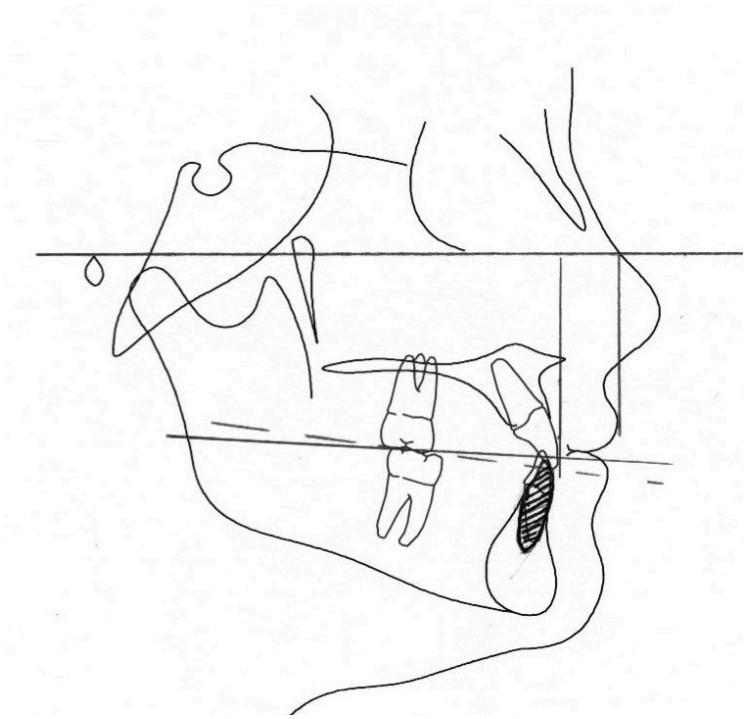

*Figure 5: Modified Steiner Box and Visualized Treatment Objective.*

**Minimal Appliances**

Upon eruption of the permanent teeth, the clinicians applied a simple arrangement of bands on the maxillary 1st molars and brackets applied to the maxillary incisors. A slightly long .014 x .018 stainless steel omega-looped archwire corrected the mesially rotated molars (Figure 6).

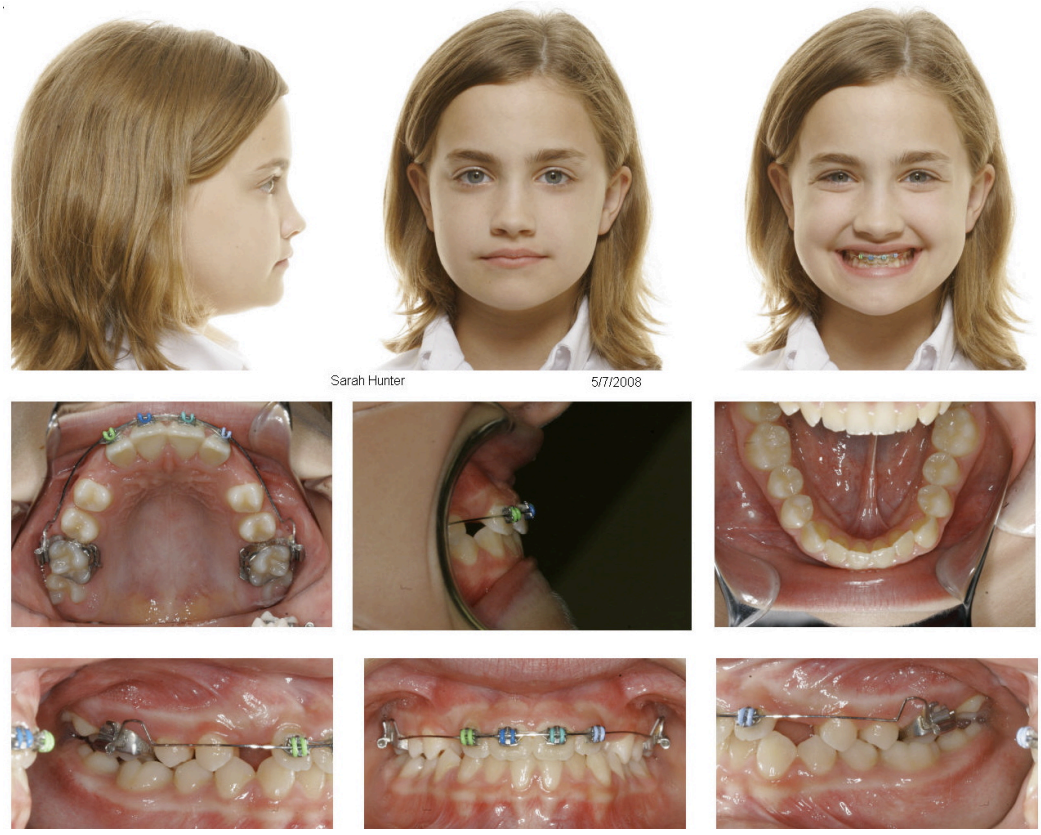


*Figure 6: Initial 2nd phase therapy with long omega-looped archwire that created maxillary posterior space and rotated the molars.*

Tardy eruption of the maxillary canines eventually required their uncovering with a laser. Once these teeth erupted and aligned, the mandibular molars, incisors and canines had appliances placed, and these teeth were aligned, leveled and coordinated to the maxillary arch (Figure 7)


*Figure 7: Maxillary and mandibular molars, incisors and canines with alignment and leveling arch wires. Note the optimal Class I posterior occlusion, midline, overjet and overbite.*

The clinicians decided at this point to forego further bonding since this would disrupt the ideal arrangement of teeth that existed, and they made plans to complete the patient's treatment, remove the appliances and retain the therapeutic result (Figure 8).

Figure 9 displays the final cephalometric tracing, and Figure 10 shows the cephalometric superimpositions of the beginning of the second phase of therapy and the result. The maxillary incisors advanced during this treatment more than desired, but had no deleterious effect on the patient's profile. The mandibular incisors advanced and intruded during the treatment as planned in the VTO


*Figure 8: Completed therapy accomplished with minimal appliances and without bonding of the premolars.*

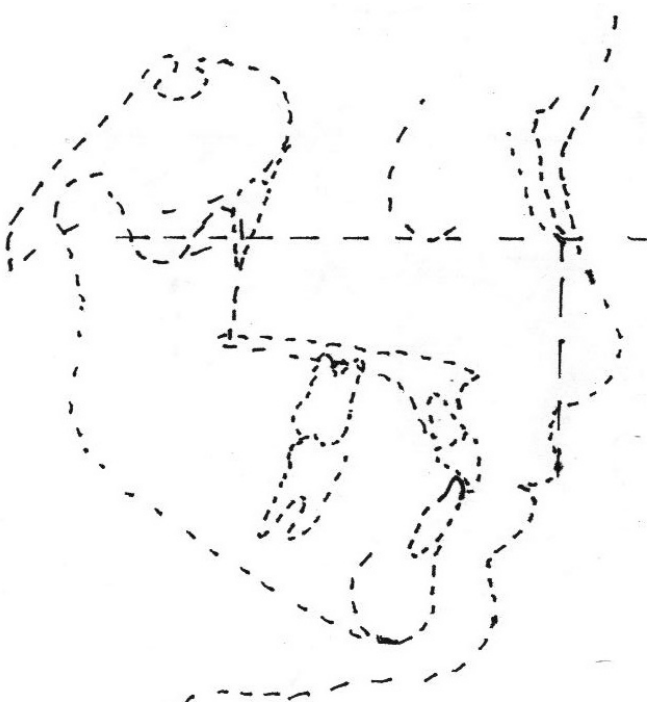

*Figure 9:  Final cephalometric tracing*

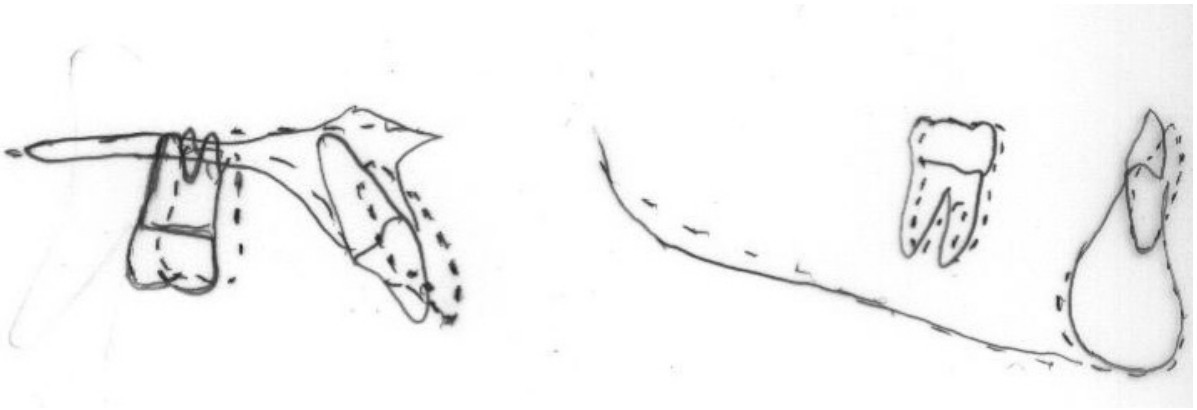

*Figure 10: Maxillary and mandibular before and after cephalometric superimpositions (solid line - before initiating the second phase of treatment; dotted line - after treatment.*

## Summary

Although banded and bonded appliances for all teeth has developed into a fashionably obligatory technique, instances occur when minimum appliances seem preferable. Not so long ago the bonding of only selected teeth held great appeal for orthodontists for several reasons, e.g., easier anchorage maintenance, avoidance of orthogenic malocclusions, more predictable mechanical control, freedom of occlusal development,etc.

When the posterior teeth have a firm, unsullied Class I occlusion, the bonding of premolars will more often than not disturb the occlusion and initiate more problems than solutions to the malocclusion. The patient of this article presented in the second phase of therapy with a solid Class I occlusion uncomplicated by rotations, and once the anterior alignment, overjet, overbite and midline corrections were achieved, the inclusion of premolars would have only disturbed the occlusion and introduced an orthogenic malocclusion that would have required additional months of therapy with uncertain results. When patients present with ideal posterior occlusion, therapists gain little and risk much when they attempt to satisfy some *de rigueur* protocol.

Bibliography


1. Angle EH. Some new forms of orthodontic mechanism and the reason for their introduction. Dental Cosmos 1916;58:969-994.
2. Angle EH. The latest and best in orthodontic mechanism. Dental Cosmos 1929;71:164-174, 260-270, 409-421.
3. Lisher BE. Principles and methods of orthodontics Philadelphia: Lea &Febiger; 1912.
4. Kingsley NW. Oral deformities. New York: Apleton & Son; 1880.
5. Andresen V. Beitrag zur retention. Z. Zahnartsl Orthop. 1910;3:121.
6. Robin P. Observation sur un nouvel appareil de redressement. Rev Stomatol Chir Maxillofac 1902;9:423.
7. Terry HK. The labiolingual appliance. Am J. Orthod 1969;55:714-733.
8. Mershon JV. A practical talk on why the lingual arch is applicable to the orthodontic problem. Dent. REc 1926;46:297 -301.
9. Oliver OAaW, , C. R. Lingual, labial appliances and guide plae. Internat. J. Orthodont. 1932;18:1182-1190.
10. Shepard EE. The philosophy of the twin-wire appliance. Am J. Orthod 1969;55:688-704.
11. Johnson JE. A new orthodontic mechanism: the twin wire alignment appliance Internat. J. Orthodont. 1934;20:946-963.
12. Mulligan TF. Common Sense Mechanics in Everyday Orthodontics. Phoenix, AZ: CSM Publishing; 1998.
13. Melsen B, , Fiorelli, G. Biomechanics in Orthodontics. Arezzo. Italy: Libra Ortodozia; 1995.
14. Alexander RG, Steffen, J.M., Haltom, T. The Readers Corner. J. Clin. Orthodontics 1987;21:524-529.
15. Begg PRaK, P.C. Begg orthodontic theory and technique. Philadelphia: W.B. Saunders Co.; 1977.
16. Begg PRaK, P.C. The differential force method of orthodontic treatment. Am J Orthod 1977;71:1-39.
17. White LW. A Pragmatic Cephalometric Analysis. Dallas; 2008.
18. Showfety KJ, Vig, P.S., Matteson, S. A simple method for taking natural head position cephalogram. Am. J. Orthod. 1983;83:495-500.
19. Moorees CFA, Kean, M.R. Natural head posture, a basic consideration in the interpretation of cephalometric radiographs. Am. J. Phys. Anthropol. 1958;16:213 -234.
20. Michiels LYFaT, L.P.M. Nasion true vertical: a proposed method of testing the clinical validity of cephalometric measurements applied to a new cephalometric reference line. Int. J. Adult Orthodontic Surg. 1990;5:43-52.
21. Lundstrom FL, A. The Frankfort horizontal as a basis for cephalometric analysis. Am. J. Orthod. 1995;107:537-546.
22. Lundstrom FL, A. Natural head posture as a basis for analysis. Am. J. Orthod. 1992;101:244-247.
23. Harvold EP. The Activator in Interceptive Orthodontics. St. Louis: C.V. Mosby Co.; 1974.
24. Cooke MS, Wei, S.H.Y. A summary five factors cephalometric analysis based on natural head posture and the true horizontal. Am. J. Orthod. 1988;93:213-223.

25. Cooke MS, Wei, S.H.Y. Nasion true vertical: a proposed method for testing the clinical validity of cephalometric measurements applied to a new cephalometric line. Am. J. Orthod. 1988;93:280-288.
26. Holdaway RH. A soft tissue cephalometric analysis and its use in orthodontic treatment planning, Part I. Am. J. Orthod. 1983;84:1-28.
27. Holdaway RH, op. cit. A soft tissue cephalometric analysis and its use in orthodontic treatment planning, Part II. Am. J. Orthod. 1984;85:279-293.
28. Creekmore TM. Where teeth belong and how to get them there,. J. Clin. Orthod. 1997;30:586-608.
29. Alvarez A. The A Line: A New Guide for Diagnosis and Treatment Planning. J. Clin. Orthod 2001;35:556-569.
30. Casko JS, Shepherd, W.B. Dental and skeletal variation within the range of normal. Angle Orthod. 1984;54:5-17.
31. McNamara JA, Ellis, E. III. Cephalometric analysis of untreated adults with ideal facial and occlusal relationships. Int. Adult Orthod. Orthogn. Surg. 1988;3:221-231.
32. Ricketts RM, et al. Bioprogressive Therapy. Denver: Rocky Mtn Orthodontics; 1979.
33. Gleick J. Chaos, Making a New Science. NY, NY: Viking Penguin Group; 1987.
34. White LW. Modern Orthodontic Diagnosis, Treatment Planning and Therapy. Glendora, CA: Ormco Corp; 1996.
35. Burstone CJ. Lip posture and its significance in treatment planning. Am J Orthod 1967;65:262-284.