Mentors: A continuum in orthodontic education

By Robert J. Manasse, DDS

A mentor, as described by Webster, is a friend of Odysseus entrusted with the education of Odysseus' son Telemachus. The ancient philosophers Socrates, Aristotle, and those who followed were also mentors acting as trusted counselors, tutors or guides to their charges[1].

Mentors through the ages provided those helping hands which guided careers and protected the learner while learning. A mentor brings students through the blurry maze of their careers, pushes them through the prickly spots and soothes the bruises acquired along the way[2].

Socratic education was clearly exemplified by the Angle School of Orthodontia, and was perhaps best demonstrated by its founder Dr. Edward H. Angle[3]. He was a mentor to his students, but his method of teaching was autocratic. His approach to orthodontics was empirical, and his teaching methodology dogmatic.

Angle could not convince the colleges of dentistry, where he held faculty positions, that orthodontics should be studied in a thorough and comprehensive manner. For this reason, he reluctantly concluded that if he was to teach the specialty of orthodontics in the broad and thorough manner that he considered necessary, it must be done outside of the confines of a dental college. Angle believed that this was the only way that orthodontics could grow as a specialty[4,5].

In the Angle School, the curriculum was clearly delineated into areas of study, including head and neck anatomy, dental anatomy, embryology, histology, radiology, and of course, orthodontic therapy. For the first time, the new specialty of orthodontics was studied in a broad and comprehensive manner in an academic environment. The first session of this school opened in Dr. Angle's office in St. Louis in the year 1900.

The course of study was incorporated with examinations. Only upon successfully passing those examinations would a student be awarded

Abstract

One orthodontist's appreciation of the many contributors and contributions to the making of an orthodontist and the progress of the profession. This article was originally submitted April, 1984.

Key Words

Education • Mentors •

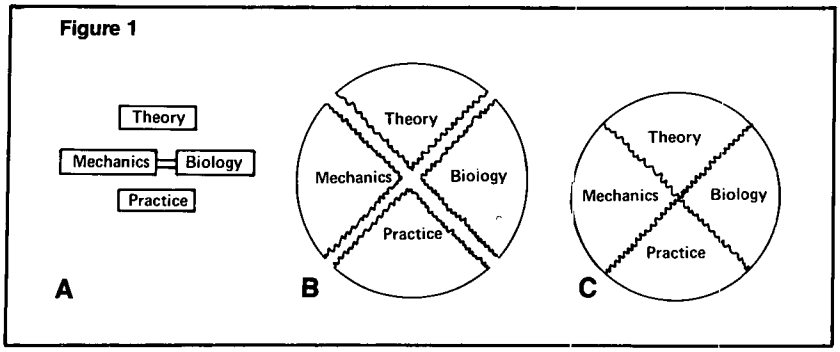


Figure 1
Orthodontic theory is separated from practice by appliance mechanics and dental and facial biology. Correlating biology and mechanics connects theory and practice. The effects of mechanics on the biology of the system link theory and practice.

Figure 2
Patient DL's pretreatment records show hypertonic perioral musculature upon lip closure and a retrognathic-convex profile. Growth potential was based on sex, age, facial pattern and physical characteristics. Models show a Class II division I malocclusion with a 10 mm overjet and a complete overbite.

a certificate as a graduate of the Angle School of Orthodontia.

Angle had an uncanny insight into the mechanical and biological principles of orthodontic procedures. Although he was an innovator, pioneer, and perhaps a technical genius, he knew the limits of his capabilities in the sciences. For this endeavor, Angle used his magnetism to bring together such scientists as Dewey, Osborn, Noyes, Oppenheim, Ketcham and others[3,5].

A high degree of discipline and dedication was essential for Angle's students to succeed in his rigorous and demanding curriculum. He clearly challenged each student to excel in the specialty of orthodontics, as is evidenced by the graduates of the school who went on to become leaders in their respective fields.

Although Angle's teaching methods would not be accepted by today's students, his autocratic methods did have positive effects. This is evidenced by his guidelines in orthodontic diagnosis and mechanotherapy such as the Angle classification of malocclusion (still almost universally used today), his influences in orthodontic treatment goals and concepts, and the Edgewise appliance.

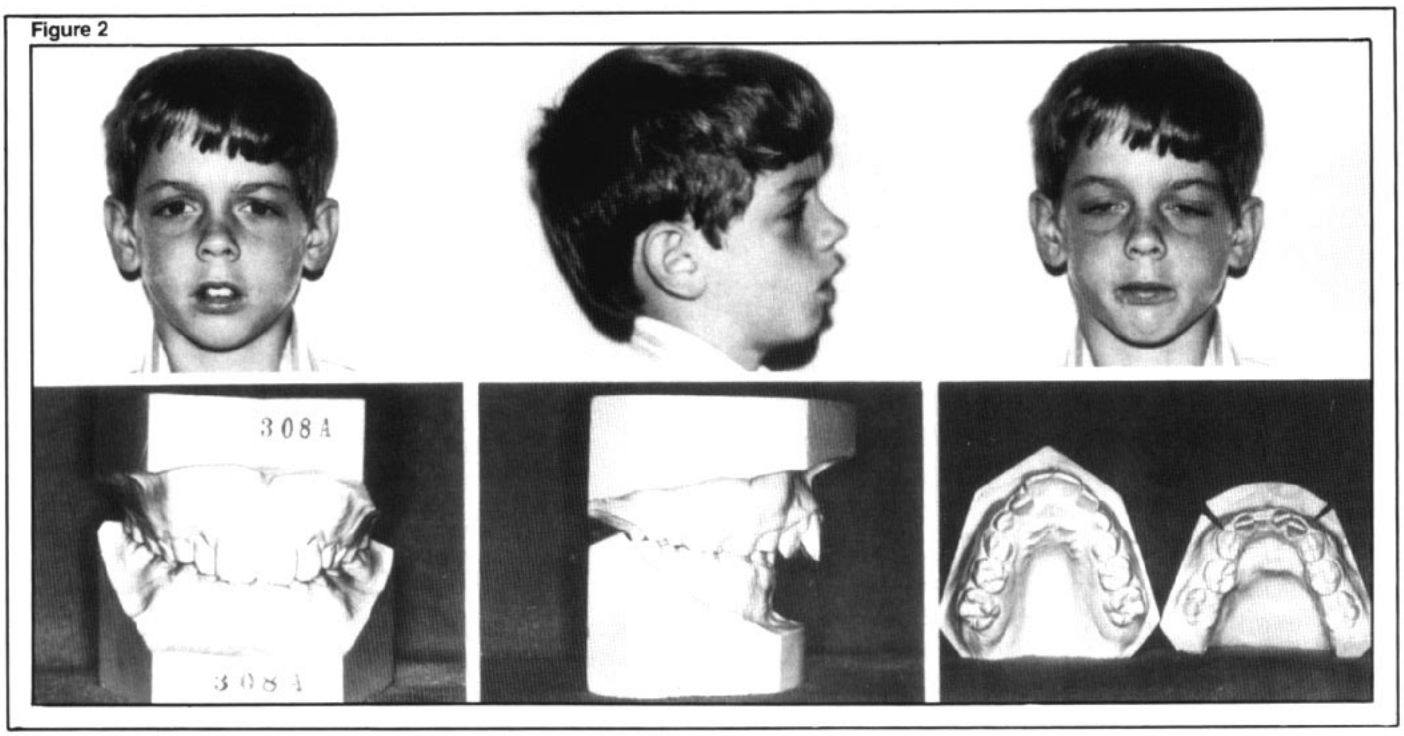
It was through Dr. F. B. Noyes's guidance in 1930 that the graduate course in orthodontics was started at the University of Illinois College of Dentistry. Noyes himself had graduated from the Angle School in 1908, after which he had stayed with Dr. Angle to teach histology and embryology before being called to serve as Dean at the University of Illinois[6,7].

Noyes appointed Dr. Allan G. Brodie, a graduate of Angle's last formal class in 1926, to teach Angle's latest scientific and mechanical teachings and inventions[8]. Brodie brought together the science and art of orthodontics at the graduate level in a university, and readily became a foremost researcher, teacher and mentor.

As brought out in a panel discussion on orthodontic education, both education and training are required for an orthodontist. Brodie clearly distinguised between education and training, a distinction often overlooked by many of today's professionals[9].

During an orthodontist's education at a university, knowledge of the specialty may be acquired through various methods of teaching and the student's deepening comprehension of the subject matter. However, orthodontic training is acquired through discipline and rote drilling.

Training methods develop proficiency in the



skills required for manipulation of the orthodontic appliances, but it is education that develops the judgment needed for their safe and effective application. No amount of training can accomplish that.

A mentor serves to combine education and training for application toward attainment of the student's personal and professional goals. This combination had been one of Dr. Angle's lifelong efforts in the specialty of orthodontics, and Brodie then continued this effort.[10]. This is evidenced by the vast amount of research that he and his students and their students have have made available to the profession in the literature.

The relationship between mentor and student is usually developed within a school environment, but it may also be nurtured away from the school setting. Mentors often give the student personal exposure to their professional lives outside the school, so that the type and quality of their practices adds relevance to the education and training received at school.

This paper looks at the impact of mentors on a future orthodontist, drawing on the Author's personal experience and information. The portfolio of advice and experience provided first as teachers and later as friends has been invaluable. This ongoing sharing of ideas, techniques, and patient treatment (failures as well as successes), through correspondence, visits to offices, and hours spent in informal discussion are the ultimate in truly effective continuing education.

As pointed out by Hellman[11], theory and practice are divided by the importance placed by

Figure 3

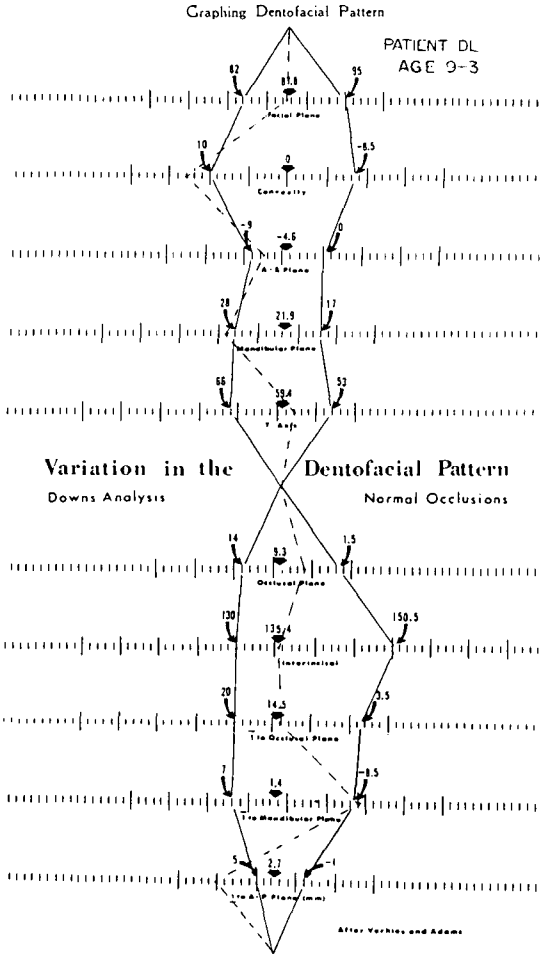


Figure 4

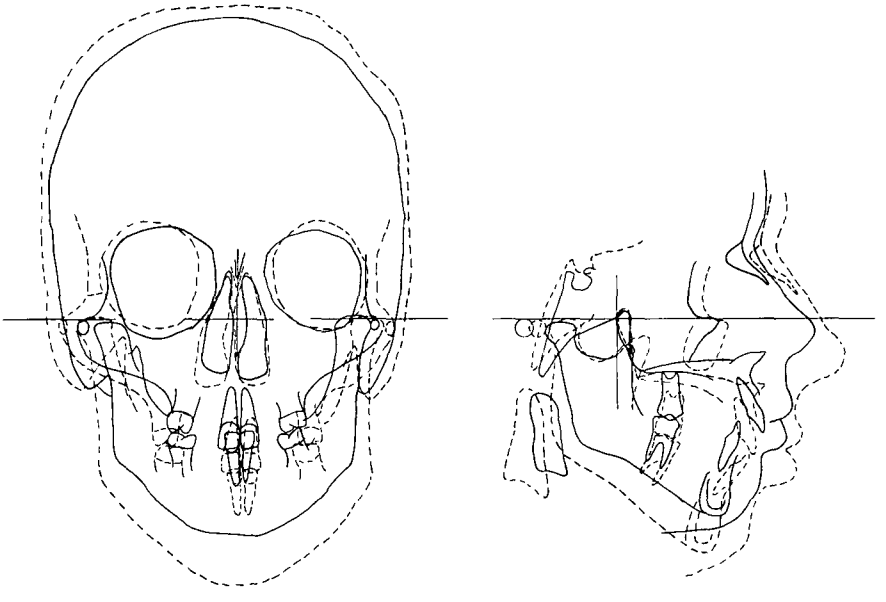


Figure 3
A Down's cephalometric analysis of DL indicates a good relation of the facial plane, a large angle of convexity, a steep Frankfort-mandibular plane angle and good direction of mandibular growth. Dental relationships were good, except for the negative lower incisor to mandibular plane and the excessive upper incisor to A-Pogonion plane.

Figure 4
DL's headplate tracings show growth in a direction aiding correction of the malocclusion. Note growth of the maxilla and mandible both in width and in a downward, forward direction. Pleasing profile changes also occurred.

Figure 5

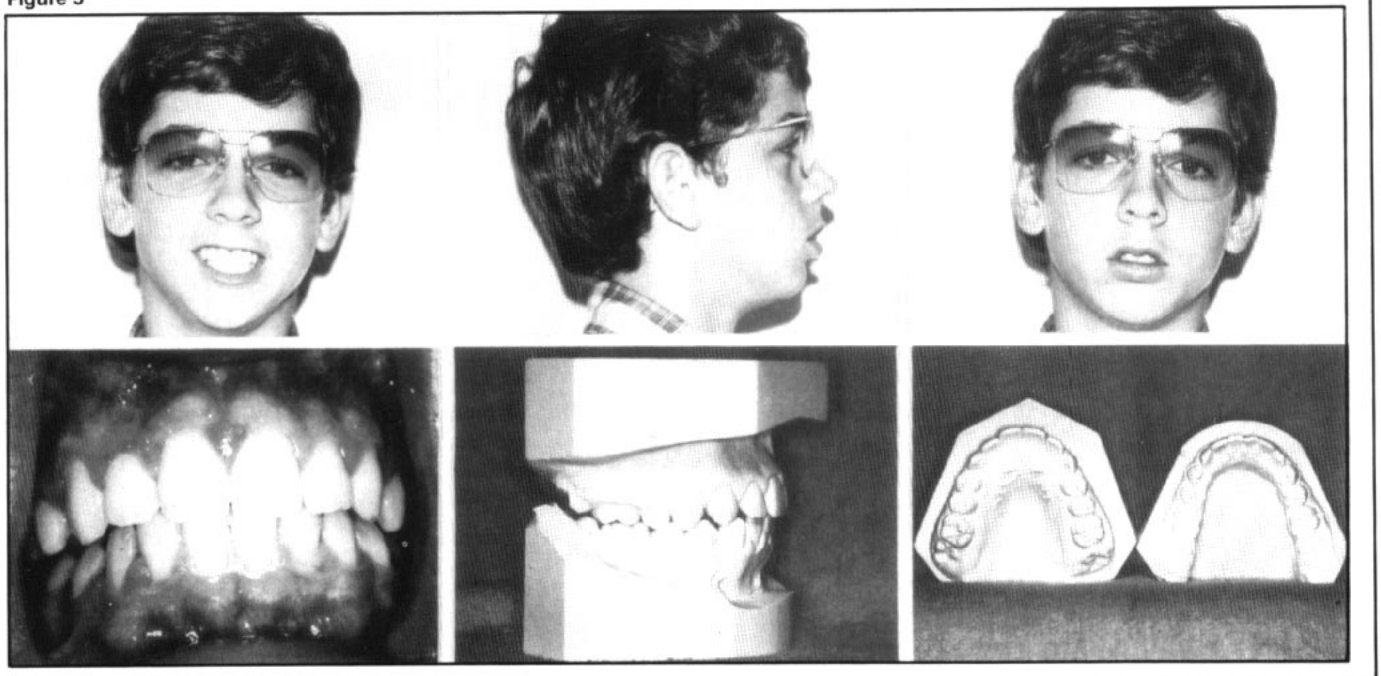


Figure 5
Posttreatment records of patient DL indicate a balance and harmony of the dentition with the rest of the face.

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Figure 6
Pretreatment records of case SM.

Figure 7
A Down's cephalometric analysis indicates Class I skeletal and Class II dental relationships.

an orthodontist on the biology and the mechanics of the orthodontic appliance. This dividing line's importance determines the manner in which mechanics can be closely related to biological concepts (Fig. 1a). Although this concept was published in 1937, this Author believes its content is still valid today.

Hellman indicated that the biologic concepts which apply to orthodontics have a two-fold relationship by which mechanical means are used to correct a biological malocclusion. First, there are those concepts which involve tooth movement which are closely related to the treatment of the malocclusion because teeth are moved. Second, there are those concepts which control the growth gradients of the face and which may be remote from the actual procedures of the application of forces through appliances. However, it is these last concepts which can be extremely important in solving the fundamental problems of correcting the malocclusion.

When the biology and mechanics of orthodontic procedures are correlated, a bridge is formed between this education and training received at the university and that derived from mentors. Then its use in private practice, by applying the biologic and mechanical orthodontic concepts that have been acquired, will eliminate the dividing line described by Hellman (Fig. 1b).

Application

The treatment goals and objectives in the following cases are to produce the best balance and harmony of the dentition with the rest of the face. Each case was retained with a full complement of teeth in a normal relation[12]. The application of the theories learned and the mechanics used are thought to be closely related to the applicable biological concepts. Therefore, the effects of the mechanics on the biology of the system combine theory and practice to accomplish the final result (Fig. 1c).

The combination of the concepts of the whole are used first of all for a better understanding of the growth of these cases. Then, taking into account the contribution of growth, it may be finally utilized. Of course, the greatest asset in correcting skeletal and dental problems related to malocclusions in growing individuals is time—the fourth dimension[13].

Case Presentations: In his observations on facial growth and dental development, Hellman described the depth, height and breadth dimensions[14]. Certain investigators who have been mentors to this Author have explored the biologic concepts of the abnormal growth patterns of the jaws and their coexistent dental malocclusions in these same three spatial dimensions —horizontal, vertical and transverse. They have also provided a basis for treatment mechanics and direction for constructing the armamentarium to correct certain problems in these dimensions.

1. Horizontal Dimension

A Class II_1 skeletal and dental malocclusion has been selected to illustrate the correction of a problem in the horizontal dimension. The major

components of this problem lie in the anteroposterior or sagittal plane. The patient is a healthy boy 9 years 3 months of age (Fig. 2).

The casts demonstrate a 10mm overjet and a 5mm overbite. When examining the occlusal views, mild maxillary and severe mandibular arch length deficiencies are present. It is evident that there is insufficient space for eruption of the mandibular permanent canines. Also, a tapered maxillary arch form along with a tendency toward a square mandibular arch form can be seen (Fig. 2).

The Downs cephalometric analysis (Fig. 3) indicates that the maxilla in this case is positioned anteriorly, as shown by a large angle of convexity and large dimension from the maxillary incisor to the A-pogonion line. The Frankfort-mandibular plane angle of 29° is somewhat steep compared to the 22° mean value[15].

This patient had an excellent growth potential, which is a good indication that the treatment of choice would be guiding the growth directions of both the maxilla and mandible[16]. The treatment objectives were to decrease the maxillary protrusion, eliminate the maxillary-mandibular skeletal base discrepancy, and correct the mandibular arch length deficiency.

The primary mechanotherapy was Kloehn cervical headgear[17] and tandem mechanics as described by Haas[18]. These growth guiding mechanics were continued for nearly two years. The maxillary and mandibular first permanent molars were the only teeth banded during this period. Then, bands with .018 × .025 Edgewise brackets were placed on the mandibular incisors for their alignment and depression. Five months later, the maxillary incisors were banded for the same purposes. Kloehn cervical headgear was continued throughout the active treatment. Ten months later, at the age of 12 years 10 months, the occlusion was retained.

Total active treatment time was 38 months. However, of this period, a fixed Edgewise appliance was worn on the incisors for only 10 months. Figure 4 demonstrates the excellent direction and amount of growth during the treatment period. The angle of convexity decreased, as did the distance from the maxillary incisor to the A-pogonion line. The Frankfort/mandibular plane angle remained stable, as did the distance from mandibular incisor to the A-pogonion line.

The facial and intraoral photographs taken over two years after active treatment show a balanced face with a stable dentition (Fig. 5). As Kloehn has stated, *"The essential requisite for successful treatment with an extraoral appliance is that sufficient force is applied over sufficient time and in the desired direction."*

Figure 6

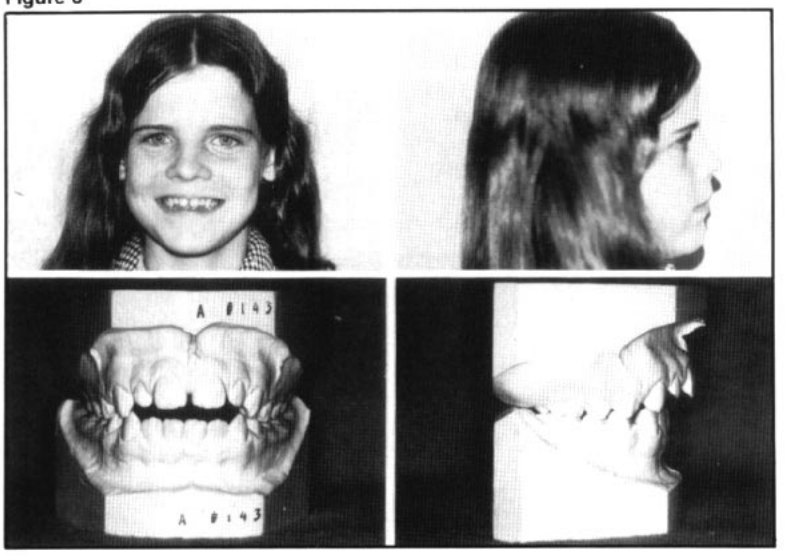
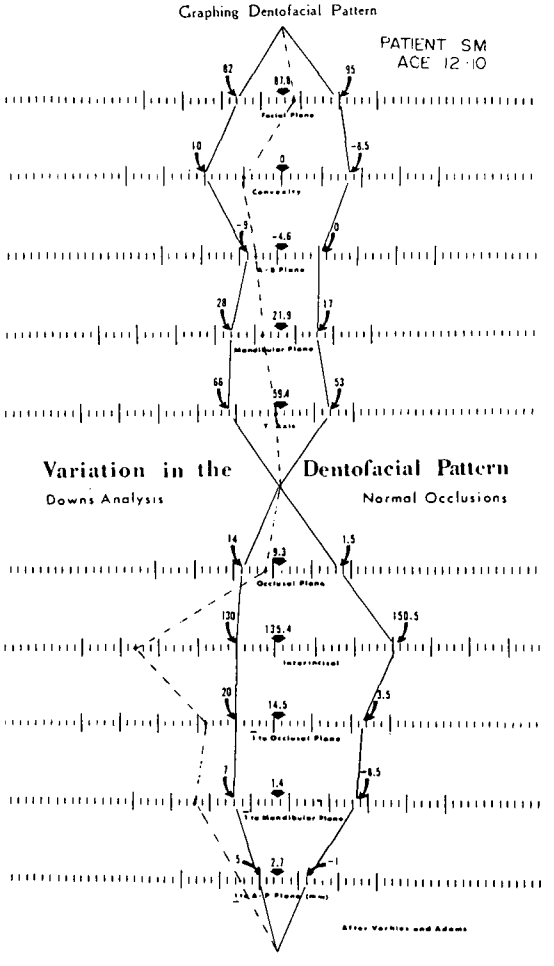


Figure 7



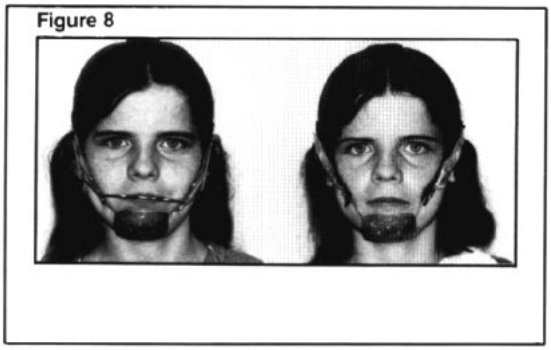


Figure 8
Extraoral therapy for SM included chin cup and cervical headgear.

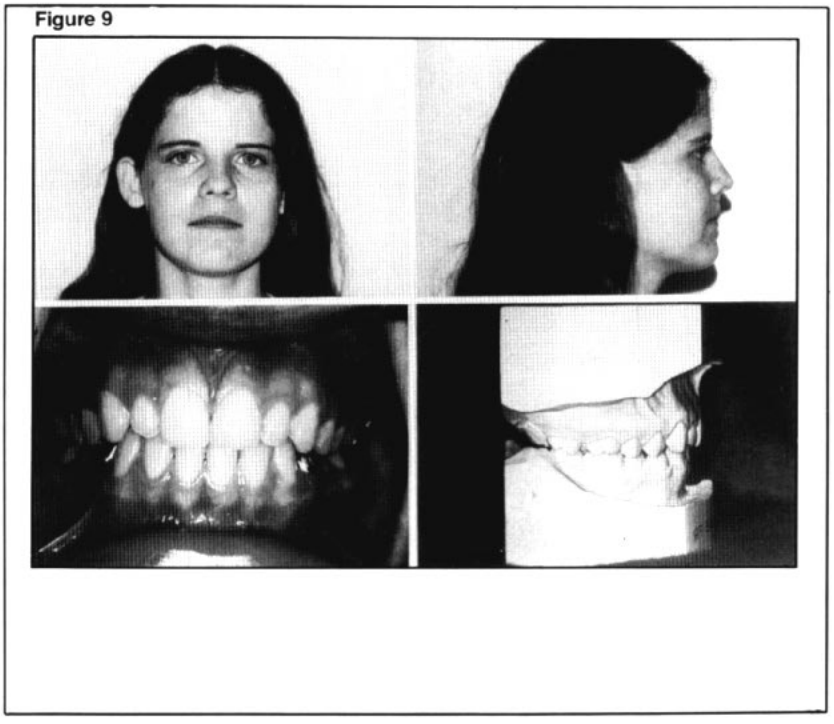


Figure 9
Post-retention records indicate balanced and harmonious facial relations and a stable Class I dentition.

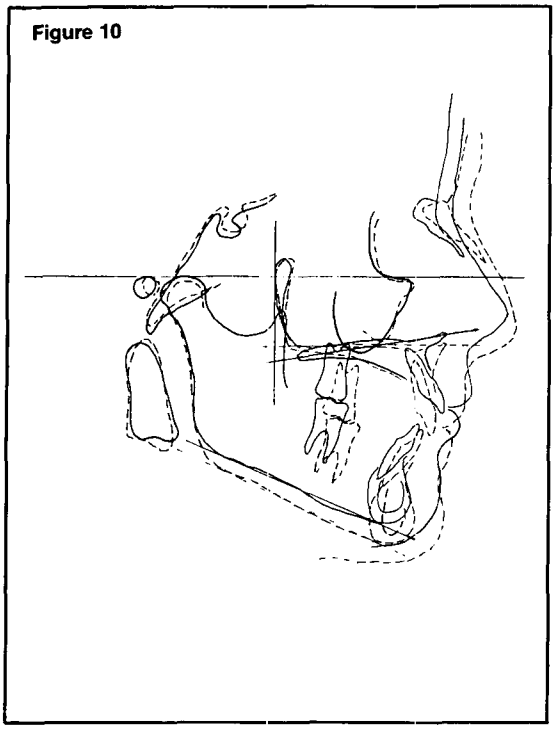


Figure 10
SM's headgear tracings show that excellent growth occurred. Note the change in angulation of the palatal plane and the stability of the mandibular plane. Improved dental relations are also evident.

He states further that *"A good functioning occlusion with good facial balance is the goal in all orthodontic treatment with acceptable evidence for the method"*[19]. Of course, the method to which he referred was the correct choice and application of the Kloehn cervical headgear.

2. Vertical Dimension

A vertical dimension problem can be illustrated with a skeletal and dental openbite. Figure 6 presents a healthy 12 year 10 month old girl with a 5mm anterior openbite indicating the presence of a muscular disharmony[20,21]. The muscular pattern, as exhibited by a tongue thrust, has produced a skeletal and dental openbite. There is not only the presence of an openbite but also an 8mm overjet.

The Downs cephalometric analysis indicates a Class I skeletal pattern with good maxillary and mandibular skeletal base relations. Anteriorly, the palatal plane is markedly tilted superiorly in relation to the Frankfort Horizontal plane. A large maxillary incisor to A-pogonion line is also seen (Fig. 7).

The excellent growth potential of this patient, based on the criteria described earlier, was a vital factor in determining the treatment plan to correct the skeletal and dental malocclusion.

First, tongue spurs were placed on the lingual of the mandibular incisor bands to inhibit tongue movement in that direction[22,23]. Correcting the muscular imbalance enables the clinician to correct the vertical and anteroposterior discrepancies without that resistance.

To achieve that correction, the patient also wore a vertical-pull chin cup to depress the posterior segments and provide a better axis of rotation for the vertical masticatory muscle sling. This has been described by Sassouni[24] and Haas[25].

To correct the anteroposterior discrepancy, the patient wore a Kloehn cervical headgear simultaneously with the chin cup (Fig. 8). Of course, excellent patient cooperation is necessary to correct such problems with these mechanics.

Active orthopedic-orthodontic treatment required 14 months. During this time, she had a fixed Edgewise appliance on the maxillary incisors for seven months. However, the patient wore the vertical-pull chin cup during the entire period of active treatment and the early retention period. Also, a mandibular lingual fixed retainer from right first premolar to left first premolar with tongue spurs in the incisor area was worn for two years during the retention phase.

Figure 11

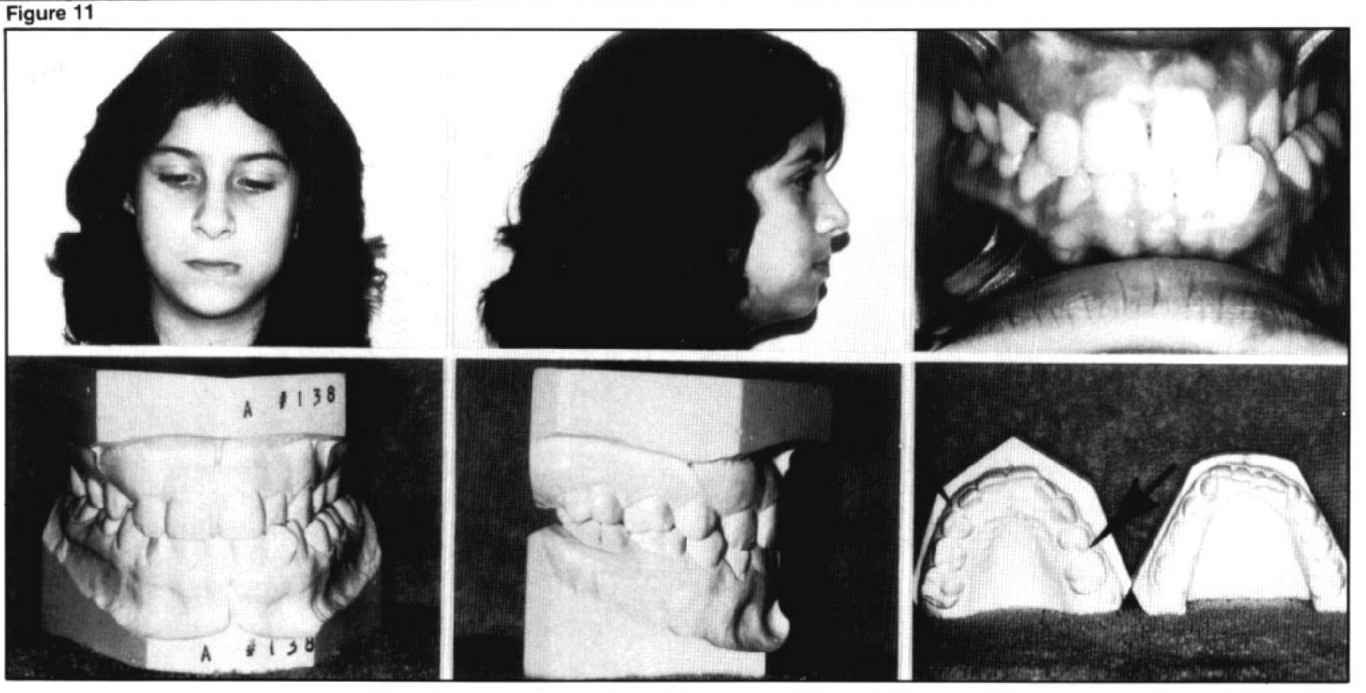


Figure 9 shows the stability of the corrected occlusion after almost four years of retention. Figure 10 shows cephalometric evidence of favorable growth, including a stable mandibular plane angle. This was accomplished by redirecting growth of the maxilla and interfering with posterior alveolar growth so that the posterior teeth maintained their stability after being depressed[26].

Transverse Dimension

The last of the spatial dimensions to be demonstrated is the transverse dimension, showing the correction of a skeletal deficiency in width of the maxilla with its related dental malocclusion. This patient is a girl age 13 years 3 months, with a mandibular deviation to the left caused by the maxillary insufficiency as exhibited by the left posterior crossbite (Fig. 11). This is an example of a functional mandibular displacement occurring as an accommodation to the deficient maxillary width.

The occlusal view of the casts shows a constricted ovoid maxillary arch form with maxillary right canine and maxillary left second premolar blocked out. This can be seen radiographically in Figure 12. The mandibular arch form appears square at the left canine-lateral incisor contact area.

The Downs cephalometric analysis indicates an average (Class I) skeletal and dental pattern (Fig. 13). Growth appeared good for this age, providing a vital asset in orthodpedic and orthodontic correction. The treatment objectives were to correct the maxillary insufficiency along with the severe maxillary arch length deficiency and the poor mandibular arch form with its dental malalignment.

Figure 12

The first objective was correcting the maxillary and mandibular skeletal base discrepancy. As reported by Haas[27,28], a true maxillary deficiency can be corrected by a fixed rapid palatal expansion appliance. This appliance was worn for three months, beginning with two and one-half weeks of patient activation of the appliance on a daily basis and then two months

Figure 11
Pretreatment records for DC show mandibular deviation caused by the left posterior crossbite.

Figure 12
Periapical radiographs show the impacted maxillary right canine and maxillary left second premolar.

Figure 13

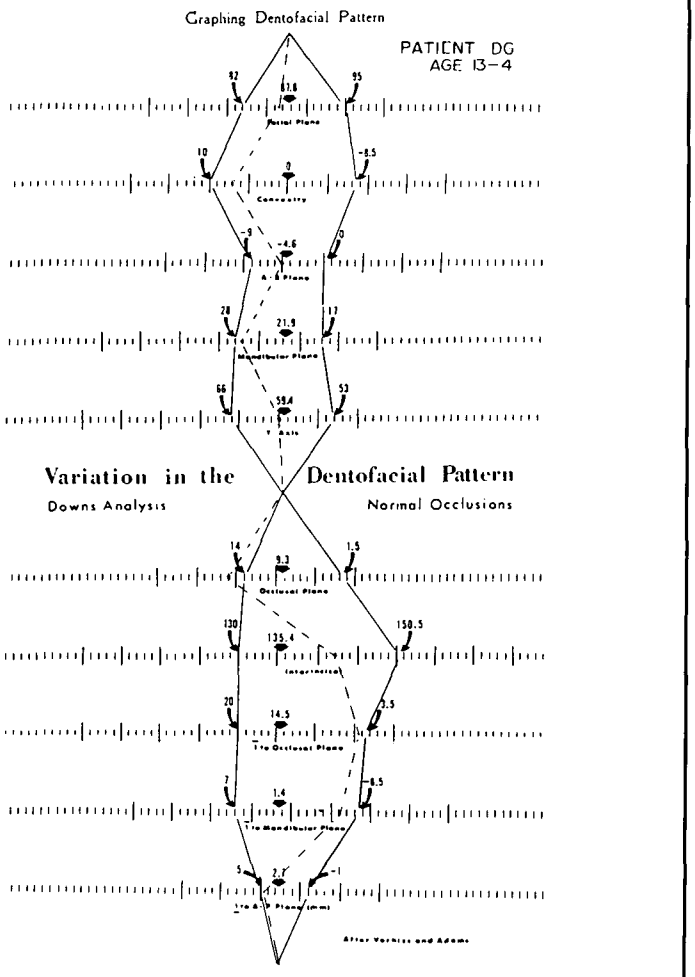


Figure 14

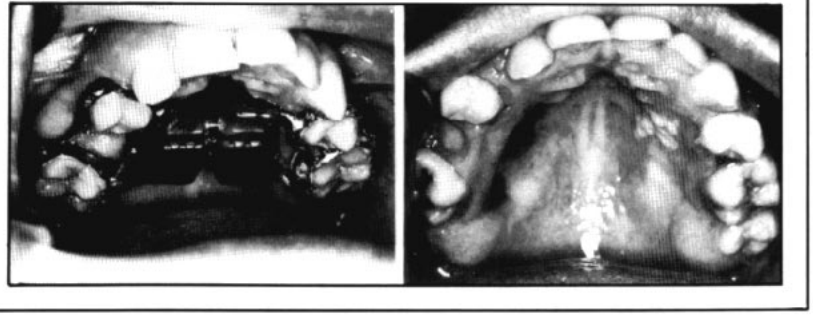


Figure 13
A Down's cephalometric analysis of DC shows Class I skeletal and dental patterns.

Figure 14
Intraoral photograph show placement of the fixed rapid palatal expansion appliance and increased palatal width following removal.

for stabilization of the separated palatal shelves (Fig. 14).

On removal of the rapid palatal expander, a Kloehn cervical headgear and Haas tandem mechanics were used for four months[18,29,30].

Because of the distorted mandibular arch form and severe maxillary arch length deficiency, this case required finishing with a full-banded upper and lower fixed Edgewise appliance. The remainder of the active treatment took an additional 29 months. Poor cooperation and frequent appliance breakage extended the treatment time beyond the usual period.

The mandibular fixed retainer was kept in place for almost four years. From the start of treatment to four years post treatment considerable favorable growth occurred (Fig. 15). The final result is a complete dentition in balance and harmony with her facial features (Fig. 16).

As Angle stated in his 1907 text, "we should be able to detect not whether the lines of the face conform to certain standards but whether the features of each individual balance and harmonize and whether the mouth is in a harmonious relation with the other features"[31].

Summary

Each individual case presented here demonstrates the correction of a problem in one particular dimension, although problems in other dimensions were also present. *Sagittal* (depth or anteroposterior) problems as seen in a Class II_1 malocclusion, *vertical* (height) problems as exhibited by a skeletal and dental openbite, and *transverse* problems as exhibited by a skeletal and dental posterior crossbite are presented.

Time, the critical fourth dimension, is employed to make corrections to apply the growth potential of the individual patient to aid in the correction of the skeletal and dental deformity by orthopedic-orthodontic mechanotherapy. The importance of the biologic age in orthodontics is realized when considering the value, contribution and utilization of growth[14], and this has been of utmost importance in the treatment of the cases presented here.

Most important to this Author is the value of mentors in the overall advancement of our specialty and the quality of care that it provides. They have provided the education and training necessary to make the methods of diagnosis and treatment for these patients attainable. The treatments applied to these patients result directly from the practical application of theoretical information, associating biological concepts with mechanical means.

It is not the intention here to provide a detailed evaluation of the skeletal or dental changes, or the relative contributions of growth or treatment mechanics employed. Rather, this is an effort to demonstrate the correlation of biologic principles with mechanical appliance therapy, and the many pieces of concepts and information that must be drawn on in the resolution of a specific problem.

Above all, this is an expression of appreciation to the many mentors who have guided, and are currently guiding this Author directly and indirectly. Further, while one author can speak

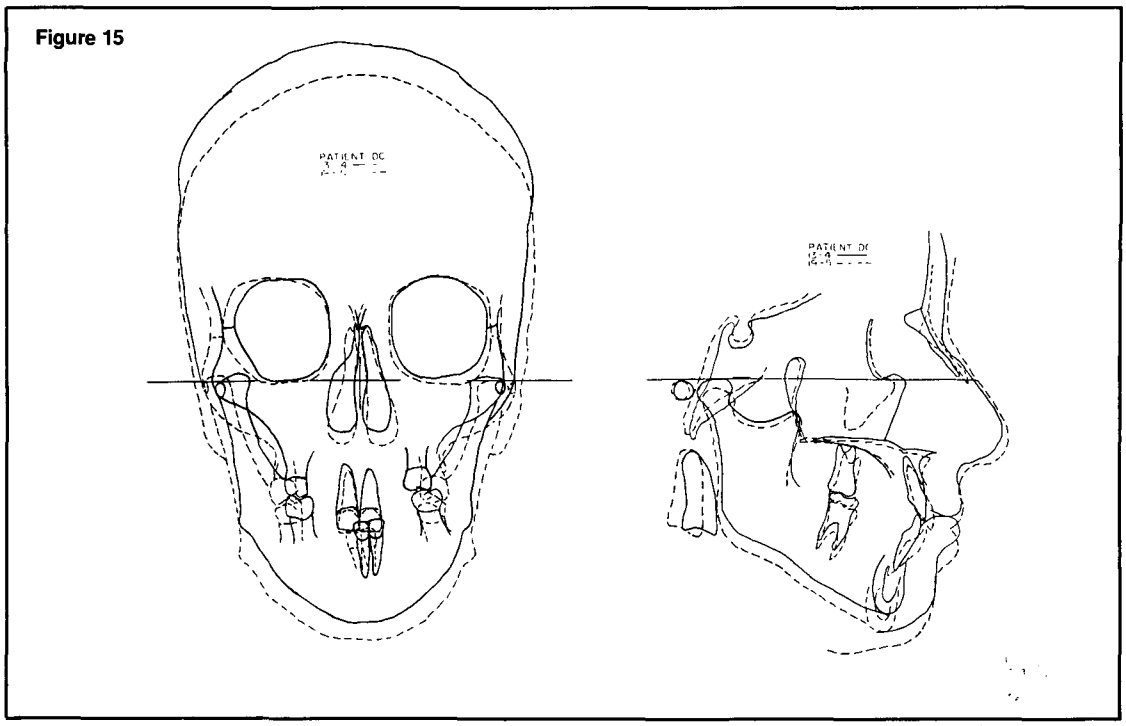


Figure 15
Headplate tracings for DC illustrate favorable growth of both the maxilla and mandible, both in width and in a downward, forward direction.

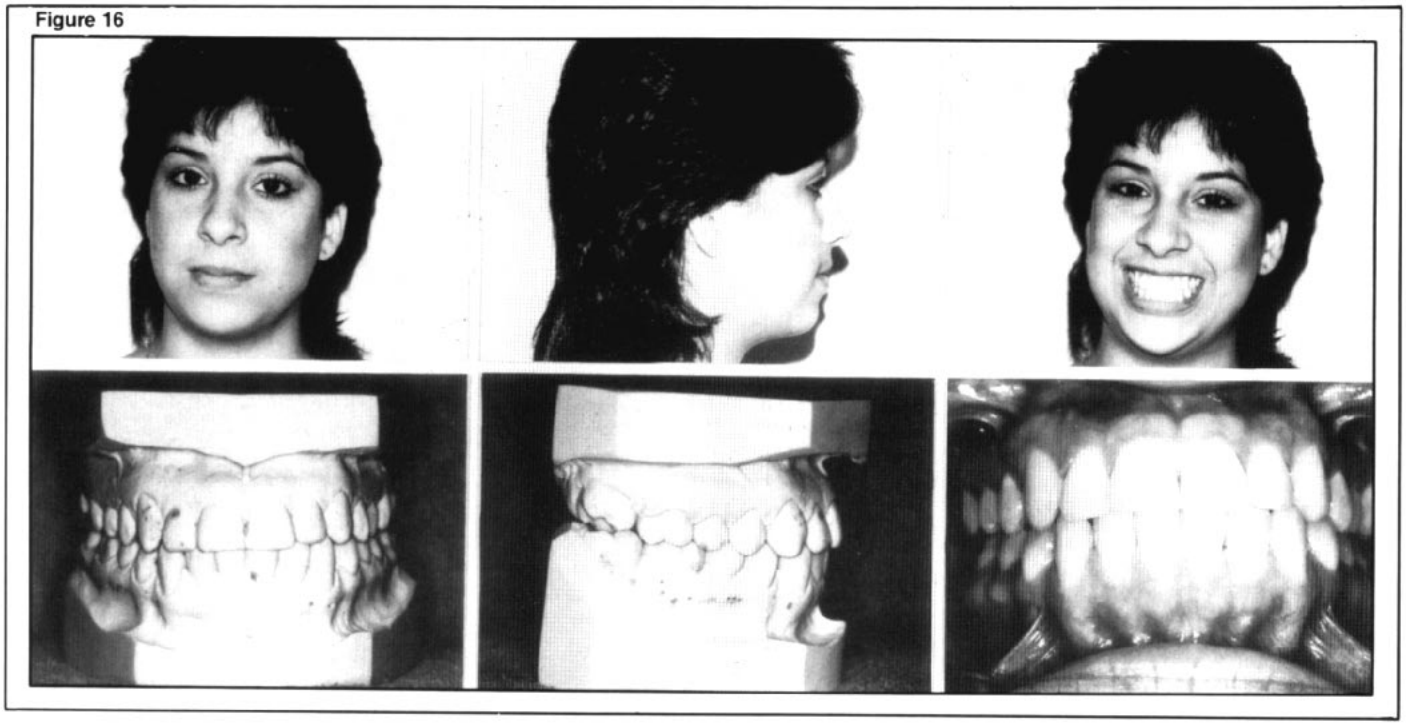


Figure 16
Posttreatment records show a balanced, harmonious facial relationship and a stable Class I dentition.

in specific terms only from direct personal experience in a matter such as this, a broader appreciation is also expressed to the countless mentors, past and present, who have contributed so much to the lives of individual orthodontists and their patients, and to the overall advancement of our specialty.

The Author would like to personally acknowledge his many mentors.

Beginning with a foundation of dentistry provided not only by the University setting but especially by Dr. G. F. Boas[32,33], then continuing into orthodontic education beginning with Dr. Milton B. Engel who provided the spark to light the fire of inquisitiveness.[34] As stated by Dr. Angle, "vessels are to be filled and fires are to be lighted." Dr. Engel was and will continue to be a cornerstone of my career in orthodontics.

The value of research methodology was provided under the patient guidance of Dr. R. J. Dooley[35], who has always unselfishly extended his time, encouragement and advice. His positive attitude and optimism have been a source of strength for continuing research projects.

Many of my teachers, such as Drs. A. Goldstein, S. J. Kloehn, S. Pruzansky, R. M. Ricketts and R. C. Thurow, have also

provided guidance during my developmental stages in becoming an orthodontist.

The mentor who provided the bridge to cross, for the utilization of the theories of the biology and the mechanics of dentofacial orthopedics-orthodontics to be relevant so that they could be applied to the treatment of my patients, was Dr. Andrew J. Haas[29,30]. He provided all the values and definitions of a mentor. Utilizing his interpretation of the philosophies of Dr. Brodie for "Practicing twenty-first century orthodontics at the present" gave a basis for the treatment of the cases presented here[36].

Finally, many thanks are extended to the author's brother, Dr. Henri R. Manasse, Dean of the University of Illinois College of Pharmacy and Dr. David L. King, Acting Chairman of the Department of Pediatric Dentistry at the University of Texas Health Science Center at San Antonio for their numerous helpful comments and suggestions in the preparation of this manuscript.

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