Mixed Dentition Treatment[1]

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The time to start orthodontic treatment is a basic problem in which there should be some fundamental harmonious agreement and understanding, but unfortunately there seems to be considerable confusion among various groups within the profession. Some are of the opinion that appliances should be placed as soon as any of the permanent teeth erupt in an abnormal position, while others are of the opposite opinion advocating no treatment until all the permanent teeth have erupted. A small number, realizing the importance of the balance of environmental force, are taking the middle road. They are applying the principles of growth and development and starting treatment at various ages whenever a definite plan of treatment can be determined which will obtain the best results.

One of the reasons for the differences of opinion seems to be the result of misinterpretation of the purpose of classifications of malocclusion. There has been a great tendency toward giving rules for treatment according to the classification of the malocclusion. Standardization of treatment in various types of malocclusion with rules to cover the same does not seem possible in orthodontia. We can have principles relating to treatment and time of treatment which can be readily applied, but not rules. The exact sciences use and apply rules with success, but orthodontia is an applied science with too many variables.

In our allied profession, orthopedics, early treatment of deformities and abnormalities is essential to develop better musculature; to train muscles for good function; and thereby to direct function and growth. Orthodontia is interested and aims toward a similar goal, namely the balance of the forces of occlusion which is essential for a good stable result.

The principles determining the time of treatment should be uniform in orthodontia as well as orthopedics, and should serve as a guide in which we can hope to find agreement. The principles applied to each case by the author to determine the time of treatment are as follows in their order of importance:

1. When can the most stable result be obtained? This is determined by the detrimental effects of the malocclusion, on the development of the environmental forces of occlusion, on the path of eruption of the remaining unerupted permanent teeth, and on the growth of the alveolar bone.
2. When is it possible to correct the malocclusion with the least amount of disturbance and destruction of tooth tissue and alveolar bone?
3. When is it possible to have the shortest time of treatment?
4. When is it possible to use the least amount of appliances?
5. What is the psychological effect of the malocclusion on the patient?

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The teeth must be in normal occlusion, supported and maintained by environmental forces which are in balance to produce a good stable orthodontic result. The best balance of the environmental forces can be obtained by normal function of these forces during the growing and developing age. When the lips are in abnormal position and function, they cannot develop to their normal size, tonicity, and relationship. Abnormal position and relationship of the teeth frequently force the lips and tongue into abnormal function, which disturbs their normal growth and development. To obtain the best development and balance of the environmental forces, the teeth and jaws must be placed in good functional relationship at an early age.

Orthodontic literature contains many references to the development of the environmental forces of the denture and the relationship of one to the other in normal and abnormal occlusion. Most of this work is found in the literature prior to 1930 when the cephalometric findings were first presented to the profession.

The cephalometric studies gave us the definite process of the development of the face and the eruption of the teeth. It corrects the early erroneous concepts that orthodontic appliances and treatment influenced growth and pattern of the facial bones. This left a definite change in clinical orthodontia with its greatest effect on the time of treatment.

The authors of the cephalometric work gave us their scientific findings but did not attempt to reach and give the profession any definite conclusions in relationship to rules of treatment. They realized the necessity for further study and investigation to reach conclusions as vital as these.

Many clinical orthodontists who did not understand the full significance of these cephalometric findings reached the conclusion that early treatment was useless if it could not influence growth of the facial bones or change the pattern. These conclusions seemed to change our thinking and analysis of the human denture from a dynamic to a static consideration, ending most of the work and thought on the development of environmental forces. As a result, very little has been contributed in the literature on this important phase of our work since the introduction of the cephalometer. Facial musculature, abnormal habits, and all the other environmental forces influencing the position of the teeth and the stability of the denture which were fully discussed in the early literature are now conspicuously absent. We must continue further study of and research in these important forces if we expect our profession to advance in treatment methods and especially in preventative orthodontia.

Trends in orthodontia have impeded the progress of our science many times, and again we can notice this effect. Since presentation of cephalometric findings, our literature has carried very little material on treatment during mixed dentition; even case reports are conspicuously absent. All our failures were laid at the door step of the constancy of growth and determination of that abnormal pattern.

The peculiar phase of this trend to discontinue treatment in mixed dentition is that it was confined mostly to Class I and Class II malocclusion. Realizing that the growth of the facial bones could not be influenced nor their pattern changed, treatment in mixed dentition was continued in mild Class III and pseudo Class III malocclusion.

The pseudo Class III referred to is that type of malocclusion in which there is a good mandible and mandibular dental arch but the maxillary incisors, deciduous canines and molars, and one or both six year molars

are lingual to the mandibular teeth. The six year molars frequently are in Class III relationship, but usually due only to anterior positioning of the mandible because of the tooth interferences. The maxillary arch is held within the mandibular arch, disturbing its normal growth in width and length, resulting in lack of space for normal eruption of the permanent teeth. The result is usually a lack of space for the maxillary-canines which erupt in a labial position, protruding into the lip. The failure of functional stimulation on the alveolar bone results in underdevelopment of the premaxillary area, and treatment at twelve years of age does not permit sufficient growth to overcome this loss. Treatment of this type of malocclusion after eruption of all the permanent teeth results in facial deformity because of failure of good alveolar growth and development of environmental forces.

Mixed dentition treatment in this type of malocclusion after eruption of the six year molars and the eight incisors is usually successful and remains quite stable. The maxillary teeth are then well supported by a good mandibular arch which, by its functional stimulation, results in good alveolar bone growth and development of environmental forces. Many of these cases continue their good development requiring no further treatment.

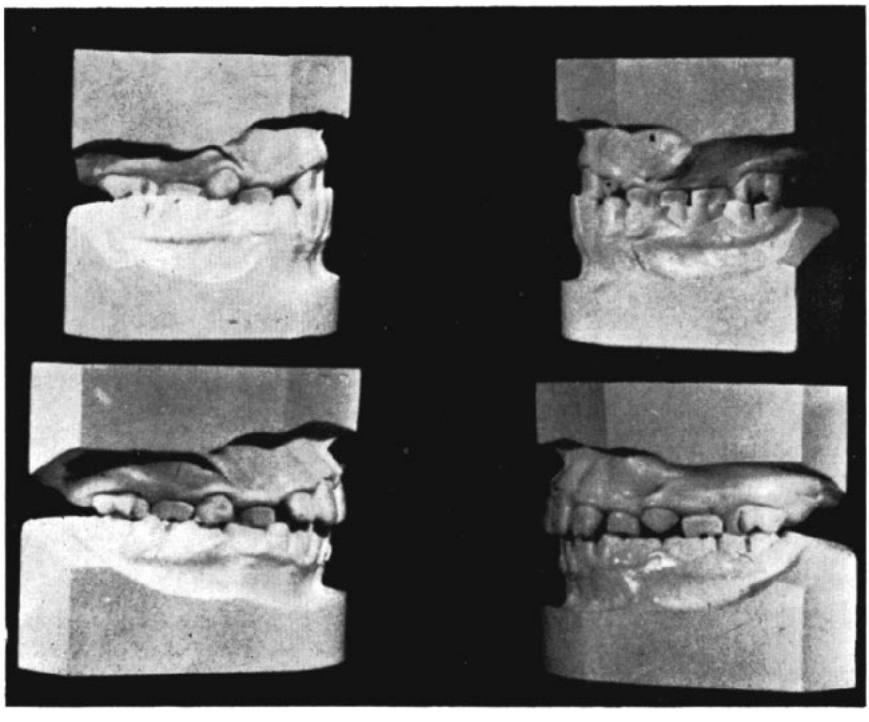

Fig. 1.

The models above are right and left views of a Class I malocclusion (often termed pseudo Class III), with an under development of the maxillary arch in a boy seven years of age. The upper incisors, all the

deciduous molars and canines, and the right six year molar are lingual to their mandibular antagonists. The models below were taken after five months of treatment, using the edgewise arch appliance in the upper and lower arch. The teeth are in correct functioning relationship for his age.

During treatment the maxillary arch length from the buccal groove of the six year molar to mid ine was increased from 41½ millimeters to 46 millimeters. The width between the molars was increased from 46 to 49 millimeters.

For retention a palatal plate was worn for six months. This case is continuing its normal development with good eruption of the bicuspids and canines. I am certain no further mechanical treatment will be necessary.

Fig. 2—Occlusal views, right before, left after.

Fig. 3.

Photographs upper before, lower after. Analysis of the models, photographs, and clinical evidence will conform with scientific cephalometric findings that treatment did not change the pattern nor stimulate growth of the facial bones. The changes resulting from treatment were confined to the alveolar bone.

Mixed dentition treatment in this case resulted in better function, better alveolar bone growth, better balance of the environmental forces, and a more stable result. Treatment time as compared to treatment after eruption of the permanent teeth was reduced about sixty per cent. Bands were placed on only twelve permanent teeth, thereby keeping tissue destruction and disturbance at a minimum. Psychologically, this patient was given help at the most critical time.

If orthodontic treatment in mixed dentition can change alveolar bone growth and guide the erupting teeth in this type of malocclusion, is it not

possible that the same can be accomplished in many Class I and Class II malocclusions? I think it can, and results will show better balance of environmental forces, better occlusion with less disturbance and destruction of tissue. Treatment time can be reduced with much less irritation to the patient.

Treatment in Class I and Class II malocclusion mixed dentition will demand some changes in principles and mechanics, especially in the use of anchorage. Teeth surrounded and supported by growing alveolar bone which is in a constant state of flux will not always serve well for anchorage. More consideration must be given to cusp interference which frequently disturbs the normal growth of the alveolar bone and disturbs the position and functional relationship of the mandible.

There is need for more information and knowledge of the growth possibilities of the alveolar bone. Treatment of one arch, either upper or lower, frequently is accompanied by improvement in the other, though no appliances are used on the opposite. This demonstrates clearly that the potential growth of the alveolar bone can be influenced considerably by normal functional stimulations and the effects of good environmental forces.

The following cases will demonstrate the application of the principles of mixed dentition analysis and method of treatment used.

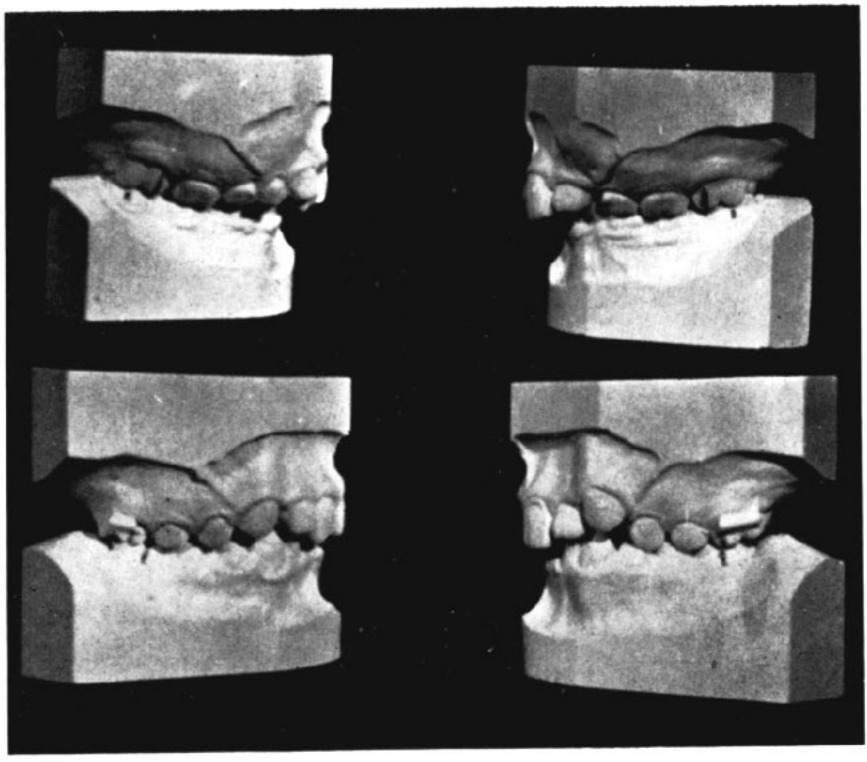

Fig. 4.

The models above are right and left views of a Class II Division II malocclusion in a boy nine years of age. The models below are right and

left views taken eighteen months later. The only appliances used consisted of bands on the maxillary right and left molars with a round arch and headcap worn only at night. During the daytime, a palatal bite plane was worn to correct the deep over bite and to unlock occlusion, thereby permitting better function. The relationship of maxillary to mandibular dental arch has been changed from Class II to a Class I without placing any appliance on the mandibular teeth.

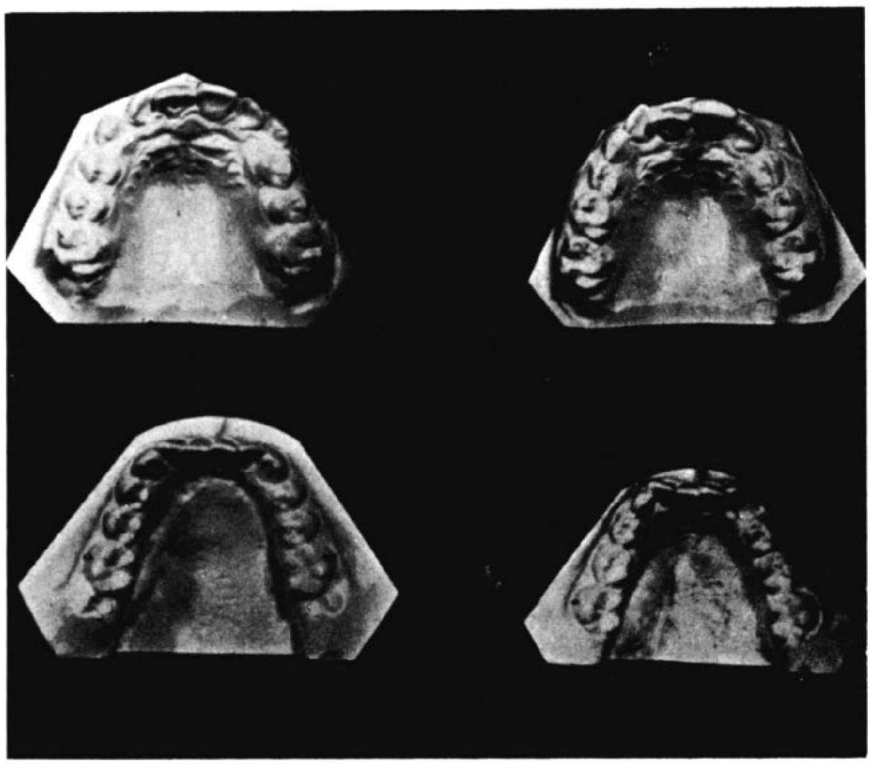

Fig. 5.

Occlusal views. Right models before and left models eighteen months later.

The mandibular teeth were in good alignment before, with a fair arch form. There is an excessive curve of spee with a flattening in the incisor area, which is the result of the influence of the upper incisors by a deep overbite. The maxillary incisors did not permit normal alveolar bone growth in the mandibular incisor area. The bone covering the labial surface of these roots was very thin with a slight inflammation of the gingival tissue. This is the type of case in which recession of the alveolar bone and gum tissue frequently occurs when bands are placed on these teeth. The mandibular teeth must not be moved labially with appliances if we are to expect a stable result with good healthy tissue.

The left models show the correction and improvement in mandibular arch resulting from wearing the bite plane, which merely corrected occlusal interference, thereby permitting better alveolar bone growth in this area.

The maxillary arch before treatment, which is the upper right model, is much too short to permit normal eruption of all the teeth. The lateral incisors are crowded labially with a lack of space for the canines. In analyzing the models separately, there is a great similarity to the maxillary model of pseudo Class III shown in Fig. 2. Treatment to obtain arch length, however, is entirely different. The premaxillary area is well developed with the apical ends of the incisors too far labially in comparison to the other teeth. The maxillary buccal segments must be moved distally without any mesial movement of the maxillary incisors or any of the mandibular teeth. The arch length of the maxillary arch from the buccal groove of the first molar to the midline before treatment was 41½ millimeters. After eighteen months of headcap treatment, arch length was increased to 45 millimeters which gives sufficient space for the bicuspids and canines which are erupting. During this time there was no mechanical force or pressure on the incisors. As the maxillary molars were moved distally, their width was increased from 54 to 59 millimeters. This is necessary to maintain good relationship with the mandibular molars because the width of the dental arches increases as we move distally.

This case will need further treatment, but the major objectives have been obtained. The molars are in Class I relationship, arch length was increased to accommodate all the permanent teeth, and the overbite is partially corrected, permitting good functional relationship of the maxillary and mandibular teeth. This was all obtained without placing any appliance on the mandibular teeth, resulting in a minimum amount of tissue disturbance.

Fig. 6.

Opposite page before, above eighteen months later. The facial balance was good before treatment was started and has been maintained with some improvement.

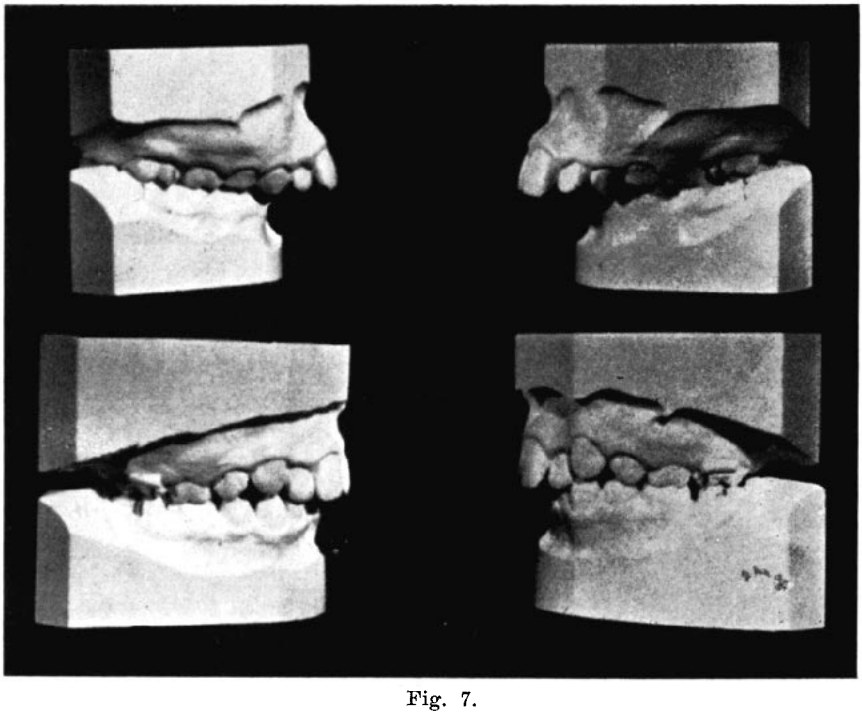

Fig. 7.

Upper models are right and left views of a girl eight years of age with a typical Class II, division 1 malocclusion. Lower models are right and left views sixteen months later.

Appliances used were bands on the maxillary first molars with a round arch and headcap worn at night. A palatal bite plane was worn during daytime.

The mandibular arch shows a loss of space for the canines, which was corrected by the use of the lingual arch.

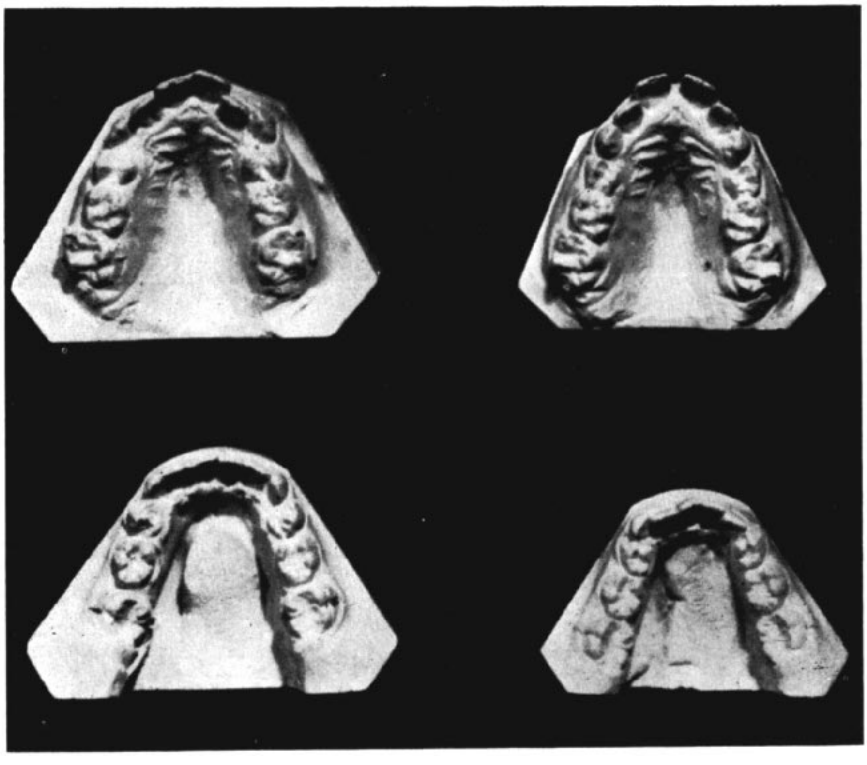

Fig. 8.

Occlusal views of same case. Right models before, left after. The maxillary arch length remained the same. Width of the molars was increased from 47 to 49 millimeters. The mandibular arch length was increased four millimeters on the right side and three millimeters on the left.

Fig. 9.

Upper before, lower sixteen months later. The molars have been placed in Class I relationship and arch length has been increased to permit sufficient space for eruption of all the permanent teeth. There is a better balance of the environmental forces. Functional relationship has been improved which will permit the alveolar bone better possibility toward reaching its maximum growth.

This case may need further treatment unless there is exceptionally good growth.

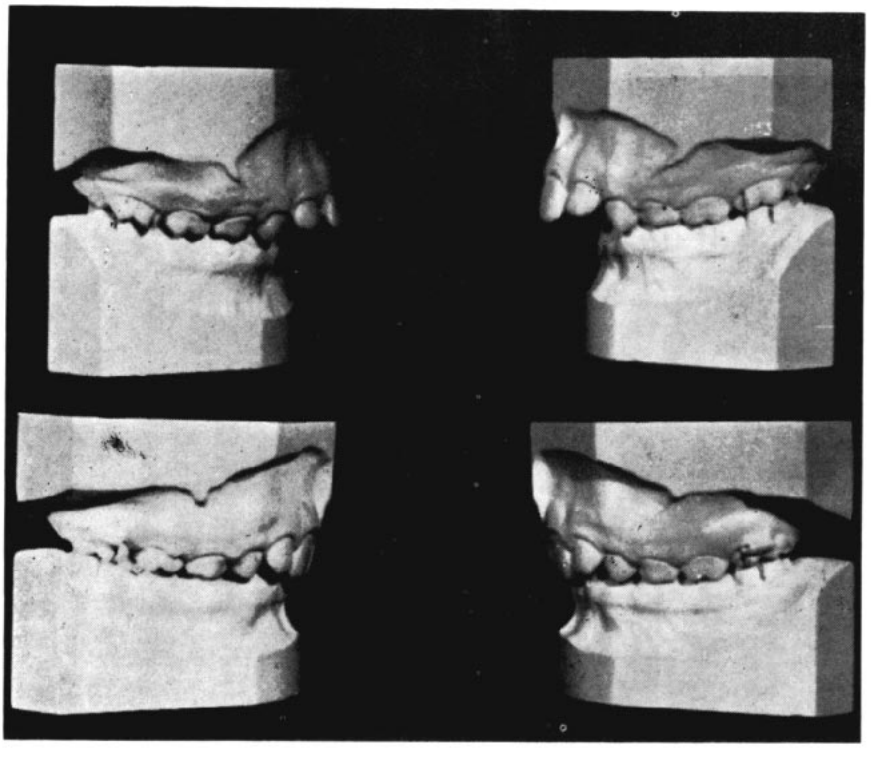

Fig. 10.

Upper models are right and left views of a girl eight years of age with a Class II, division 1 malocclusion.

Lower models are right and left views after twelve months of treatment. Appliances used were bands on the upper right and left six year molars with a round arch and headcap worn only at night.

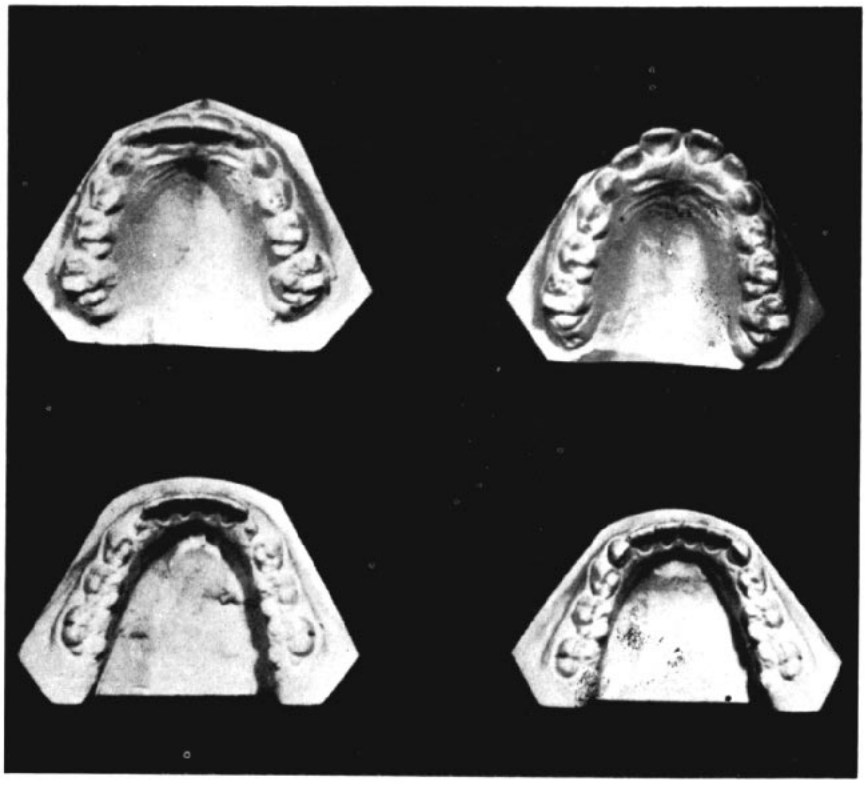

Fig. 11.

Occlusal views of the same case. Right models before and left models after. This patient had a mandibular arch with the teeth in good alignment, good arch form and in balance with the tongue and lips, as well as the supporting bone. Our objective is not to disturb this balance.

The maxillary arch length was decreased 2½ millimeters. Arch width between the molars was increased from 52 to 56 millimeters.

Fig. 12.

Upper before, lower after one year of treatment. Facial balance has improved and we can expect better development of the environmental forces and better alveolar bone growth. There is a rather deep overbite which is being corrected by the use of the Hawley bite plane.

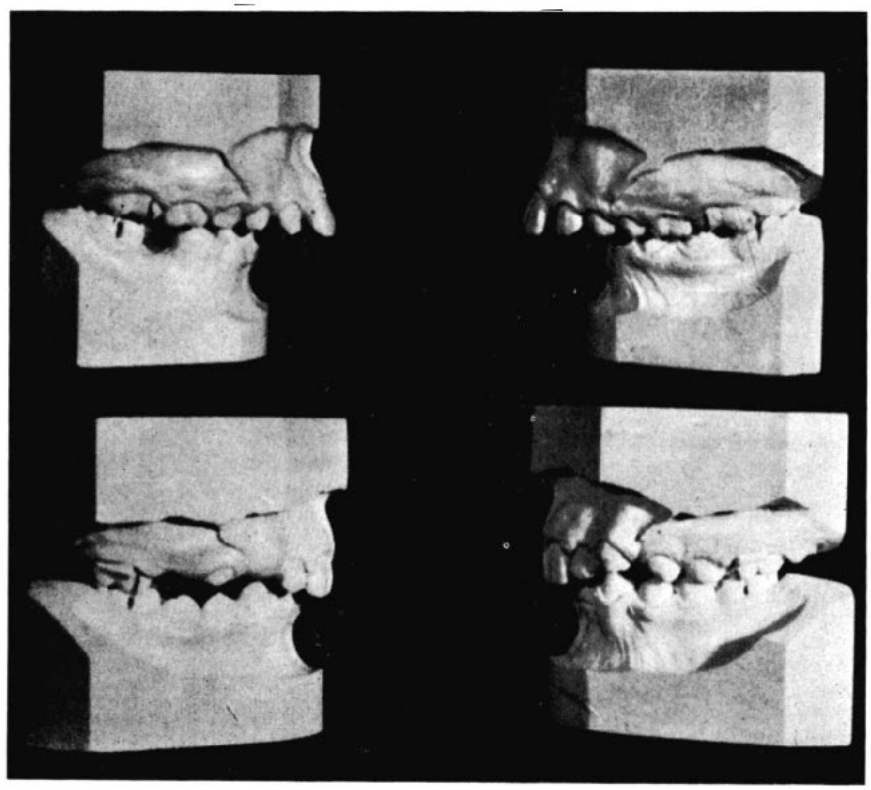

Fig. 13.

Upper models are right and left views of a nine-year-old boy with a Class II, division 1 malocclusion.

Lower models are right and left views after two years of treatment. Bands were placed on maxillary right and left molars with a round arch and headcap worn at night. A Hawley bite plane was worn in the daytime for about one year.

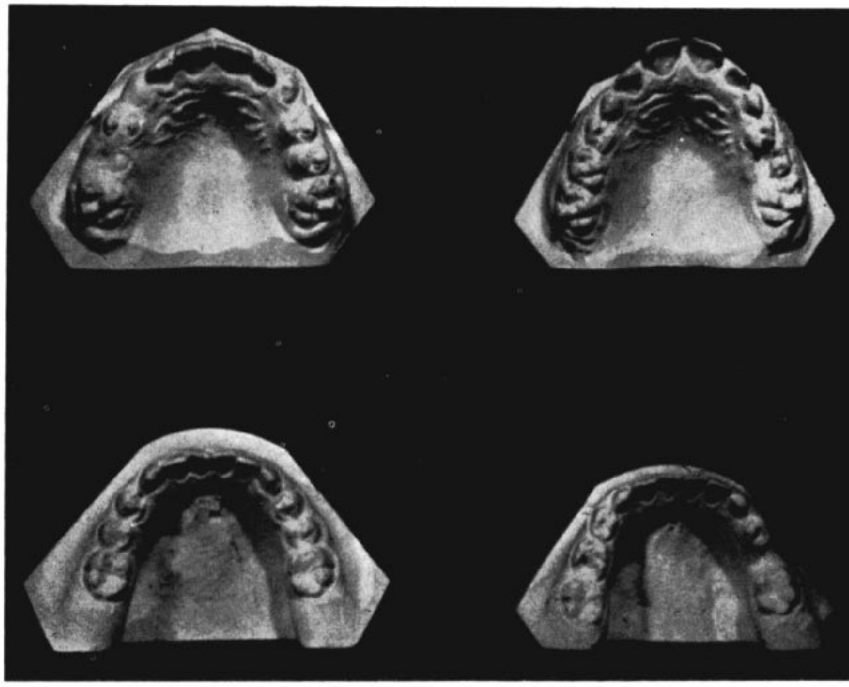

Fig. 14.

Occlusal views. Right models before, left models two years later.

The mandibular arch was fair. There was an early loss of the right and left deciduous molars with some loss of space. The distal movement of the maxillary six year molars with the headcap and the use of the bite plane seemed to have stopped the mesial drift of the mandibular molars, permitting normal eruption of the permanent canines and bicuspids without any mechanical assistance.

Maxillary arch length was decreased two millimeters while molar width was increased one millimeter.

Fig. 15—Opposite page, before treatment, above two years later.

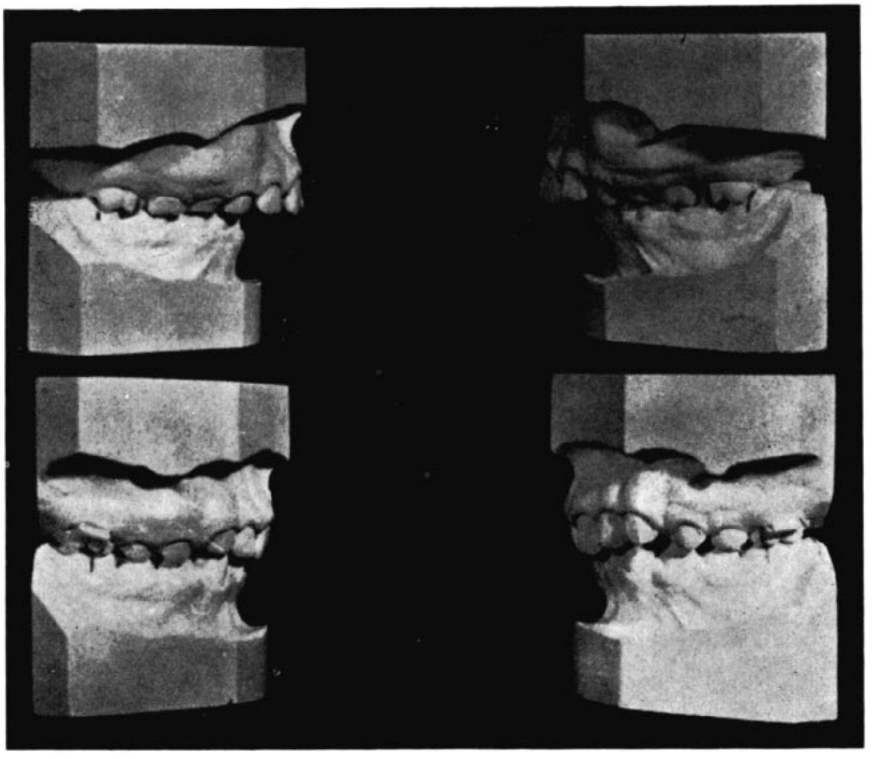

Fig. 16—Models above are right and left views of a nine year old girl with a Class II, division 1, malocclusion.

Models below (Fig. 16) are right and left views of same case after fifteen months of treatment. Bands were placed on the maxillary right and left six year molars with a round arch and headcap worn at night. A Hawley bite plane was worn during the daytime for seven months.

Fig. 17.

Occlusal views. Right models before, left fifteen months later. The mandibular arch form and tooth alignment is good and our aim should be not to disturb it. The maxillary arch length was not changed. The width of the maxillary molars was increased from 49 millimeters to 53½ millimeters.

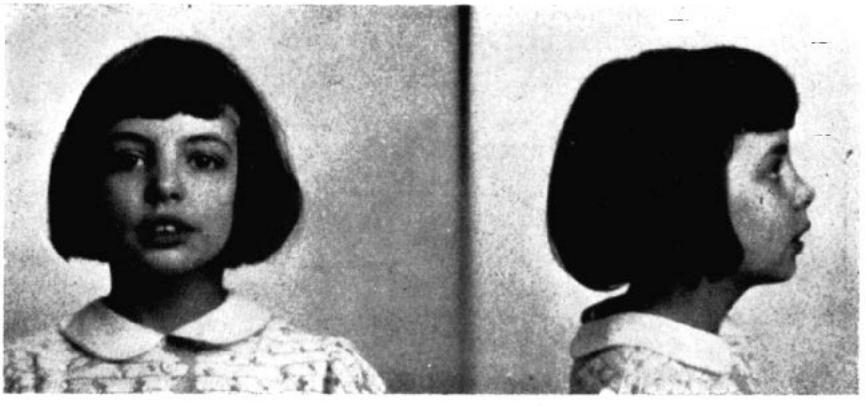

Fig. 18—Opposite page, before treatment, above one year later.

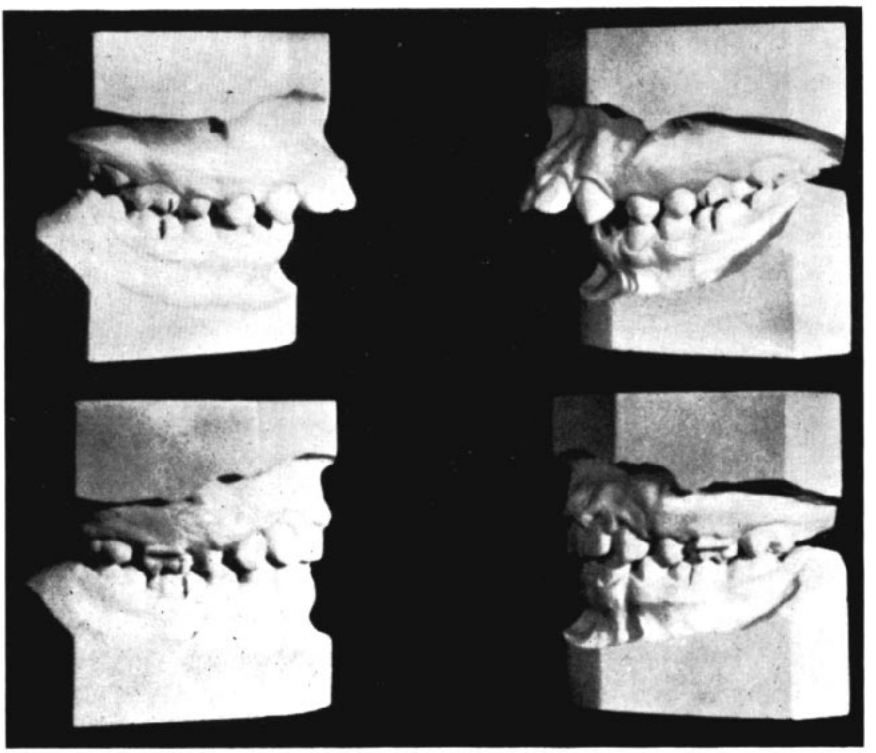

Fig. 19.

Upper models are right and left views of a boy 14 years of age. The molars are in Class I relationship, but the face is that of a severe Class II, division 1 malocclusion.

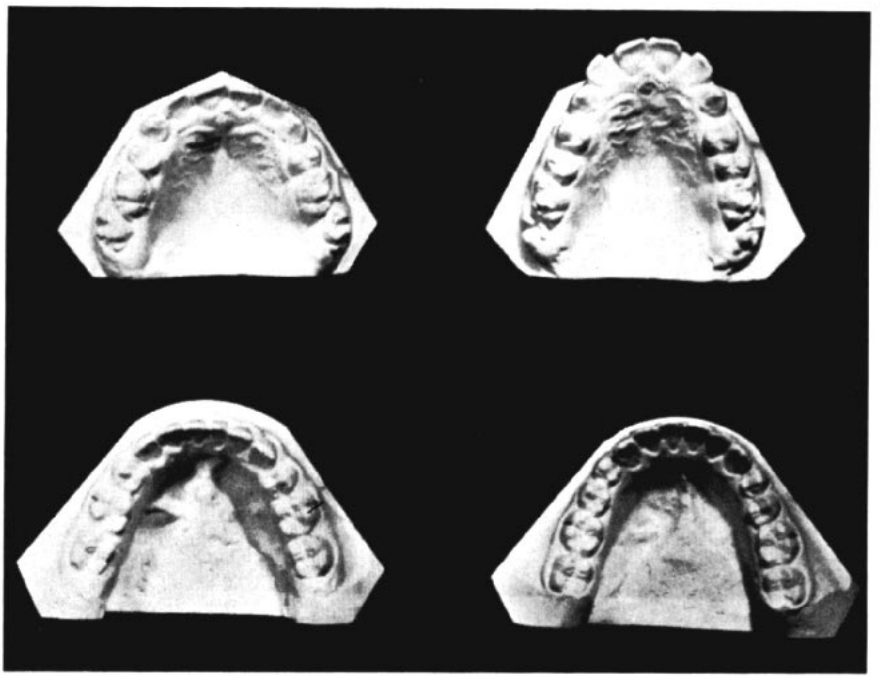

Fig. 20.

The lower models are right and left views after twenty months of treatment. The right and left maxillary and mandibular first cuspids were removed. The edgewise appliance was placed, banding all the teeth including 2nd molars. The contact points were all closed, moving the upper teeth distally by the use of occipital anchorage. There were no intermaxillary elastics used at any time.

Occlusal views. Right models before treatment, left models twenty months later.

Arch length in maxillary arch from the buccal groove of the first molar to the midline was decreased from 49 millimeters to 36 millimeters. Arch width in the maxillary first molar was decreased from 56 to 54 millimeters.

Mandibular arch length from buccal groove of six year molar to midline was decreased from 36 millimeters to 30 millimeters. Mandibular molar width was decreased from 52½ to 49 millimeters.

Fig. 21.

Upper before, lower after twenty months of treatment and eighteen months of retention. During retention he was given lip exercise and was a good cooperative patient.

For retention, bands were placed on the maxillary molars, using the round arch and headcap at night which was worn for eighteen months.

This case leaves much to be desired for a good, balanced result. Treatment with simple appliances at about seven or eight years of age during the mixed dentition period would have produced a much better result. We could have reduced treatment time with much less disturbances and destruction of tissue. Distal movement of the maxillary teeth at mixed dentition age would have permitted much better development of lips. Normal function with good lip exercise at this early age would have resulted in a much better balanced face.

Psychologically, much could have been accomplished for this boy by treatment at an earlier age.

Summary and Conclusions

1. The time to start orthodontic treatment is a basic problem in which the profession should have more uniformity of thought and practice.

2. Treatment during mixed dentition has been neglected, permitting many cases of malocclusion to develop to such severity that mechanical treatment cannot obtain the desired result.

3. Good environmental forces are necessary for a good stable result. These forces can be developed into better balance by correction of malocclusion at an early age when the major development and growth of the face is still to follow.

4. Alveolar bone growth is influenced by environmental forces surrounding it, thereby guiding its growth and development. Further investigation of the potential growth and pattern of this bone is necessary.

5. Failures of mechanical appliances to influence bone growth or change the pattern has been considered the primary factors for failure of mixed dentition treatment. It is the opinion of the writer that many of these failures could be successfully treated cases by better analysis and better application of mechanical forces. Mixed dentition treatment, to be successful, will require a change of analysis and plan of treatment with particular consideration of anchorage.

6. The philosophy of mixed dentition treatment should be to use as little in the way of appliances as possible, using them to direct alveolar growth and guiding the teeth during eruption. Let us give more thought and work toward improving our analysis and methods of mixed dentition treatment, thereby preventing severe malocclusions and reducing treatment time with better results.

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