Guiding Alveolar Growth and Eruption of Teeth To Reduce Treatment Time and Produce A More Balanced Denture and Face.

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IN REVIEWING the literature of the progress of medical and dental science, we find evidence of interruptions, but the most serious ones occur by the failure of correct evaluation and clinical application of the findings of our research men. One of the most outstanding examples was the invention of the x-rays and thereby the findings of the effects of focal infection on general health. The physicians demanded the removal of all devitalized teeth and many vital ones for the cure of every illness from arthritis to falling hair. If the etiology of any disease or ailment could not be determined immediately, the removal of teeth was always recommended. The dental profession fell right in line and many dental schools discontinued teaching root canal therapy, against the opinion and findings of the men who were working in this field. After considerable time, the physicians found the removal of teeth was not a cure-all. The dental schools replaced root canal therapy in the curriculum and started working on a more scientific basis. The result is that many teeth are again being maintained in healthy functioning condition. Considerable time was lost and many good, functioning teeth lost unnecessarily.

The science of orthodontia has been just as guilty of interruption of its progress by misinterpretation of the research findings and clinical application of the same. The misinterpretation of Wolff's law of bone growth and the apparent changes of facial balance in the orthodontically treated patients gave us the erroneous concepts that teeth placed in correct functioning relationship increased bone growth. As a result orthodontic appliances were placed on many children if they could afford the fee, as soon as the first permanent tooth erupted in an abnormal position, which very often is the lower central incisor. The patients were kept under treatment for the following six or eight years under the impression that we were stimulating growth of mandible and facial bones.

The presentation of the profession by Broadbent of the cephalometric equipment and method of studying growth and development of the face and head, opened a new approach to our work. The findings of Broadbent and Brodie convinced us that the correction of malocclusion had no influence on the future growth of the bony structure of the face beyond the alveolar process. The cephalometer has afforded the profession the opportunity to know what we are accomplishing with orthodontic appliances and thereby has changed many of our previous concepts. These findings, as well as our failures in many of our treated cases, resulted in a discontinuation of treatment in deciduous and mixed dentures by many orthodontists.

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We have also heard the statement made, "If orthodontic treatment and correction cannot stimulate bone growth or change the pattern as found by Brodie and Broadbent, our only solution is to remove teeth." Right or wrong, nowhere can we find these conclusions presented by the authors of the work on growth and development of the face and head. Is the pendulum swinging too far in assuming that we cannot guide the teeth or alveolar growth into a good balanced occlusion because we cannot change the growth pattern? Certainly extraction of teeth is not the only solution to our problem. The fact that today we cannot accomplish all we desire with an appliance should not discourage us to the extent of considering it impossible. Some of these failures are the result of our failure to apply what scientific information we possess and others to the fact that our scientific knowledge is not yet complete. The extraction of bicuspids does not change the mandible, maxillae, or any of the facial bones, but merely places the teeth in a different relationship to them. According to cephalometric analysis of treated cases, extraction and non-extraction, the tooth movement is not always in the direction nor as great as our clinical observation has led us to believe. We must maintain a more optimistic view and try to find methods of correcting these abnormalities without sacrificing teeth.

In our literature we find many severe cases of malocclusion treated successfully years ago in which today four bicuspids would be extracted. During the past five or six years we have had the opportunity to see clinics presented by Dr. Noyes, Dr. Mitchell, and Dr. Burrill of many cases treated twenty-five years ago with records taken before treatment and after, and again twenty-five years later. Some of these cases may have appeared to be in double protrusion and the lower incisors off the ridge, the criteria used today in judging the success of treated cases, but twenty-five years later many of these cases were still in good functioning relationship with good balanced occlusion and accepted as correctly treated results. The occlusion was the same as at the end of treatment and in many patients facial balance improved, with the supporting bone and gum tissue appearing healthy and normal. Certainly the evidence presented by those men should give us some optimism and stimulate our thinking toward efforts in the clinical analysis and treatment of each individual case rather than grouping them under compromise treatment as the trend seems to be.

In the past five or six years very little thought has been given toward treatment of malocclusion during the mixed dentition period. It is difficult to find even a case report of treatment during mixed dentition in any of our journals. Right or wrong, I followed this same trend of thinking and treatment partially due to my failures in treatment of deciduous and mixed dentition cases. The failures as I see them are due primarily to lack of anchorage. The deciduous teeth and partially erupted permanent teeth supported by alveolar bone which is in more or less a state of flux, due to its rapid growth, will not serve very well as anchorage. As a result we are not certain which we are moving most, our malposed teeth or those used for anchorage.

In the Class II cases treated in mixed dentition, the maxillary teeth were not always placed distally sufficiently and the mandibular teeth were brought mesially leaving neither in balance with the supporting bone, lips, and tongue. Many of these cases have partially or completely relapsed into their Class II relationship within a year. In some, no doubt, this was due to a mandibular shift during treatment, in others a failure of balance of

the forces of occlusion. Most of these were difficult cases to treat at their second period of treatment because of the forward movement of the mandibular teeth during the first period.

Many children are brought to us for treatment, especially Class II Division I, at the age of four or five years. I followed the usual procedure of telling them that treatment at this age was not successful. We kept these cases under observation during the eruption of the permanent teeth with the same prognosis. After eruption of all the permanent teeth, treatment was finally started and sometimes proved a failure because of the lack of sufficient anchorage in the mandibular teeth. Many methods have been tried to reinforce anchorage, but with little or no success. The use of occipital anchorage proved most successful. In reviewing the work

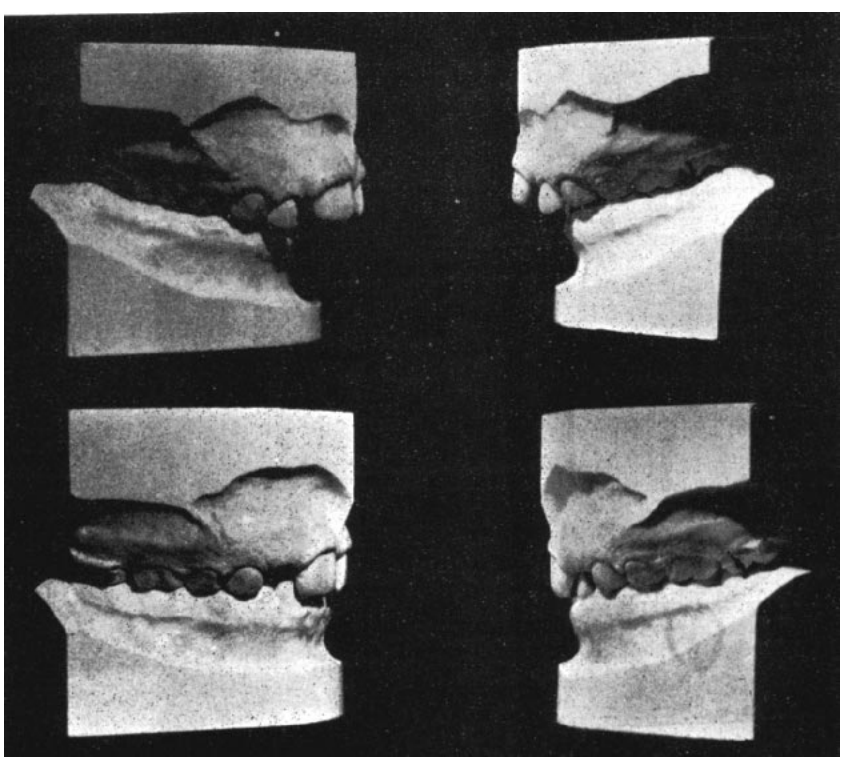

FIG. 1 (upper half). Shows a typical Class II Division I malocclusion at the age of seven years with eruption of all four first molars, four mandibular incisors and the maxillary central incisors. This patient was seen for the first time at the age of three years with the deciduous dentition in full Class II relationship and a protrusion of the incisors. It was impossible for the patient to close her lips normally and she was a mouth breather. No records were taken at that time. She was placed on the observation list and informed that successful treatment could not be started at that age. At seven years of age the first records were taken and it was decided to start treatment with the "E" arch and occipital anchorage.

FIG. 1 (lower half). Shows the same case six months later in Class I relationship. There is a rather deep overbite which can be corrected after eruption of the lateral incisors by placing a Hawley retainer, using a bite-plane with incisal hooks on the maxillary incisors.

on the application of occipital anchorage, the presentation of Dr. Oppenheim, "Biologic Orthodontic Therapy and Reality" in the 1936 ANGLE ORTHODONTIST is very enlightening and encouraging. His plan was to accept the position of the mandibular teeth as most correct for that individual and moved the maxillary teeth distally into correct relationship with their antagonists by the use of occipital anchorage, thereby avoiding any possible disturbance of the mandibular teeth. This clinical supposition was verified later by our research men when they found that many mandibles in Class II Division I malocclusion showed no more variation in size than mandible in Class I. The "E" arch treatment with occipital anchorage as employed by Dr. Oppenheim moved the maxillary teeth distally while the face and mandible were growing in their normal path downward and forward. This we can call guiding growth of the alveolar process and eruption of the teeth. The maxillary teeth are moved distally during this period of treatment, but much less than appears clinically. We must consider that in normal growth, alveolar process and teeth move forward, and if in a Class II malocclusion at the age of five or six years we could just stop this forward growth of the maxillary teeth and alveolar process until the normal forward growth of the mandible had advanced sufficiently for normal relationship of the teeth, we would have attained our goal. It is important to start this type of treatment as early as possible because of the declining rate gradient of growth of the jaws and alveolar process. The time which has proven most satisfactory from appliance manipulation as well as patient cooperation is as soon as the six year molars have fully erupted. This would then be accomplished with the least possible tissue disturbance which should be our aim. The cases which follow will illustrate this. (Fig. 1).

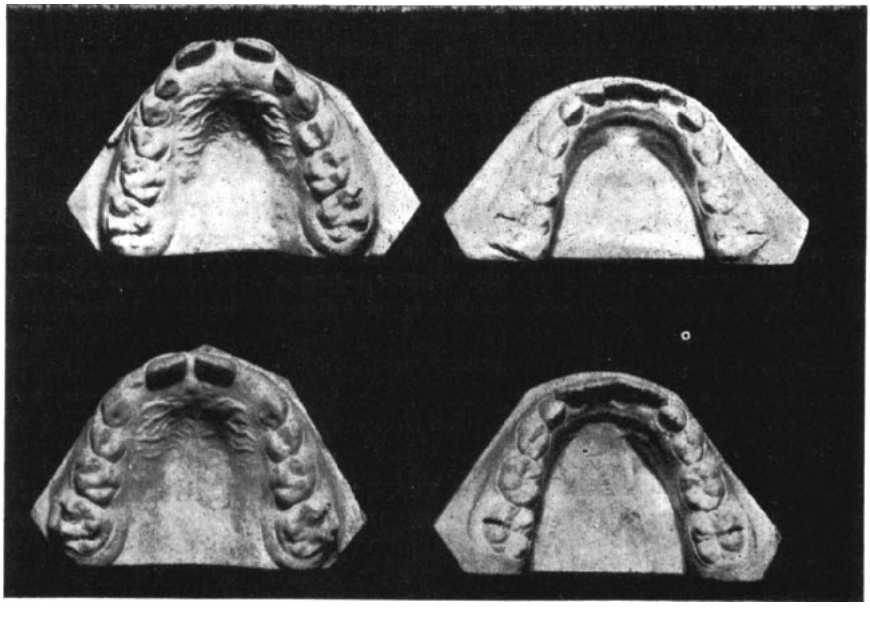

FIG. 2. Upper models show occlusal view before treatment and lower models after. The mandibular arch before treatment was quite normal for a seven year old individual with the teeth in good relationship to its face. It was the same after treatment because no appliances were placed on these teeth.

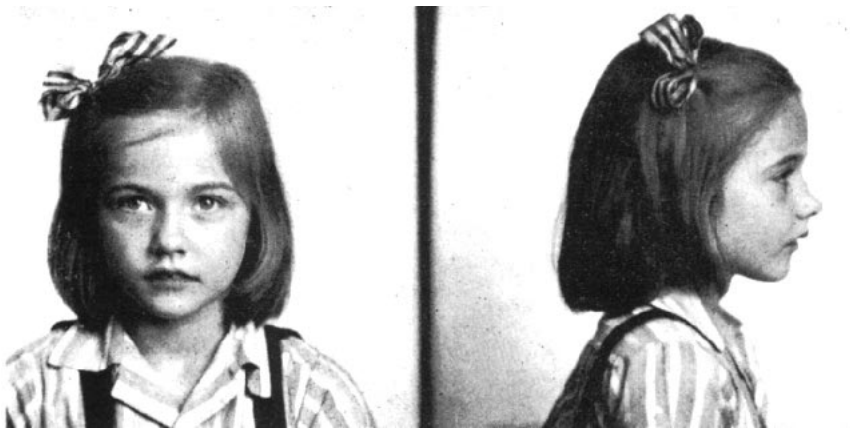

FIG. 3. Front and profile photographs of the patient at seven years of age before treatment.

FIG. 4. Front and profile photographs six months later.

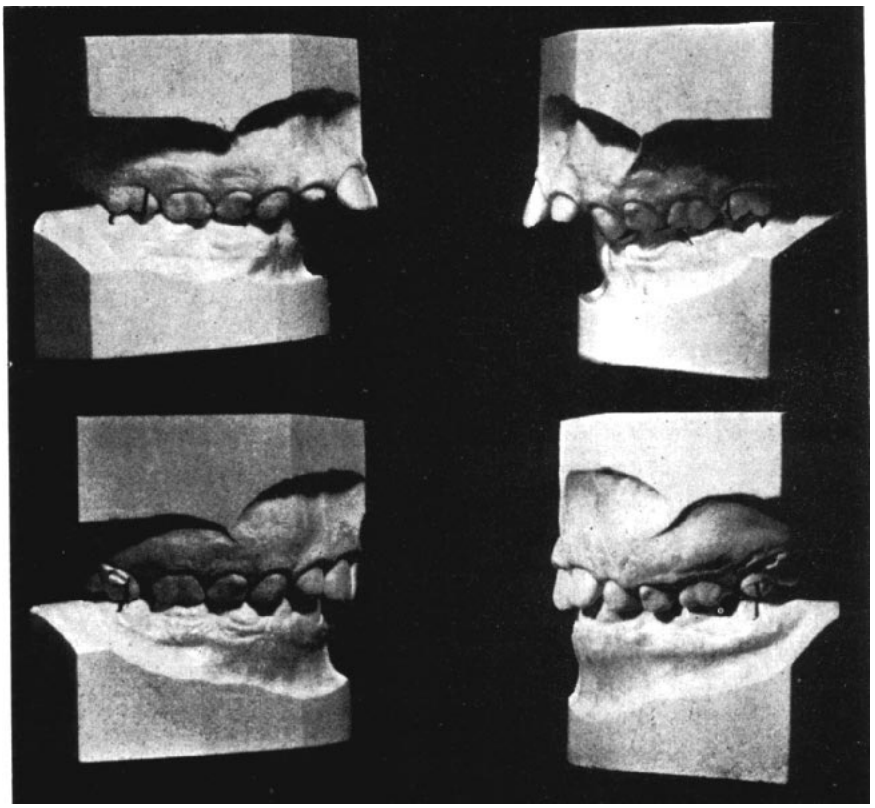

FIG. 5. Another typical Class II Division 1 case which was first seen at six years of age. She was also placed on the observation list and informed that treatment could not be started at this age. At eight years of age the four first molars, four mandibular incisors and the four maxillary incisors had erupted. Records were taken at this time. Bands were placed on the maxillary molars and "E" arch with headcap was worn at night. Models below show case fourteen months later.

FIG. 6. Occlusal view of case before and fourteen months later. The lower arch form is quite normal and the teeth in good relationship to the base. The models below, taken at about nine years of age shows the permanent canine erupting in normal position. If these teeth are not disturbed in their position and relationship to the supporting structures, we can expect a normal arch form after the permanent teeth have erupted. The arch length in the maxillary arch from the mesial of the six year molars to the mid-line was decreased about three millimeters by correcting the axial inclination. This was accomplished by permitting the "E" arch to rest against these teeth.

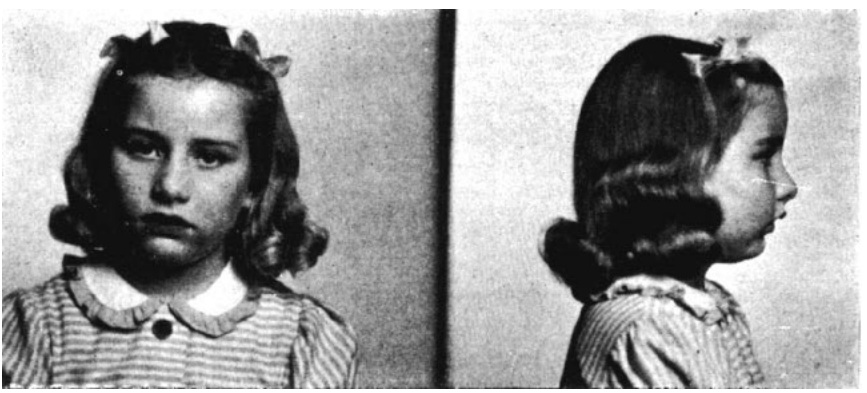

FIG. 7. Frontal and lateral photographs of this patient at the age of eight years. The protrusion of the upper teeth make it impossible for this child to close her mouth normally. She has developed a mouth breathing habit which will interfere with normal lip development. In studying the relationship of the mandibular teeth to their base as well as the development of the mandible, one reaches the conclusion that this is one of those cases in which failure is certain to follow if the mandibular teeth are moved labially even the minimum amount. Therefore, this type case must be treated without the use of Class II elastics if we expect a good result with good facial balance.

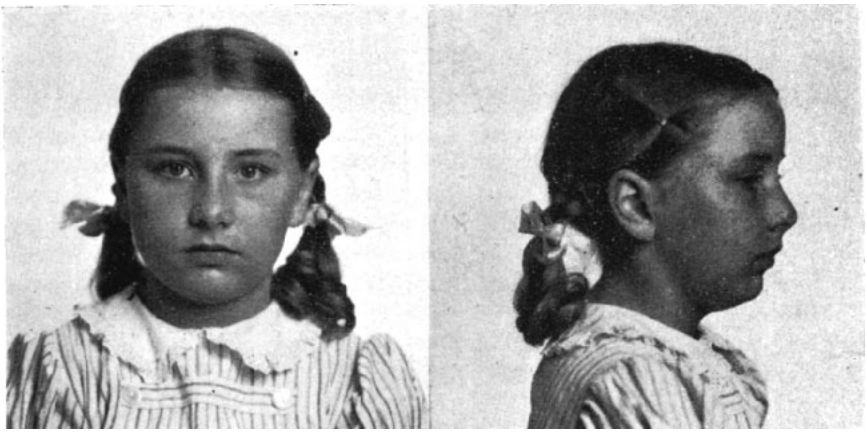

FIG. 8. Frontal and lateral photographs of same patient at nine years of age after wearing "E" arch with occipital anchorage fourteen months. She still shows a slight strain of lips, part of which is facial type. Some of this may leave with lip exercises and normal function. When this patient came under my observation at six years of age, I had not used the headcap and was still postponing treatment of these cases until the permanent teeth had erupted. Therefore the delay in treatment. It is possible to have reduced the time of headcap treatment with better development of facial musculature if treatment had been started as soon as the six year molars had erupted.

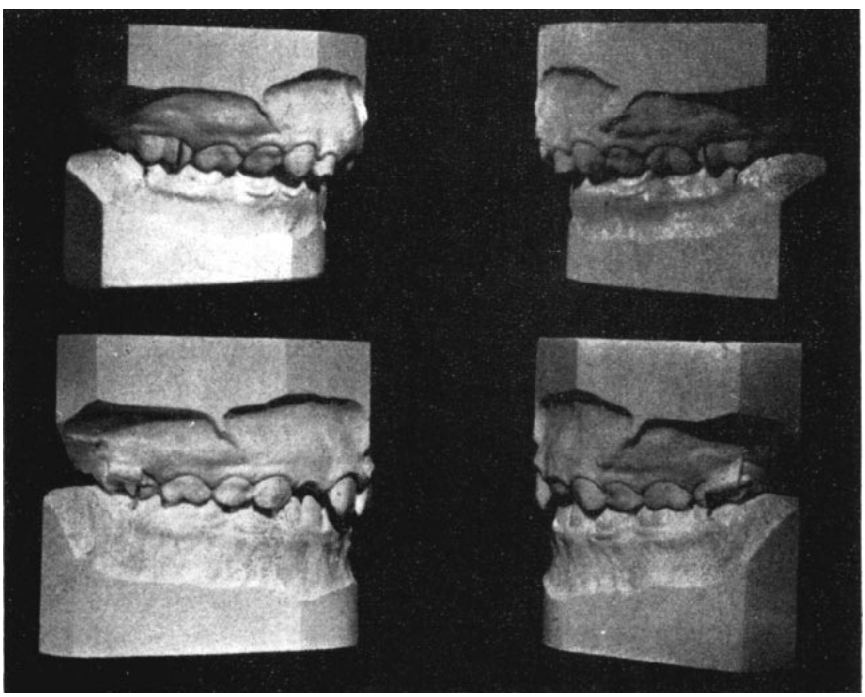

FIG. 9. A patient seven years of age who had been under observation for the previous four years. His deciduous dentition was full Class II with a deep overbite. Bands were placed on the maxillary six year molars and "E" arch with occipital anchorage were used at night. The models in the lower half of the figure were taken eight months later with occlusion in Class I relationship.

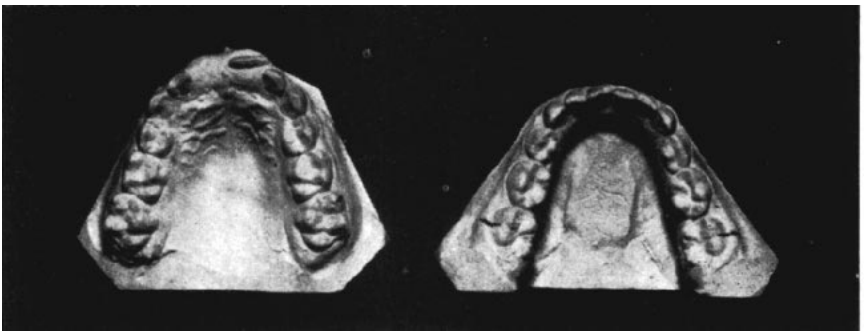

FIG. 10. Shows occlusal views of models when treatment was started. Only one maxillary incisor had started to erupt at this time. When the second models were taken eight months later, the central incisors were fully erupted and the lateral just starting. The overbite was corrected partially, but he will need further help with a bite plate which I prefer not using until all permanent incisors have erupted.

FIG. 11. Frontal and lateral photographs at seven years of age when treatment was started. The facial musculature appears quite normal and we could detect no abnormal habits.

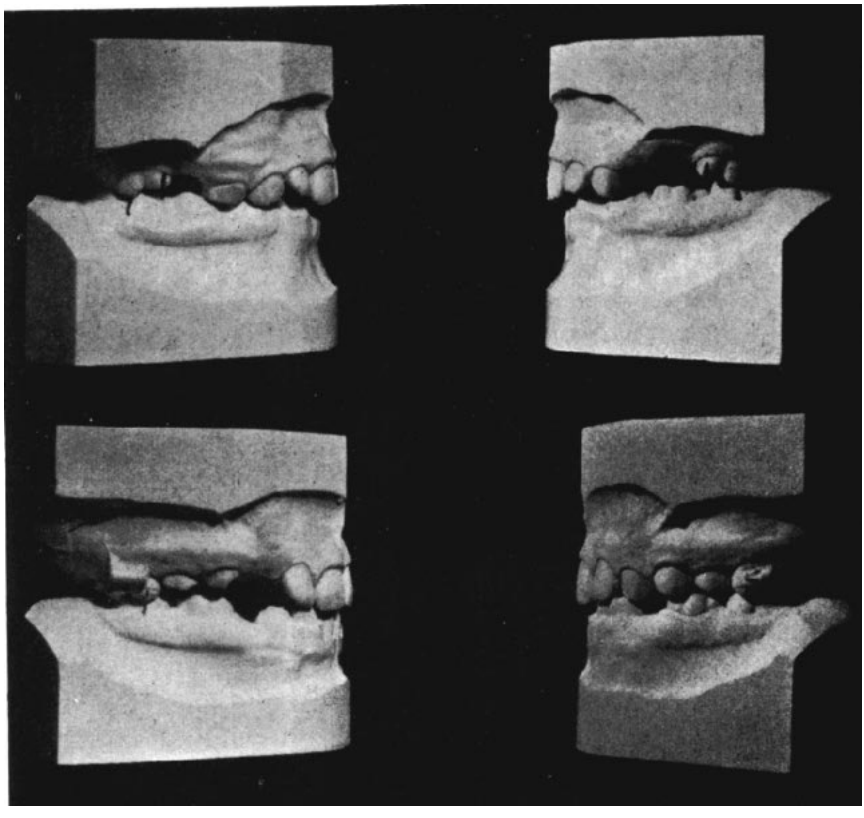

FIG. 12. Shows right and left views of models of a patient nine years of age who had lost the right and left maxillary deciduous second molar at the time of eruption of the permanent first molar. According to the history I received, the distal roots of these two deciduous teeth were resorbed by the erupting permanent first molar. The two deciduous molars were finally extracted to permit eruption of the maxillary permanent first molars. The left maxillary deciduous first molar was also lost before the permanent successor was ready to erupt. As would be expected the maxillary permanent first molars drifted mesially into full Class II relationship. There was also a deep overbite. Bands were placed on the maxillary first molars with "E" arch and headcap. The models in the lower half of the cut were taken ten months later. The maxillary molars are in Class I relationship and both the first and second bicuspids have erupted. The bite has opened and I believe there is sufficient space for eruption of the maxillary canines.

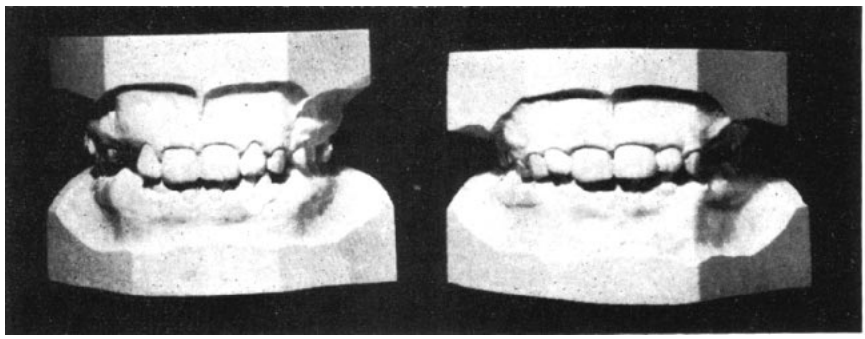

FIG. 13. A front view of case before and after showing the opening of bite.

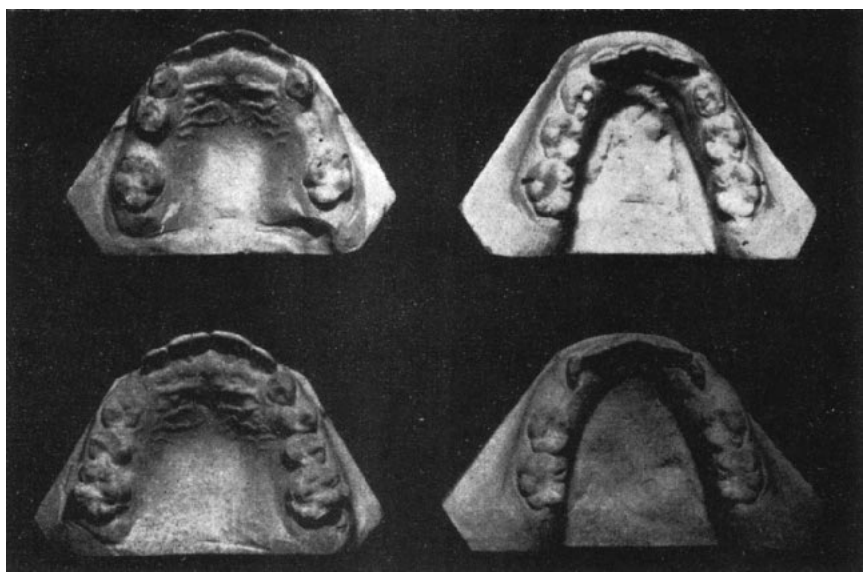

FIG. 14. Upper occlusal view of models before treatment. The mandibular arch shows a collapse as would be expected in the closing of the bite. The deciduous canines were lost early and the space partially closed. Models below are occlusal views taken ten months later. The only appliances used were the "E" arch and headcap at night. The mandibular permanent canines are starting to erupt. They are slightly rotated but in fair position. This patient may need some help after eruption of the remaining permanent teeth. The mandibular arch may need a little increase in length to correct rotations, but this I believe can be done by moving the incisors labially and still maintain them in balance. If, however, the usual method of treatment had been employed using Class II elastics, there would be a possibility of bringing the mandibular teeth too far labially and leaving them in an unbalanced position to the facial musculature as well as the bone supporting them. The maxillary arch length from the mesial of the six year molar to the mid-line was increased about three millimeters. This was accomplished by either a distal movement of the maxillary six year molar or a normal forward growth of the maxillary incisors while the six year molars were held stationary. The maxillary and mandibular molar relationship had changed from Class II to Class I which was accomplished by a distal movement of the maxillary six year molars or the normal forward growth of the mandible while the maxillary six year molars were held in their original position. Clinically we have obtained the desired result but a cephalometric appraisal before and after would permit us accurate measurements and analysis of tooth movement and growth which might be of considerable help in improving our analysis and methods of treatment.

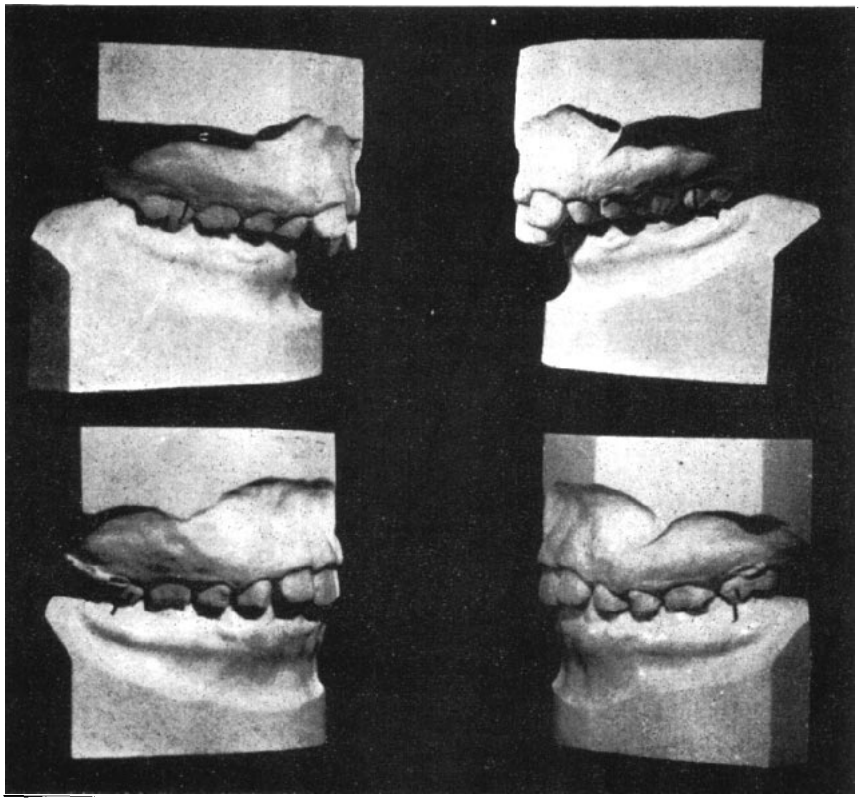

FIG. 15. Shows right and left views of a Class II Division I of a patient eight years of age. Full edgewise arch appliance with bands on all the teeth including deciduous teeth was placed. Regular Class II treatment using the mandibular teeth for anchorage was used. The appliance was removed after eight months. An "E" arch and headcap were placed when the edgewise arch appliance was removed and continued. No other retention was used.

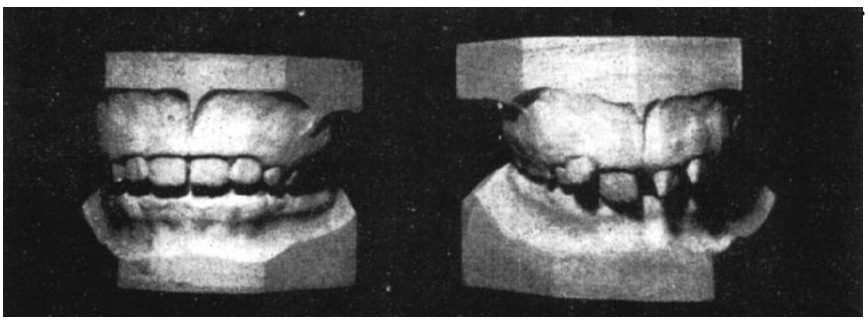

FIG. 16. Frontal views before and after treatment.

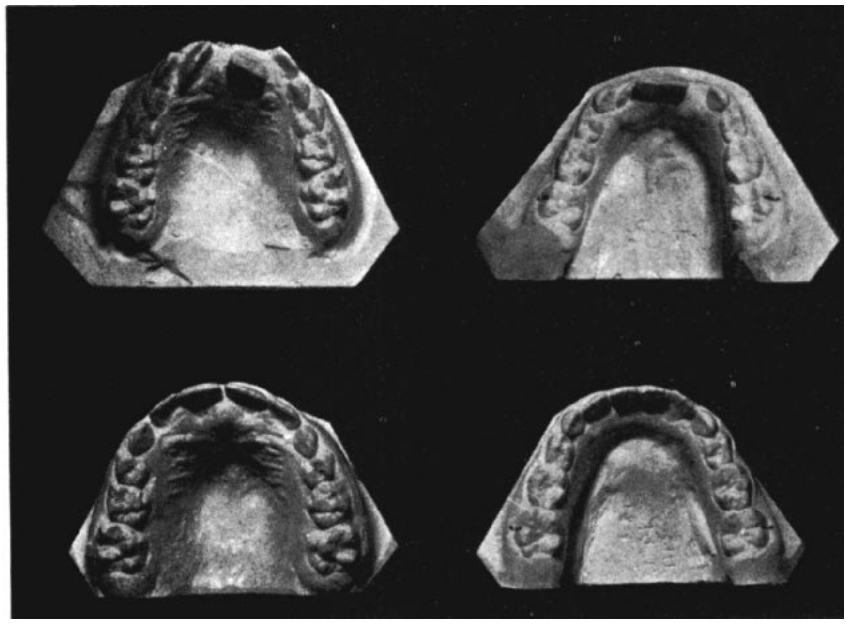

FIG. 17. Upper: occlusal views of model before treatment. The lower arch before treatment was in good relationship to the supporting bone and in good facial balance. The incisors may have been in a slight lingual position which has resulted in a lack of space for normal eruption of the lateral incisors. This was due to an interference with normal alveolar growth in this area by the abnormal position of the maxillary incisors. The models below are occlusal views after treatment. Because of the Class II elastics, the lower teeth have been moved too far labially. This case was treated before I started occipital anchorage treatment and I believe it was not treated correctly. The "E" arch and headcap were placed for retention to prevent any relapse of the Class II relationship.

FIG. 18. Lateral and frontal photographs of patient before treatment.

FIG. 19. Lateral and frontal photographs after treatment. The prognosis for a good balanced result are fair but it will not tolerate any further use of Class II elastics. If I were to treat this case today, I would place full edgewise arch appliance in the maxillary arch with occipital anchorage and no Class II elastics. No appliances should be placed in the mandibular teeth at this time. The correction of the deep overbite by correction of maxillary arch and distal movement of the same would permit better growth of the mandibular incisor and alveolar bone.

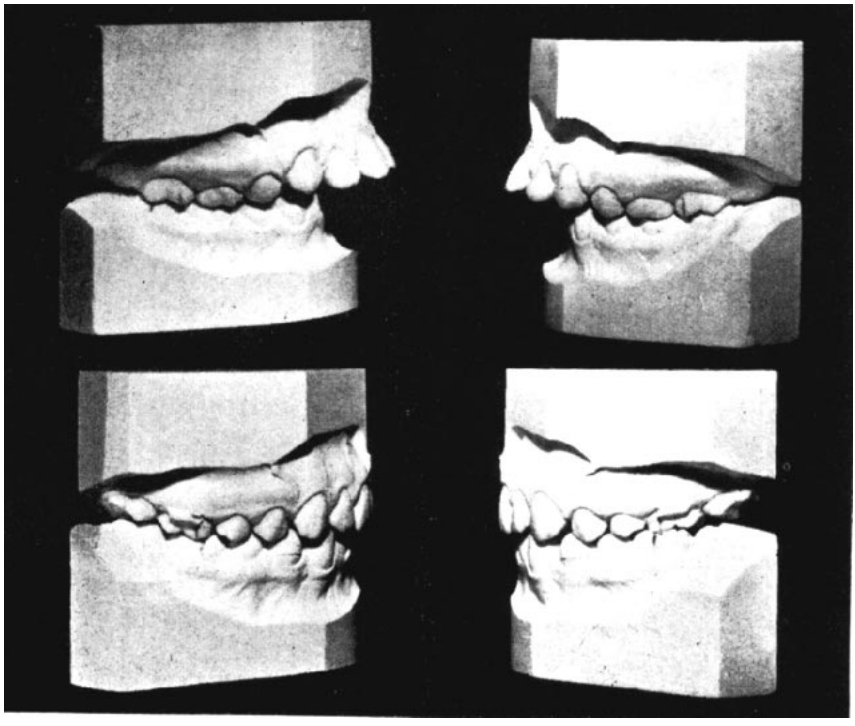

FIG. 20. Upper models show right and left views of a typical Class II Division I case age twelve years. She was placed under treatment September 10, 1946 using the

(Continued on next page.)

edgewise arch treatment. Occipital anchorage was placed on the maxillary teeth without any Class II elastics for the first four months. During this time the arch form and details were corrected in the mandibular arch. This required very little correction but was allowed to settle for six weeks without removing the arch. Class II elastics were then worn in the day time for three months. After that only the headcap was worn during the night until August 12, 1947 when the edgewise arch appliances were removed. In the mandibular arch, retention was placed with bands on the first bicuspids and a fixed lingual wire. On the maxillary arch, bands were placed on the right and left first molars with "E" arch and headcap worn at night. The lower models show right and left views after eleven months of active treatment; at this time "E" arch and headcap retention was started.

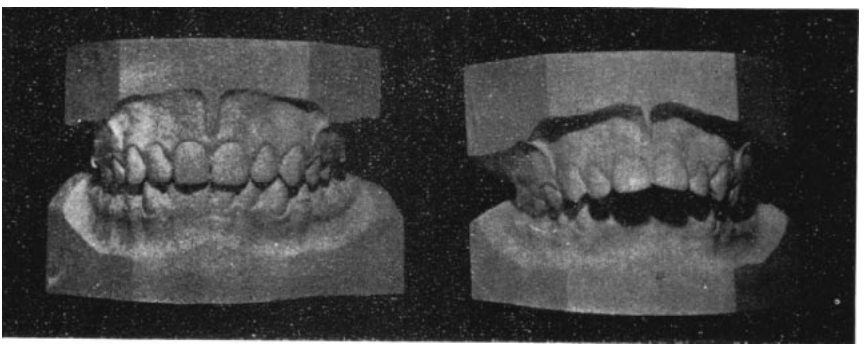

FIG. 21. Front views of models before and after treatment.

FIG. 22. Front and lateral photographs before treatment.

FIG. 23. Front and lateral photographs after treatment.

As stated before, the mandibular teeth were in good relationship to each other as well as to the supporting bone. This would have been an ideal case for "E" arch and headcap treatment at about seven years of age after eruption of the first molars. The maxillary teeth could have been placed in correct relationship to the mandibular teeth permitting better function and certainly better facial muscular development. From my present observation, it seems very possible that this case could have been corrected entirely by use of "E" arch and headcap at seven years of age with a better balanced result.

The face seems to be in good balance and the teeth in good relationship to the supporting bone. (FIG. 23) Occipital anchorage was used because mandibular teeth would not tolerate any labial movement. The upper lip was short with a hypotonicity of the same. Therefore, I felt it necessary to use "E" arch and headcap for retention in the maxillary arch. I use this retention in all severe Class II Division I cases and find that occlusion settles much better and faster than with the Hawley retainer. This I believe is due to better function which is possible when no removable retainers are worn. The patients seem to prefer wearing the headcap at night, to the Hawley retainer full time.

FIG. 24. Shows front and lateral view of headcap as used in these cases.

TECHNIQUE

The bands placed on the molars for "E" arch treatment must be heavier than those ordinarily used and at the present time I am using band material 5/32" width and .006" in thickness. On the buccal surface of these bands gold platinum tubes are soldered to engage the "E" arch. The "E" arch is made of .045 round stainless steel with .020 round gold hooks just distal to the central incisors. This arch must be very rigid and the hooks placed so that the wires from the headcap do not irritate the corners of the mouth. The hooks on the headcap are made of .050 stainless steel with elastic traction operating from hooks sewed on the headcap. Very light tension is placed on these hooks. Stops are soldered on the "E" arch just anterior to the tubes on the molar bands. If the maxillary incisors have open contacts and a severe labial inclination these stops are moved forward about 1½ m.m. every six to eight weeks until contact is closed. This permits the arch to rest against these teeth to tip them lingually. If the maxillary incisors are in good relationship and axial inclination and only distal movement of the buccal teeth is desired, the stops are placed so as to keep the "E" arch about three millimeters labially from the maxillary incisors.

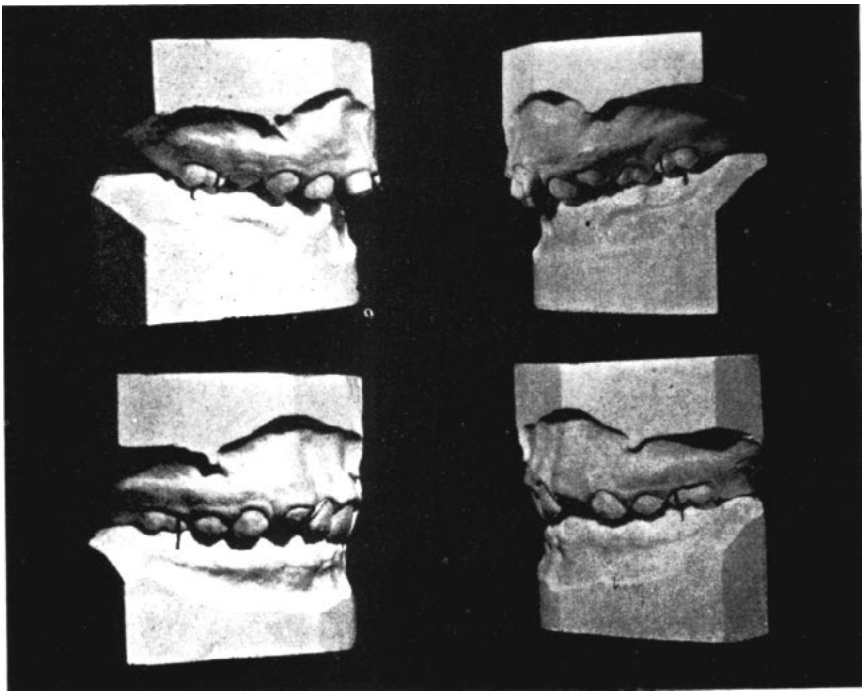

FIG. 25. Upper models are right and left views of a ten year old girl with a typical Class II Division 2 tooth relationship. A study of normal mandibular rest positions revealed that she did not have a typical Class II Division 2 jaw relationship, but rather a distal locking of the mandible. A palatal bite plane was placed and the lower models show right and left view eight months later. No other appliance was worn during the time.

The work on mandibular position presented to the profession by Dr. Thompson is another scientific contribution which, if applied clinically, will prevent severe ma'occlusions in many cases. The correct clinical application of this scientific knowledge will reduce treatment time and in many cases eliminate bands and complicated appliances.

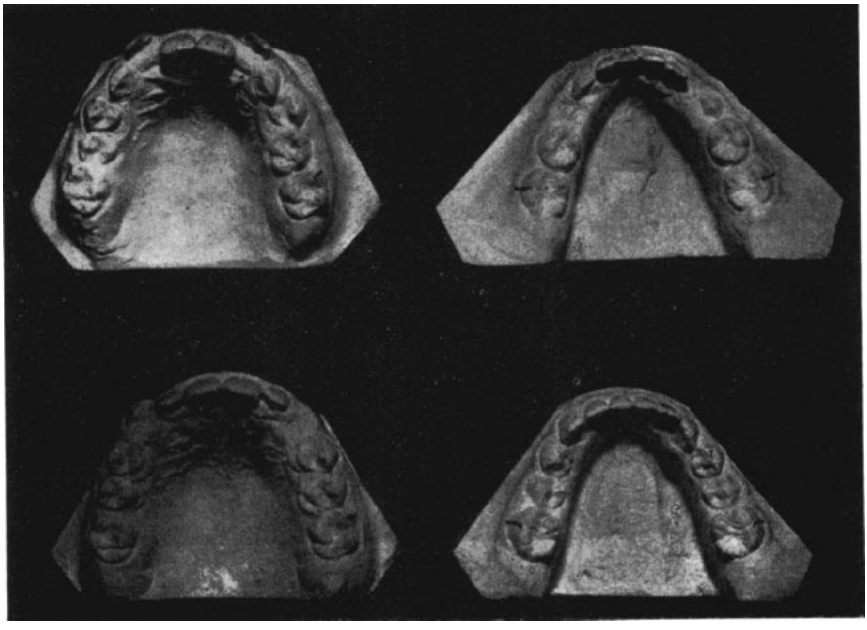

FIG. 26. Upper models show occlusual view before and lower models after.

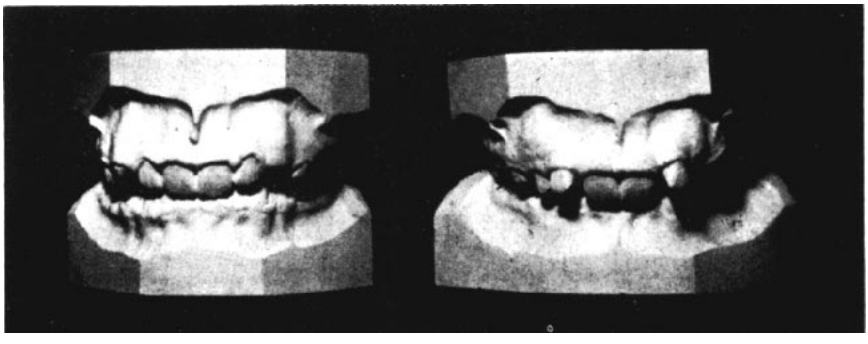

FIG. 27. Front view of same patient before wearing bite plane and eight months later.

FIG. 28. Front and lateral photographs taken after. The photograph records taken before are missing. This patient will need a little further help; the deep overbite of the incisors needs more correction, and the maxillary canines are erupting slightly labially.

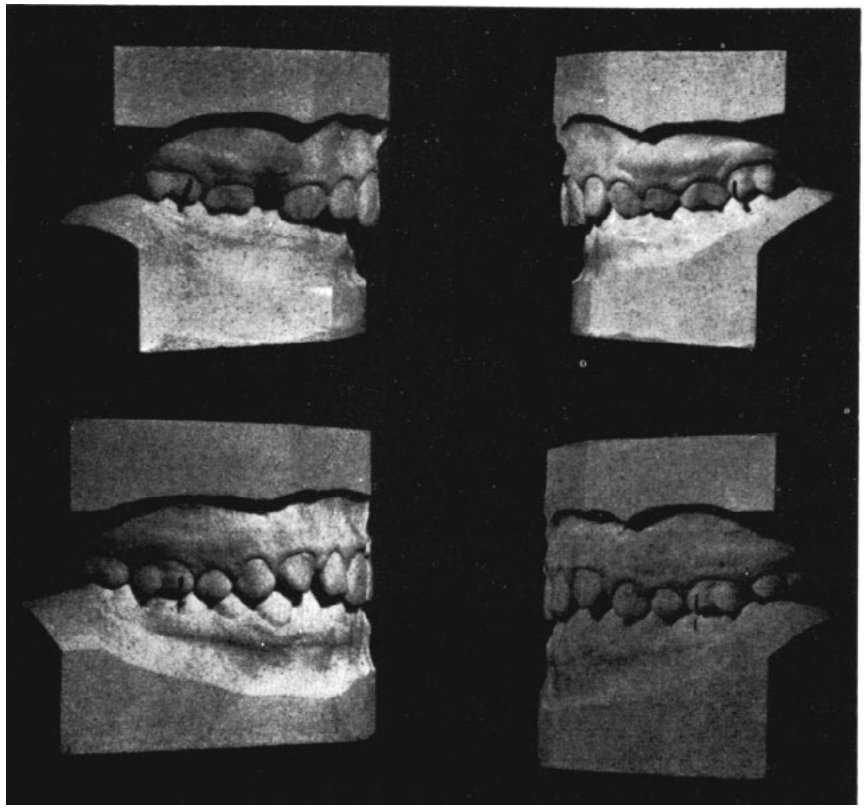

FIG. 29. Upper right and left views of a Class I case with a deep overbite of a nine year old patient. A palatal bite plane with a Hawley wire was placed to unlock the occlusion and to permit better alveolar growth.

Models below were taken two years later. There has been good growth with fair occlusion. The maxillary canines have not erupted to their full clinical crown length but there is sufficient space and they are in good relationship to the adjoining teeth. The overbite has not been corrected sufficiently which was an error on my part. At the present time I am placing incisal hooks on the Hawley wire which will be discussed later.

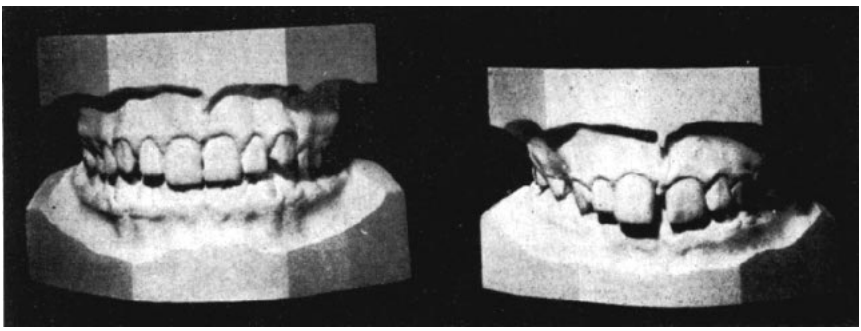

FIG. 30. Front views of models before and after.

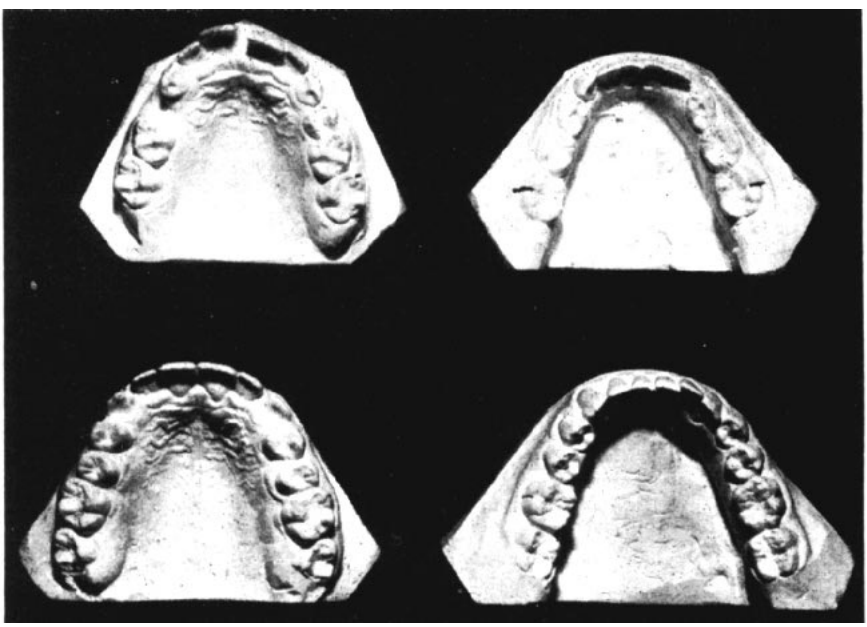

FIG. 31. Upper models occlusal view before wearing bite place. Lower models occlusal view taken two years later.

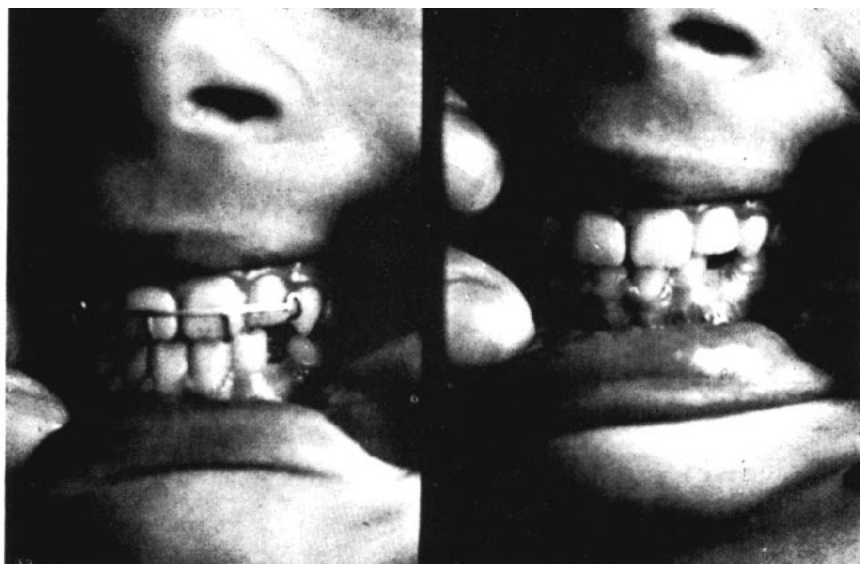

FIG. 32. Right view of Hawley bite plane with incisal hooks. Left view same patient without bite plane. Incisal hooks are used when and where depression of incisors is desired. In this particular case, the central incisors had erupted about 1½ millimeters more than the lateral incisors, so no hooks were placed on the laterals. We are retarding the eruption of the maxillary central incisors and mandibular incisors while encouraging faster alveolar growth and eruption of the remainder teeth.

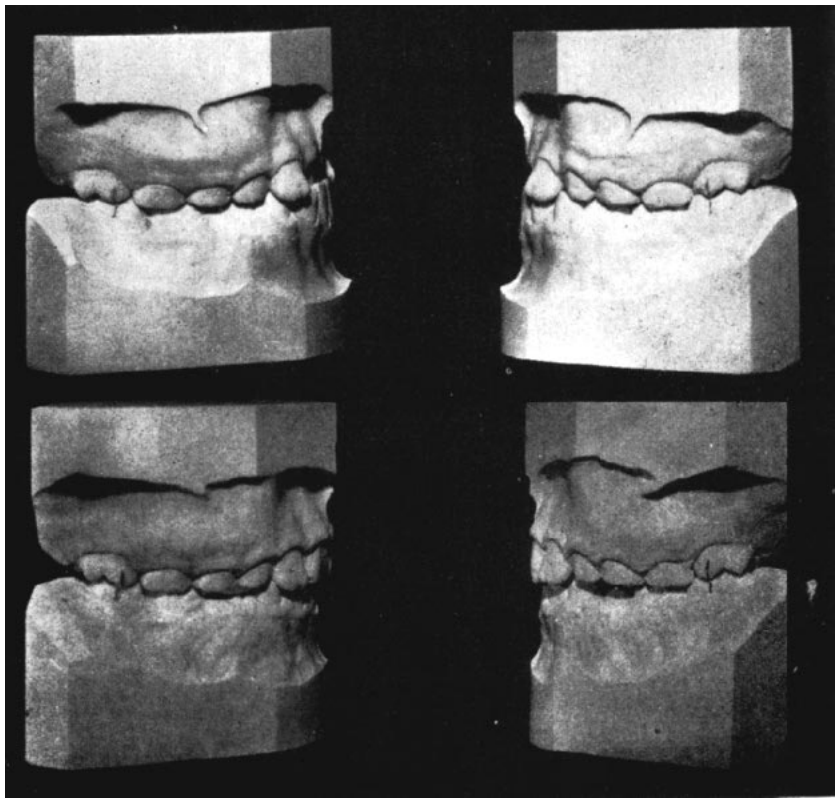

FIG. 33. This is a Class I case with lingually locked central incisors of a nine year old patient. Upper models show right and left buccal occlusion which is normal. Lower models shows same view two months later.

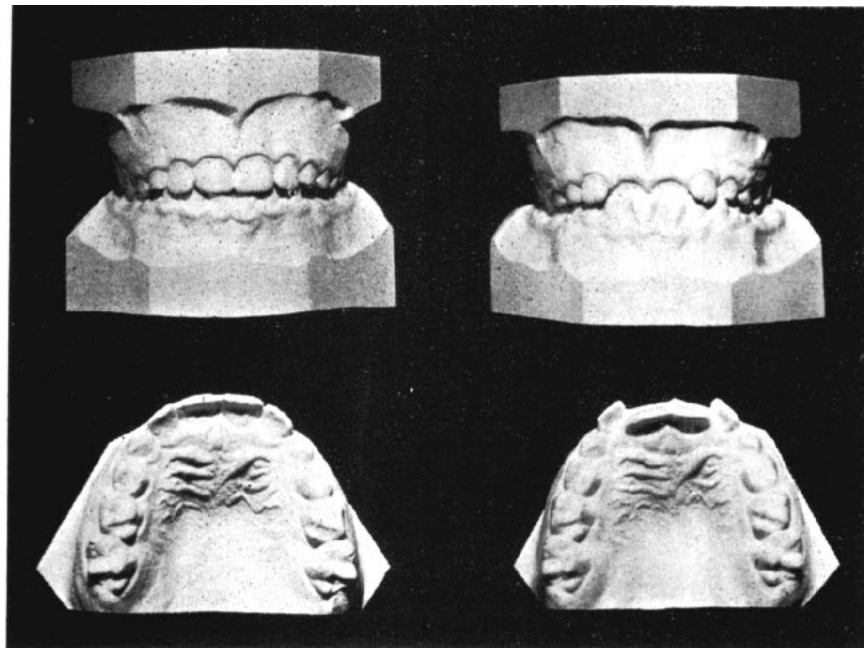

FIG. 34. Upper models are front views before and after correction. Lower models show occlusal view of maxillary models before and after correction. Mandibular teeth were in good relationship to their base and to each other. This case was corrected by the use of an acrylic splint cemented on the lower incisors with a plane engaging the lingual of the upper incisors.

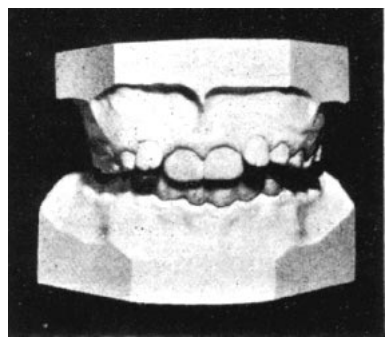

FIG. 35. Models with an acrylic splint on lowers. In severe cases such as this the bite usually opens by over-eruption of the buccal teeth. When the splint was removed a palatal retainer was placed with incisal hooks over the lateral incisors which was worn until the bite closed. The use of the palatal retainer is not necessary in all cases. The age, severity of the interlocking, and position of the maxillary lateral incisors are the determining factors.

SUMMARY AND CONCLUSION

1. If we are to profit from the work of our scientific research, let us be guided in our clinical work by the conclusion these men give us.

2. Cephalometric findings have proven that orthodontic correction of malocclusion does not alter the growth pattern of the maxillary, mandibular, or any of the facial bones. Neither does normal function change the rate of growth or pattern of these bones.

3. Change of position of the teeth influences change of the alveolar process.

4. It appears that alveolar growth and eruption of teeth can be guided and if this is done at an early age, better facial balance will be obtained. The severity of the malocclusion can be reduced by guiding alveolar growth and eruption of the teeth. Treatment is easier and treatment time can be reduced.

5. It is my belief that arch length in the mandibular arch can be increased in many cases, as well as in the maxillary arch. If, however, arch length is increased in the mandibular arch, failure is certain to follow when these mandibular teeth are used for intermaxillary anchorage.

6. If extraction of teeth is necessary in some individual cases, let us use the forceps with a reluctant attitude, thereby increasing our hope and efforts toward finding methods of guiding growth and eruption to maintain a full complement of teeth in harmony and balance.

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