

Treatment of Class II Division I Malocclusion*

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SINCE a correct plan of treatment depends on a proper diagnosis, we must first determine what Class II Division I malocclusion is held to be. Dr. Angle introduced his classification in 1899, and at that time he stated Class II malocclusion is that form in which the mandibular arch is distal in relation to that of the maxilla, as indicated by the six-year molars.

The maxillary six-year molar, first called the keystone of the dental arch by Angell in 1860, was chosen as the key to occlusion. A great controversy and a good deal of misunderstanding arose over Angle's choice of this tooth as the basis for his classification. It was not until seven years later in 1906, that Angle published his paper on "The Upper First Molar as a Basis of Diagnosis in Orthodontia."¹ In the interim he had rechecked every step to prove his contention that the maxillary first molar, while not fixed wherever found, was the most constant dental point. But the impression still existed that Angle believed this tooth was a fixed point.

Dr. Grunberg, who translated the 7th edition into German, received from Dr. Angle permission to include in the translation an explanation of the use of the six-year molar in diagnosis. He says, "For the establishment of the relationship we do not possess any other anatomical landmark than the teeth. These will serve as a safe guide provided we consider that each tooth bears a normal mesiodistal relation to its respective jaw. This will prove correct almost without exception in all cases where the presence of the teeth and their arrangement entitle us to conclude that no movement of a pathological nature of the buccal teeth has taken place in a mesiodistal direction."

This is illustrated in those cases where the bicuspid and molars have drifted mesially in the upper arch only, as indicated by breaks at the contacts of the canines. Examination reveals a Class II relation of the molars. Mentally reconstructing the position these teeth would have occupied had this not occurred, we find we have a Class I case.

More recently, Angle's contention with respect to the six-year molar and mandibular relationship has been supported by scientific investigation on Class II malocclusion. Oppenheim¹⁰ found the anomaly to be located in the mandible, and reported this from observations made on Eurasian skulls from various European museums. He made a second investigation on East Indian and Negro skulls, to determine whether or not the conclusions reached regarding Caucasians would hold for other races. The findings were strikingly similar.

Hellman,⁸ in similar investigations, arrived at the same conclusions; namely, that in Class II malocclusion, the face was smaller in all dimensions, the mandible being the most affected.

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Now if we trace the various methods employed in the treatment of these cases we find a strong effort to make it conform to the above conceptions. Prior to the introduction of the classification, we note that Angle advocated



Fig. 1-A.—Photographs of the case CY models of which are shown in Fig. 1-B.

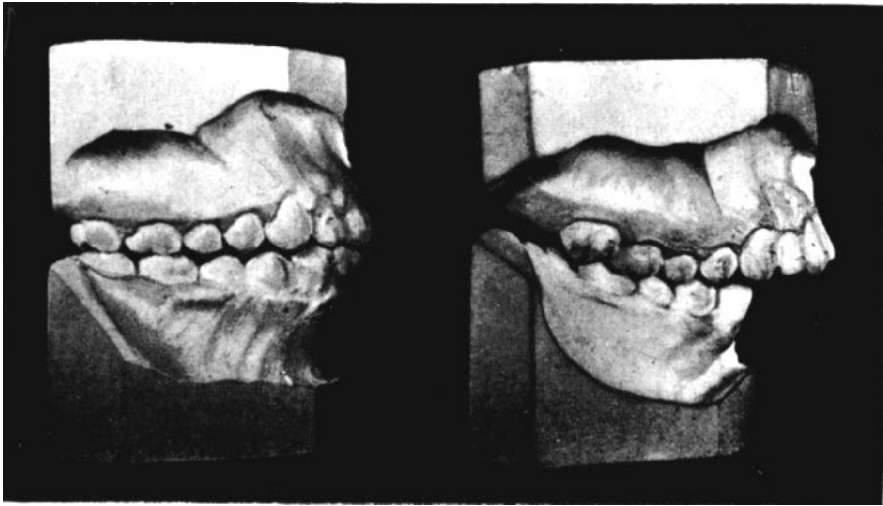


Fig. 1-B.—Models showing case CY at the beginning of treatment and at the completion of retention period.

the extraction of the maxillary first premolars on the empirical basis of esthetics alone. Then came the classification with its insistence on normal occlusion. Kingsley's jumping of the bite answered the theoretical need perfectly, but proved of little value, since the mandible was found to slide back eventually to its former position. Angle then advised the tipping of the teeth in both

arches, the upper backward and the lower forward to establish normal inclined plane relationships. This proved unsuccessful since the upper teeth tended to straighten up while the lowers continued to lean, and frequent relapses resulted.

Finally Angle advocated tipping the maxillary teeth back the entire distance to normal occlusal relationship, but he recognized that this was a compromise. In 1906,¹ in a paper on the six-year molar, he says, "Now why should we move the upper molars distally if they are in their normal positions in these cases? Simply to do the best we can to strike a balance between the normal

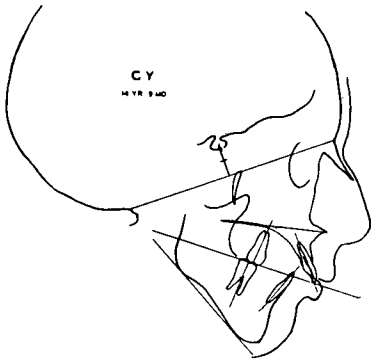


Fig. 2.—Cephalometric tracing of case CY shown in Figs. 1-A and 1-B at the beginning of treatment.

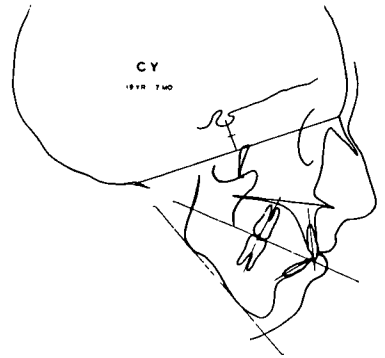


Fig. 3.—Cephalometric tracing of case CY at the completion of retention period.

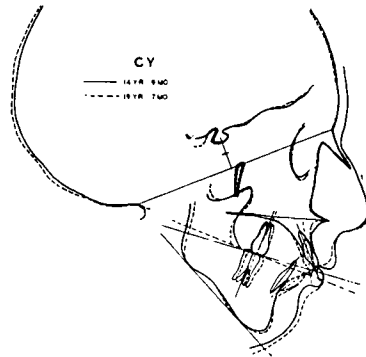


Fig. 4.—A composite of cephalometric tracings shown in Figs. 2 and 3.

in the upper and the abnormal in the lower. If it were practical to 'jump the bite' instead of the occlusion only, we would in every case of this kind that I have ever seen come the nearest to the ideal in establishing facial requirements, but we now know, at least some of us think we do, that what really does take place when we 'jump the bite' and maintain the normal locking of the cusps long enough for this occlusion to become permanent, is that in reality the mandible gradually slides back to its original, or approximately original position, and relation with the skull, the crowns of the upper teeth having been

tipped more or less distally, while those of the lower jaw have been tipped mesially, so that in reality we have accomplished, after many months of difficult retention, merely the jumping of the occlusion, or what we now aim to accomplish and do accomplish easily in a few weeks by the Baker anchorage. Yet this is not the ideal but is the best we can probably do; hence the importance of jumping the occlusion as early as possible, hoping and believing that the normal relations of the teeth will stimulate and tend toward the normal growth of the mandible, and this principle and result will hold good quite as well in the third class as in the second. Here is a statement which may surprise you. I have yet to see one of these cases where we did move the upper molars distally, together with the teeth anterior to them, that it did not show proportionately detrimentally in the contour of the upper lip, yet the compromise, as I have said, with the lower is the best we can ever do."

The actual objectives of Angle's treatment have not changed since 1907, but we have seen the development of better means to accomplish our objectives. First, came the E arch and ligatures which served chiefly to tip the maxillary six-year molars distally. The bicuspid were then moved distally by ligatures, then the cuspids, and finally the incisors were tipped lingually, using the arch and intermaxillary elastics. This employed simple anchorage. Next came the pin and tube which added the possibility of the use of the incisors as additional anchorage in moving the maxillary six-year molars distally.

Following this came the ribbon arch which gave us torque force, and the use of the bracket for stationary anchorage on the anterior teeth, to drive the maxillary molar back employing screw force. Finally the edgewise arch mechanism was introduced, and its outstanding characteristic was the use of an ideal arch performed for the individual case. In addition all the teeth were banded, giving control over bicuspid as well as over the other teeth, and for the first time we had a means of moving an entire arch simultaneously in a distal or mesial direction. Furthermore, the maximum of intraoral stationary anchorage could be obtained. Each of these succeeding appliances has given additional control over details and each has reduced the time of treatment.

Turning now to the subject proper I should like to show a few cases of the Class II Division I type treated mainly with the edgewise arch according to the foregoing principles. I believe certain problems require some modifications and these will be discussed as they occur. It will not be necessary to go into any detailed discussion of the edgewise arch mechanism since this has been ably described in the literature by Angle,³ Brodie,⁶⁻⁷ Wright¹¹ and others. I do wish to show several specific cases, and point out the methods of application in each case, the results obtained, and an analysis of those results.

A typical Class II Division I malocclusion at about 12 years of age is treated in the accepted manner, but I wish to stress a number of points, neglect of which may lead to failure of proper completion. Bracket bands are placed on all the teeth except the six-year molars, which receive bands carrying a tiny rectangular tube to fit an .022 x .028 arch wire. Ideal arches to suit the particular case are placed and ligated. Treatment first consists of gaining bracket control, particularly of the buccal teeth in the upper arch in order to allow institution of second order bends. In the lower arch the same effort is directed toward the obtaining of stationary anchorage.

I prefer to get the teeth in as nearly a normal arch form as possible before using intermaxillary elastics, even though this may involve the loss of a slight amount of anchorage. This means correction of major rotations to insure correct contact points and arch length and bracket control of all the teeth so as to be able to lock them together as a mass unit. Badly broken contacts mean shorter arch length in the mandible, which condition will not only be aggravated by the pull forward exerted by elastics, but will also prevent the establishing of a correct intercusping between the maxillary and mandibular teeth. Finally, it is necessary to establish a correct curve of Spee, which in most Class II cases is found to be excessive in the mandible.

Many of these apparent details can be corrected after the maxillary

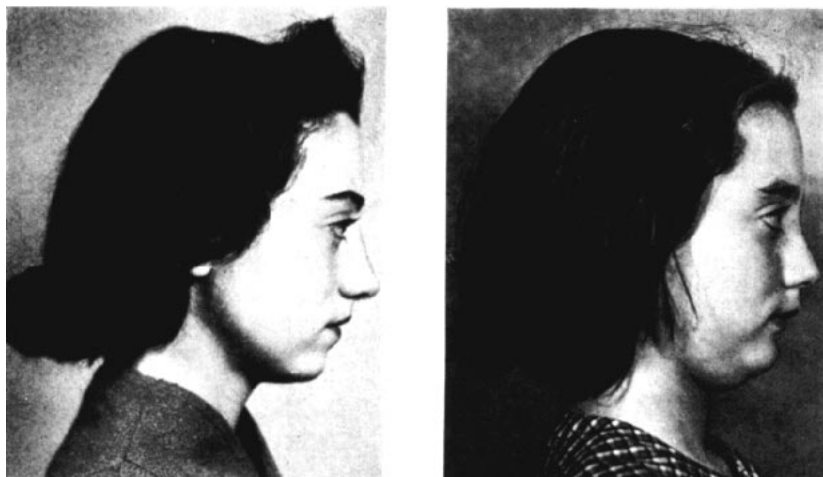


Fig. 5-A.—Photographs of case CD models of which are shown in Fig. 5-B.

teeth have been moved distally; but the backlash of tissue, and the effort to hold the new mesiodistal relation, have often resulted in protracted treatment due to an attempt to effect tooth movement in too many directions simultaneously. The normal tissue response is then lost and slight relapses may occur more readily.

Having obtained stationary anchorage in the lower arch and bracket control in the upper arch, second order bends, to effect the distal movement of the maxillary teeth, are placed in the maxillary arch wire. The arch is tied in and intermaxillary elastics are worn.

A few precautionary measures should be observed here, namely: 1. The arch must be free to move with the teeth. This means that there is no locking of teeth anywhere. 2. Depression bends must be placed in the incisor segment of the arch distal to the laterals. This aids in the smoother and more rapid operation of the second order bends. 3. Expansion in the buccal segments must be slightly increased in the upper arch, in order to maintain a correct buccolingual relation as the maxillary teeth travel backward over the diverging buccal segments of the lower arch.

A correct curve of Spee in the lower arch is necessary because if the lower

incisors are in supra-occlusion they will interfere with the lingual movement of the maxillary incisors as these teeth move backward; halting the normal functioning of the second order bends in the buccal teeth.

The maxillary teeth are carried to an over-treated mesiodistal relation. The occlusion at this point is not left "hanging in air"; adjustments are made to lock the buccal teeth in a final close intercusing. This may be done either by gradually decreasing the second order bends while wearing elastics, or by elongation bends, especially on the bicuspid.

Often the upper arch wire is removed and the teeth allowed to settle freely for from six to eight weeks. Very frequently the teeth will settle without any further treatment in exactly the right manner. This is probably due to

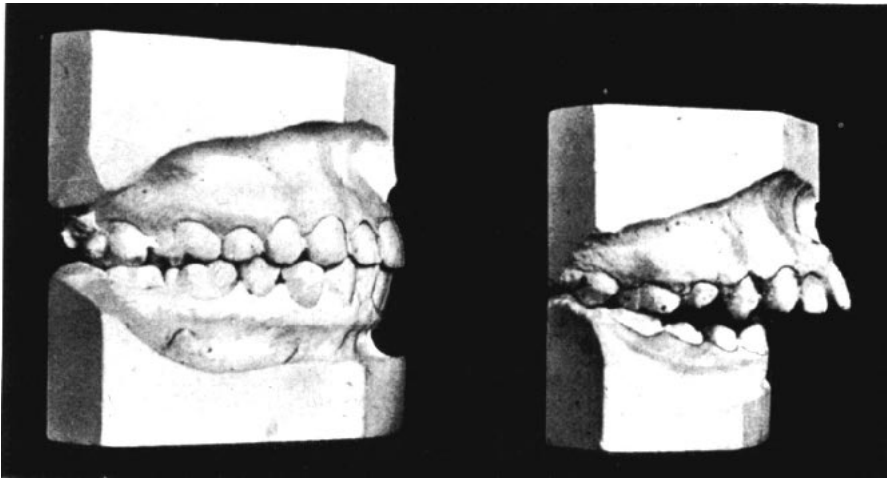


Fig. 5-B.—Models of case CD at the beginning of treatment and at completion of retention period.

the forces of the inclined planes, literally driving the teeth to their correct positions, and bring about the straightening of the roots in a normal manner. This is where a complete lower arch form proves of value. The upper arch can mold itself around the lower.

Should the upper teeth settle without any further treatment, retention may then be placed. Should further treatment be necessary, a new ideal arch is made, placed and allowed to operate without adjustment for three or four weeks. The response at this time will often prove to be amazing. It seems as if the few weeks' respite has permitted the tissues to literally catch their second wind and they respond as if inspired. This procedure has frequently shortened the active treatment period by the amount of time that would have been spent attempting to mechanically correct many details.

The above should not be taken as a universal or invariable treatment, but one that can often be used to advantage. If any details remain to be completed in the lower arch, they should be taken care of as quickly as possible and the lower arch may then be retained.

Case CY-Fig. 1 is one of an older patient in which the age at beginning

of treatment was 14 years 9 months. This case was complicated with a mesial drift of both lower buccal segments from the cuspids posteriorly. Treatment differed from that described above in that the lower teeth from the first bicuspids forward were used as a means of anchorage to move the lower pos-

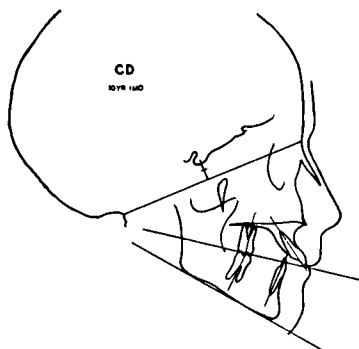


Fig. 6.—Cephalometric tracing of case CD, shown in Figs. 5-A and 5-B, at beginning of treatment.

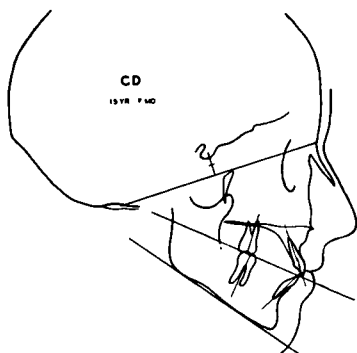


Fig. 7.—Cephalometric tracing of case CD at completion of retention period.

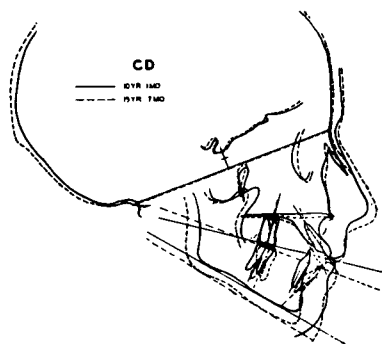


Fig. 8.—A composite of cephalometric tracings shown in Figs. 6 and 7.

teriors distally, employing spring loops. When sufficient space was opened the first bicuspids and the cuspids were moved distally to gain an ideal arch form and the case was thus retained for eight months. At the end of this retention period the case was treated as a typical Class II Division I malocclusion.

Figs. 1-4: The results here readily reveal that changes were confined chiefly to the alveolar process and that the body of the mandible is practically as it was at the beginning of treatment.

In Case CD treatment was begun in a late mixed dentition. (Fig. 5.) The first x-ray picture was taken at ten years, one month (Fig. 6), and the decided distal position of the mandible, as well as the marked protrusion of the upper incisors, is apparent.

Second order bends were placed in the upper arch and Class II inter-

maxillary elastics were worn for about eight months. Some time was then lost in waiting for additional permanent teeth to erupt. At the end of the first period of treatment, there was a definite change in the anterior teeth, a reduction in their protrusion which seems to have been accomplished by a tipping of the incisors. Treatment was again instituted with the completion of the adult denture and was carried on with indifferent response for nearly 18 months. Elastics were worn for about 12 months of this period, either with second order bends or as a straight pull to retract the incisors. The tracing in Fig. 7 was made five and one-half years after the first tracing (Fig. 6), and shows a successful clinical result.

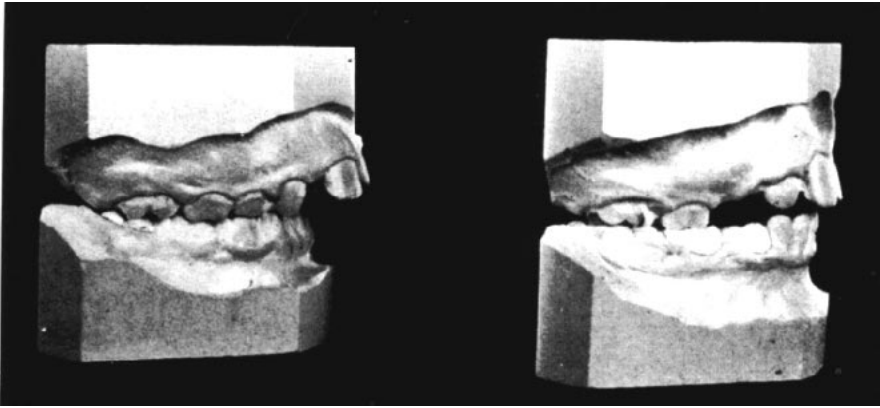


Fig. 9-A.—Lateral view of models of case CM, original (left) and seven months later (right).

The composite of the first and last pictures (Fig. 8) reveals the following: There has been a marked change both in the alveolar process and the body of the mandible. The changes seen in the mandible cannot be attributed only to treatment, however, since they occurred during a growth period.

This case was started in a late mixed denture and required a good deal of time until completion. This was due to the fact that it was not possible to have control of the bicuspid and cuspid, especially the uppers. To have attempted to move the entire maxillary arch distally might introduce the possibility of crowding or impacting the canines. This in itself would add time and effort in unraveling a new malocclusion. Treatment was begun in this case about six years ago, and at present I employ a different procedure.

This method is illustrated in Case CM. Here we have a full Class II Division I malocclusion (Figs. 9-10), with all the associated factors, such as protruding upper incisors and mouth breathing, yet I doubt whether the mouth breathing was the causative factor in this case, for by the time this first stage was completed the patient almost immediately corrected his breathing. Had the mouth-breathing been the causative factor, I question that correction would have been accomplished so soon.

Treatment consisted of banding the lower four permanent incisors with tie bracket bands. Clamp bands were placed on the lower six-year molars and

carried curvilinear sheaths for the ribbon arch. The arch was made up of an anterior segment of .022 x .028 wire edgewise, to the distal of the cuspids, and the posterior segments were ribbon arch threaded end-sections with friction-sleeve nuts. This was used to align the incisors, and provided anchorage against the pull of intermaxillary elastics.

In the upper arch clamp bands were placed on six-year molars, and straight sheaths for the round heavy "E" arch were soldered to the bands. No other bands were used, and the arch used was an Angle E arch which has an .045" diameter. This has threaded end-sections and carries friction-sleeve nuts to fit the respective tubes. The wire was shaped to conform to the general arch form, and was adjusted to lie opposite the gingival margins of the upper incisors when passive. Intermaxillary hooks were soldered opposite the deciduous cuspid areas. The arch was then advanced by turning the nuts at the six-year molars until it was labial to the incisors at least $\frac{1}{16}$ ". The lower arch was then tied in and Class II intermaxillary elastics were placed. The patient was seen about eight times in seven months when the result seen (Fig. 9) was obtained.

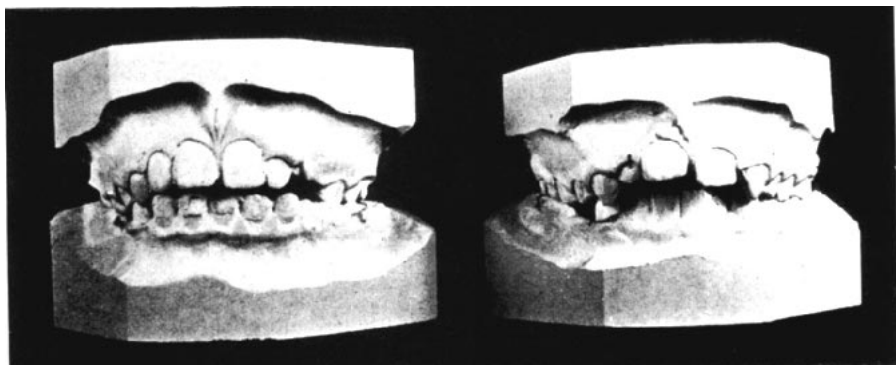


Fig. 9-B.—Front view of models of case CM, original (right) and seven months later (left).

I fully realize that one case proves nothing, but the changes that have occurred, namely, the establishing of a Class I relation of the dental arches, the stimulation in the anterior region permitting the eruption of the lateral incisors and the beginning of the establishment of normal functional forces, all justify the treatment instituted and warrant this procedure in similar cases. That the treatment to date in this case has brought about true changes is evidenced by the fact that the case has maintained its position.

The second model was taken in June, 1938 when the upper arch and elastics were removed. The third model was taken November 1—four months later, and I think it may indicate the permanency of the results. (Fig. 11.)

I think of another case of Class II Division I malocclusion in a complete deciduous denture, in which treatment was begun at age three years nine months. This case was treated in the accepted manner with the edgewise arch mechanism and was completed in ten months of active treatment. There was no history of thumb or finger sucking, but the case presented what I would

term a general lack of tonus. No retention was used at any time, but the patient was put on Wilson muscle exercises, with more or less indifferent success.

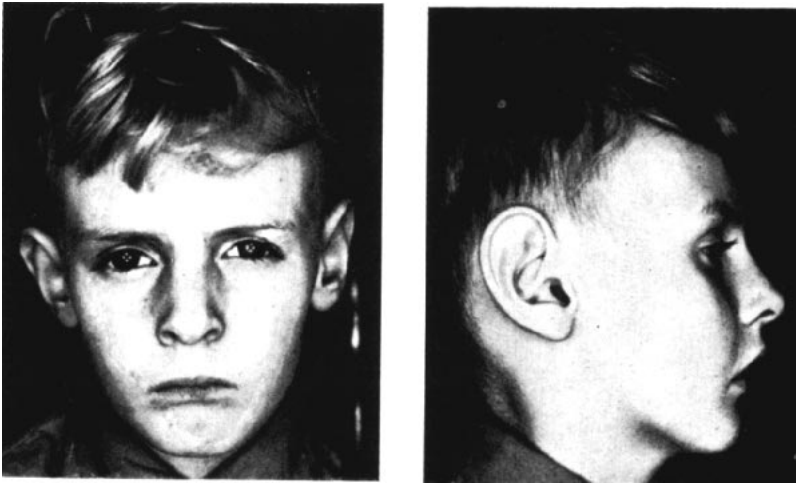


Fig. 10-A.—Original photographs of case CM.



Fig. 10-B.—Photographs of case SM after seven months of treatment.

Previous experience with cases similar to that just described seems to lead to the conclusion that treatment will again be necessary at some future time. This seems to be borne out in this particular case as evidenced by an examination of the case at seven and one-half years of age. At this stage it presents much the same picture as the original, especially in the incisor region. However, the right six-year molars are locked in correct mesiodistal relation, although the left side is not quite as good, presenting a cusp to cusp relationship.

Was treatment warranted in this case? I believe it was for the following reasons: 1. Some definite improvement in the mesiodistal relationship of the dental arches was gained. 2. It presented a lack of balance which interfered with normal function and with facial esthetics. 3. Normal mastication was impaired and the face might have been damaged to the extent that later treatment would not have entirely overcome the damage. Early treatment tends to bring about the restoration of the balance of forces more rapidly.

In analyzing the foregoing certain conclusions appear to be justified. Our present-day concepts, as revealed by cephalometric research, indicate that Class II cases do not appear to correct themselves. This has been further borne out by other investigators such as Broadbent,⁴⁻⁵ Lewis⁹ and Hellman⁸ who have studied large groups of children over a period of time.

Regardless of etiology, about which we know less now than we thought we did ten years ago, the Class II condition seems to remain constant, and grows at a normal rate. The discrepancy between mandibular and maxillary growth

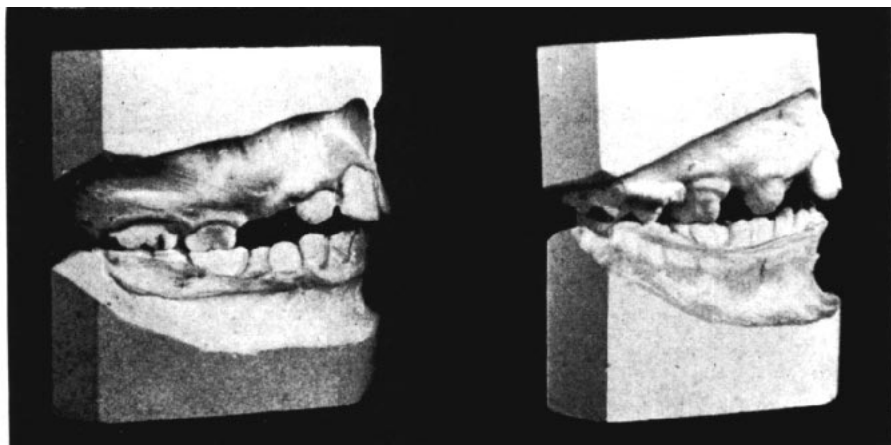


Fig. 11.—Models of case CM when upper arch and elastics were removed (right) and four months later (left).

is a scar of early development that is never eliminated. If we re-establish normal intra-oral relations at an early age we in no wise affect the absolute growth ratio, but we do allow a more complete smoothing-away of the signs of the disturbance.

Cephalometric research reveals the following results in the treatment of Class II cases¹²:

1. Distal movement of the maxillary teeth can be accomplished, but what apparently happens in most cases is a retardation of the normal, forward movement of the maxillary teeth, while the mandibular teeth are encouraged to move forward.

2. The forward movement of the denture is strongly evidenced by the fact that, although moved distally, the upper molar at the end of treatment is, in most cases, farther forward than at the beginning of treatment.

3. The lower molars show a still more decided tendency to come forward.

4. The changes induced by tooth movement appear to be restricted to the alveolar process.

5. The disturbances of the angulation of individual teeth and of the occlusal plane induced by treatment show a tendency toward recovery. This tendency diminishes as age advances.

6. The treatment of Class II cases in the adult denture involves the response of the supporting tissues only, since there is a slowing up of growth processes.

7. It appears to be better to treat these cases early rather than to subject the patient to treatment in the adult denture; late treatment usually ends in an abnormal position as related to development, with the musculature unbalanced and a lingering doubt as to the permanency of the case even after long retention.

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