Case Report

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The Class II, Division I, malocclusion here reported was treated by the author while a student in the Department of Graduate Orthodontia, University of Illinois.

History of patient. This large boned, healthy, intelligent girl was 11 years old when treatment was begun. Delivered normally at the end of an uneventful nine months pregnancy, her weight was 7 pounds 4 ounces, and her condition normal. She was breast fed for one year, and was a very rapid nurser. She soon exhausted the mother's insufficient supply of milk, and steadily refused the bottle. As a result she was quite undernourished for about one year. She began sucking her thumb soon after birth, and the habit persisted until the age of three.

In childhood a well balanced diet was prepared for her, but she was very hard to feed until about three years of age. She was quite ready to take sweets, but was made to eat her vegetables first. She was given codliver oil, orange juice and tomato juice. Her growth was retarded until she was about three, but accelerated after the age of six.

There is nothing in the family history which seems to bear on this case. Both the health and occlusion of the other members of the family are good and there is no history of abnormal frenum.

Her disease history revealed that she had measles and chicken pox at the age of 5 and mumps at 7. She had an abscessed ear at the age of 8. The mother stated that none of these conditions had been of a serious nature. Because of mouth breathing and frequent colds her tonsils and adenoids were removed at the age of 6. She has had no accidents.

The child was 4 feet 11 inches tall and weighed between 95 and 100 pounds when treatment was begun. Her posture was fairly good.

Dental and orthodontic physical examination. The face and cranium were ovoid in shape. The musculature was hypotonic, the upper lip non-functional, the lower heavy and functional. The mentalis muscle was well developed. The tongue was normal in size and was usually in its normal position, though occasionally it rested between the teeth. The frontal cephalometric x-ray showed no apparent abnormality in these dimensions. The lateral view showed the mandible distal to normal in relation to the maxilla. Although the upper incisors protruded, the maxilla seemed to need some

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Fig. 1

Full face and profile of patient before (above) and immediately after (below) treatment.

development and the mandible was not noticeably underdeveloped. Intraoral x-rays showed a full complement of permanent teeth with no abnormalities. The intermaxillary suture was open. The models showed a permanent

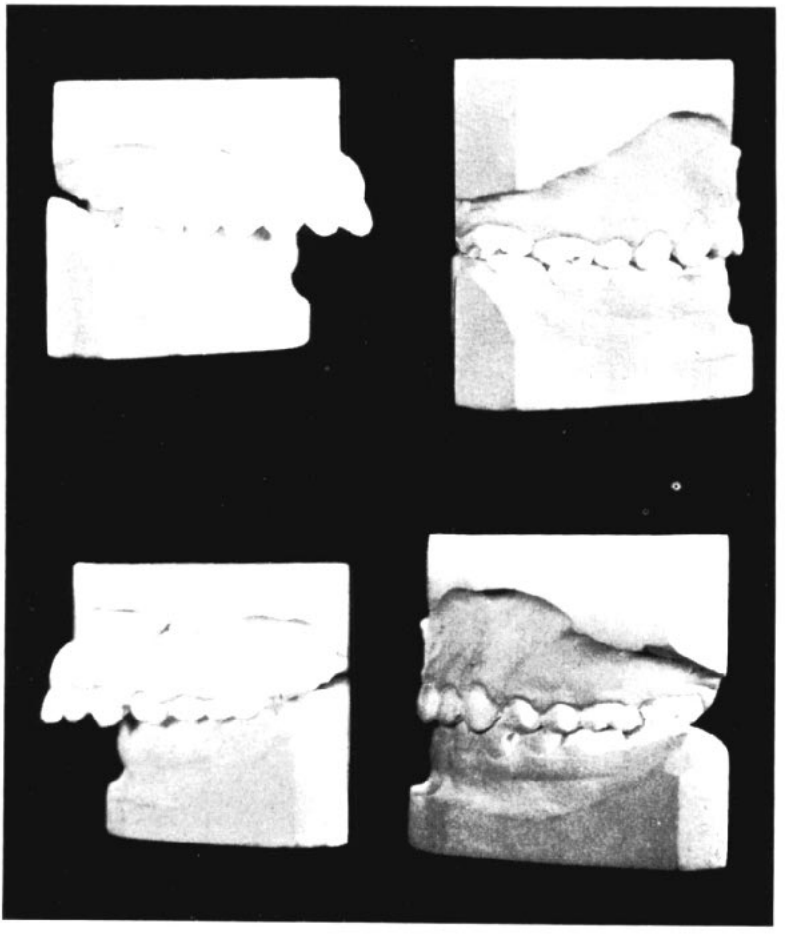

Fig. 2

Right and left view of models before and after treatment.

dentition, ovoid in type with no abnormalities in size or form of the teeth. The arches, viewed separately, looked fairly well developed except that the upper lacked canine width and was peaked in the incisal region. The upper

incisors fanned out and the centrals were separated by a space of 1/8 inch. An unusually thick superior labial frenum was attached low labially and extended on to the palate. The occluded models showed the lower arch a full tooth distal to normal in relation to the upper, the overjet amounting to fully 1/2 inch. The occlusion was indifferent, *i.e.*, the teeth were not thoroughly interdigitated, the actual occlusion being far more indifferent than would be indicated by the models. The midline coincided with that of the face in both mandible and maxilla. The teeth were free of active caries, and there were occlusal restorations only in the first permanent molars.

Case analysis. Mouth breathing beginning at an early age was probably one of the primary etiological factors in the case. The persistent thumb sucking may have aggravated the condition. Lack of restraint of the labial musculature allowed the upper incisor crowns to tip labially. The lower lip soon caught behind the upper incisors and added active pressure from the lingual. It is likely that the protrusion existed in the deciduous denture, although the molar relation may have been correct until the time the permanent molars erupted. No doubt the erupting permanent molars met in a Class II relation and after that the resulting abnormal forces held the mandibular denture distally instead of allowing it to develop forward with the maxilla. Although the tonsils and adenoids were removed at the age of six, the mouth breathing habit was not corrected at that time and the protrusion of the upper incisors progressed, making normal lip function impossible. When the patient applied for treatment, she breathed through her nose a large part of the time, covering her teeth by means of a contraction of the mentalis muscle and a drawing up of the lower lip, the functionless upper playing an entirely passive role.

Outline of objectives. Our objectives were, (a) to remold the upper arch, developing canine width and flattening the incisor segment, (b) to develop the alveolar base in the lower and move the whole arch forward into proper occlusion with the upper, (c) to substitute normal breathing habits for mouth breathing, and (d) to develop a normally functional upper lip.

Our ultimate objective was to move the mandibular arch and base forward. To accomplish this we desired to move the maxillary teeth distally into correct relation with the lowers so as to allow function to carry the whole denture forward into its proper relation to the cranium. This distal movement of the maxillary teeth we believe to be attainable, as well as the expansion in the canine region and the lingual tipping of the incisor crowns.

Outline of Means of Obtaining This Tooth Movement

(a) *Mechanics.* Every tooth was banded back to and including the first molars. Tie bracket bands (No. G447 above, No. G457 below) were placed on all teeth except the first molars which carried clamp bands with tiny rectangular tubes. Ideal arches were formed of rectangular gold and platinum wire (0.022 x 0.028) according to the size of the teeth and estimated form of the arches. The upper arch was tied in two weeks after the lower. Bracket control having been obtained in both arches, second order bends were placed in the upper arch to tip the buccal teeth distally and to depress and tip the incisors lingually, intermaxillary hooks soldered mesial to the canines, and the arch tied in with instructions to wear intermaxillary elastics (1¼" loops) from the hooks on the upper to the distal ends of the lower arch. Four or five weeks were lost because the patient did not cooperate in wearing the elastics constantly, and no appreciable movement was observed until the end of two months. The bends were increased once, and at the end of four weeks following this adjustment the buccal teeth were in correct mesiodistal relation and the bends were removed. The upper anteriors needed further depression and lingual crown movement. Two weeks later the bands were removed from the upper bicuspids and they were allowed to settle while straight intermaxillary force was used to close the spaces mesial and distal to the upper laterals, the space between the centrals having been closed by tying them together with a figure 8, alternating the knot each time to prevent rotating one tooth excessively.

The remaining mechanical treatment involved the buccal movement of the lower left first bicuspid which, due to the operator's lack of observation, had been allowed to lock lingually to the upper bicuspid during treatment. After attempting to accomplish this correction by expansion and buccal crown torque, the desired result was finally obtained by placing a buccal step bend in the lower arch. Meanwhile the intermaxillary elastics were worn at night only to hold the upper teeth in their corrected positions.

The upper arch was removed a year after its initial application. At this time the case was overtreated both in respect to distal movement of the teeth and expansion in the canine region. The overcorrection was soon reduced with function after the teeth were released from the appliance, and after observing the case for two months more, the lower appliance was removed and the lower arch retained. One month later, and fifteen months after treatment was begun, the upper was retained.

(b) *Myo-functional therapy.* As soon as the protrusion had been reduced sufficiently to make normal lip function possible, muscle exercises were prescribed to develop the upper lip. While it was not believed that muscle

therapy would aid in the tooth movement desired, we were preparing for the ultimate retention of the case which we think depends chiefly upon normal muscular balance. The exercises were (1) with the teeth in occlu-

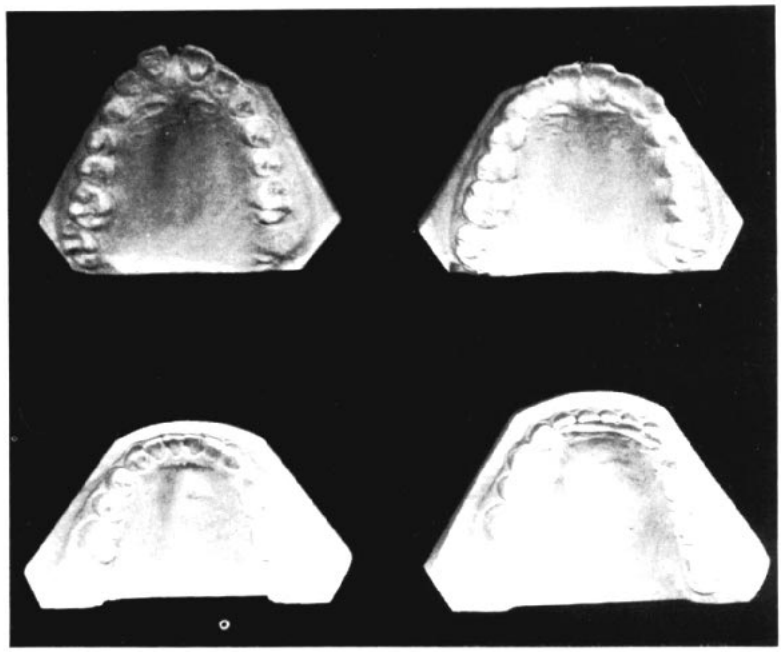

Fig. 3

Occlusal view of models before and after treatment.

sion and the lips closed bring the right corner of the mouth as far to the right as possible, inhale deeply, exhale; then bring the left corner of the mouth as far to the left as possible, inhale and exhale. (2) Holding the mandible and lower lip immobile with the fingers of one hand, bring the upper lip as far down as possible. The patient was directed to perform these exercises for at least three periods daily until a marked tingling was felt in the lips.

(c) The psychological approach to this problem involved an effort to secure the interest and coperation of the patient in labial muscular development by explaining the reasons for its importance.

Outline of retention. Our objectives were to provide mechanical support for the teeth while their supporting tissues became modified in structure

and function to meet their new requirements. This modification involves the establishment of normal muscular balance and the mutual support of the inclined planes of the teeth in function.

The mechanical support was provided in the mandibular arch by a cuspid-to-cuspid retainer with a lingual "G" wire used for one year. A thin cast metal palate with a wire labial to the six anterior teeth was used in the upper arch, but was worn only three and one-half months.

The establishment and continuance of normal muscular balance involved the continued performance of the two exercises described under treatment. An additional exercise (powerfully contracting the masseter and temporal muscles with the teeth firmly closed) was prescribed to secure the mutual support of the inclined planes of the teeth.

The psychological aspect of retention rests on an understanding and an active interest on the part of the patient in the establishment of normal muscular balance and masticatory function in order to hold the advantages gained as a result of tooth movement and development obtained during treatment.

Results of orthodontic treatment. Reviewing our objectives, and comparing them with our results immediately after treatment, we find the models and photographs indicate that we have attained our first two objectives (a) to remold the upper arch, developing canine width and flattening the incisor segment, (b) to develop the alveolar base in the lower and move the whole arch forward. Against these good results, we find that we must place as unfavorable, the resorption of the apices of the upper incisor roots shown in the intra-oral x-rays made at the end of treatment.

The superposed tracings of the lateral cephalometric x-rays before and after treatment demonstrate the accomplishment of our ultimate objectives, *i.e.,* to move the mandibular arch and base forward. The upper incisor crown has been tipped lingually, the root apex occupying practically the same position before and after treatment. The upper molar has about the same position and axial inclination in both tracings. The second x-ray was made at the time the patient was placed in retention, fifteen months after treatment was begun. The distal movement of the buccal teeth had been completed ten months before this. Only a cephalometric x-ray made immediately after completion of the distal tipping, compared with the two we have, would show whether or not we actually moved the upper molar a full tooth distal to its original position. We assume that we were successful in this attempt at distal movement, and that function carried the denture forward into its present correct relation to the cranium.

The patient, now 13 years 4 months old, weighs 135 pounds and is 5

feet 6 inches in height. She shows a gain of 35 pounds and an increase of 7 inches in height since treatment was begun two years and three months ago. Her rapid growth during this period was probably a distinct advantage in orthodontic treatment.

This report is written one year after placing the case in retention. The patient now breathes normally, but the development of the upper lip has

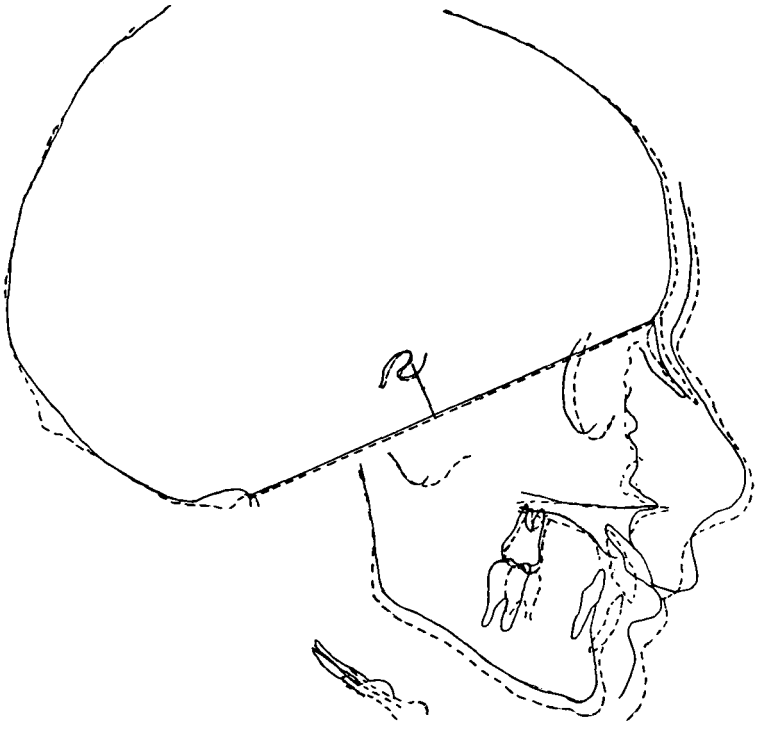

Fig. 5

Superimposed tracings of lateral cephalometric x-rays. One-half actual size. Solid line before treatment; broken line after treatment.

not been sufficient to hold the upper incisors back. Although the buccal teeth have retained their correct mesiodistal relation, the upper incisors have relapsed slightly. This indicates a failure, despite a sincere and earnest effort on the part of the orthodontist, to secure the wholehearted cooperation of the patient in the development of a normally functional labial muscu-

lature. The palate retainer was probably removed prematurely. The penalty for this will be another short period of treatment devoted to the management of the upper incisors and followed by a longer period of retention.

Summary

This Class II, Division I, malocclusion, treated with the edgewise mechanism in fifteen months, could have been treated a shorter time had the operator been more skillful and the patient more cooperative. The result immediately after treatment shows the desired forward development of the mandible. The relapse of the incisors while the buccal segments held, bears out the statement that the retention of a case of this type is dependent upon normal muscular balance and mutual support of the inclined planes of the teeth.

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