Report of a Case of "Bimaxillary Protrusion" With "Unilateral Class II Molar Relationship" In Which Four First Premolars Were Extracted As Part Of the Treatment Plan *

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INTRODUCTION

The case to be presented is representative of a group of malocclusions which, because of the facial involvement, poses a problem in diagnosis and treatment. As indicated in the title, two terms were used for its classification: "Bimaxillary Protrusion" and "Unilateral Class II Molar Relationship." The former refers to a dento-facial relationship while the latter to an occlusal relationship. The ANGLE terminology is used to describe the malocclusion of the teeth. The term "Bimaxillary Protrusion" refers to the dento-facial relationship present, which was the determining factor in deciding the direction and extent of movement of the anterior teeth in the horizontal plane in treatment.

METHOD OF APPRAISEMENT

The illustrations and graphs used for case analysis at the beginning of treatment and for the appraisement of tooth movement at the end of treatment, were obtained from oriented plaster casts, oriented facial photographs and oriented mandibular roentgenograms.

Oriented Plaster Casts.—The casts are oriented to the Frankfort plane by means of the denti-phore,[1] an instrument adjusted on the face to the two orbital and two preauricular points (Fig. 1, A and B). By transferring these four points to graph paper and joining them, we obtain the *Frankfort quadrilateral* (Fig. 1, C). Some of the graphs to be shown are made by projecting the teeth upon this Frankfort quadrilateral. All changes in tooth position in an anteroposterior direction are measured from the base of this quadrilateral or *preauricular plane.* All changes in a lateral direction are measured from the *median plane* which bisects the preauricular plane. Two mandibular casts are made with their bases parallel to the base of the maxillary cast. One of these mandibular casts is sectioned through the middle of the left central incisor tooth along a line parallel to the median plane. On this oriented sectioned mandibular cast the *crown axis* of the incisor tooth is determined and prolonged until it cuts the base of the cast (Fig. 1, D). The angle formed is the *incisor-axial angle.* Since the base of this cast is parallel to the Frankfort plane, this angle is the angle that the crown axis of the mandibular incisor makes with the Frankfort plane.

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Oriented Facial Photographs.—Profile and front view photographs are obtained with the head of the patient positioned in the cephalo-phore[2] and oriented to the *Frankfort, orbital* and *median* planes (Fig. 1, E).

Oriented Mandibular Roentgenograms.—The cephalo-phore is also used to position the head while taking the mandibular roentgenogram.[3] This roentgenogram is taken with the patient biting on a modeling compound block in which is imbedded a portion of a wire previously superimposed upon the incisor-axial line of the sectioned cast. The roentgen ray is directed perpendicular to the median plane of the cephalo-phore. By extending the line of the wire on the roentgenogram, until it intersects the lower border of the mandible, we get the crown axis of the incisor tooth (Fig. 1, F). While the oriented mandibular roentgenogram is used mainly to obtain certain important angular relationships, as described elsewhere,[3] it also serves to show the position of the roots of the mandibular incisors in relation to the labial alveolar plate. It has been pointed out by Kaletzsky[4] that the *root axis* of the lower incisors diverges from the crown axis in a lingual direction, forming the *crown-root angle* (Fig. 1, F). He found that this angle varies from 5° to 20°. We can conclude from the foregoing that the roots of the incisors are always covered with more bone labially than is shown by the position of the crown axis in the roentgenogram.

History of the Patient

This boy, white, 14 years of age, was of rather nervous temperament, but otherwise in fairly good health when he came for treatment. His health records revealed that the delivery was by instruments and that he was bottle fed for two years. He had convulsions in infancy in addition to the usual childhood diseases. The tonsils and adenoids were removed at the age of 5 years. He sucked his thumb for several years but the habit was broken long before the time of the orthodontic examination.

Orthodontic Examination

The occlusion showed a Class I molar relationship on the right side and a Class II molar relationship on the left side (Fig. 2, A). There was slight crowding and a marked labial inclination of the mandibular incisors (Fig. 2, C). The tongue was normal in size. The teeth present were all permanent including the second molars. Roentgenographic examination showed that the roots were of normal size and that the third molars were present (Fig. 4 A and B). There were no missing or supernumerary teeth. There were no apparent factors in the case history which could be considered responsible for the malocclusion present.

Case Analysis

An inspection of the casts before treatment revealed that with the exception of the arch malrelationship on the left side, which classified it as unilateral Class II, there were no criteria which would place this case either in Div. I or Div. II (Fig. 2, A). The degree of overbite and overjet present was not such that could not be found in Class I, Class II, Div. I or Class II, Div. II cases. As a matter of fact, aside from the unilateral Class II relationship, the malocclusion was not so unusual as to justify a decision to correct it. I was tempted to leave well enough alone, especially since there was a doubt in my mind whether I should succeed in correcting

the Class II arch relationship—the important undesirable trait in the malocclusion. The correction of this condition would have required the posterior movement of the left maxillary canine, first and second premolars, first and second permanent molars against an unerupted third molar—a most difficult, if not impossible feat. To have corrected the arch malrelationship on the left side, by moving the mandibular teeth on this side forward, was out of the question because this would have aggravated a facial trait that was already sufficiently objectionable to justify an attempt to modify it.

The facial photographs show the extreme prominence of the lips of this patient (Fig. 3, A). Because of this extreme bulging of the lips, which I assumed to be at least partially due to a protrusion of both dental arches, I classified this case as a *bimaxillary protrusion* with a unilateral Class II arch relationship. This classification formed the basis for treatment. Proceeding upon the assumption that a reduction of the protrusion of the maxillary and mandibular dental arches would in turn reduce the fullness around the mouth and thus improve the facial profile, I formulated my objectives of treatment.

Objectives of Treatment

In the order of their importance these objectives were:

(1) To obtain the *achievable optimum* in facial balance and harmony.

(2) To obtain the *achievable optimum* in occ usion and dental esthetics.

(3) To obtain the *maximum probability* for a stable result.

All this was to be accomplished with the least possible damage to the tissues involved.

Tooth Movement Desired

In order to obtain the objectives outlined, the following tooth movement was indicated:

(1) To retract the maxillary and mandibular teeth and change their axial inclination in order to reduce the protrusion of the dental arches.

(2) To correct the mesio-distal Class II relationship on the left side by repositioning the dental units and at the same time maintain the teeth on their respective bases in order not to aggravate the already present facial disturbance.

(3) To correct the overbite and produce a correct occlusal relationship between the maxillary and mandibular teeth.

Outline of Means for Obtaining the Tooth Movement

It was a foregone conclusion that I could not attain this extensive tooth movement without the removal of some teeth. The four first premolars were therefore extracted.

Appliances and Mechanics Used.—The appliances used were the edgewise arch and the mechanics followed were those developed by Charles H. Tweed.[5,6] Without going into a description of treatment, it would be well to give the method used in finishing and retention of the corrected occlusion.

Finishing.—After the correction of the occlusion certain steps were taken to close up the spaces between the teeth before the insertion of the retaining appliances. The four maxillary incisor bands were removed and maxillary right and left sectional arches were inserted. Class II elastics

were worn on the right and left sides with an elastic across the labial surfaces of the maxillary incisors. The labial elastic was attached to the mesial ends of the right and left sectional arches (Fig. 5). At the next visit, the right and left second premolar and first molar bands were removed, the sectional arches reinserted and the elastics continued. At subsequent visits the procedure described was repeated in the mandibular arch. The final set-up in the mouth consisted of right and left maxillary and mandibular sectional arches with canine to canine elastics on the maxillary and mandibular incisors and Class II elastics on both sides. After wearing this assemblage for a few weeks, all appliances were removed and impressions were taken for retaining appliances.

Retention.—(a) *Maxillary Arch.*—A Hawley retainer with a labial wire passed between the canines and lateral incisors and adapted to the labial surfaces of the maxillary incisors. (b) *Mandibular Arch.*—No retaining appliance on this arch.

Analysis of Tooth Movement

1. *From the Median Plane.*—(a) *Maxillary and mandibular arches:* The median line of the dental arches which were to the left of the median plane of the head before treatment are slightly to the right of this plane at the end of treatment (Fig. 2, C and D and Fig. 6, A and B).

2. *From the Preauricular Plane.*—(a) *Growth:* Natural growth is shown by the superimposed quadrilaterals taken before and after treatment. There was a forward growth of over 3 millimeters (Fig. 6). (b) *Maxillary Arch:* The anterior teeth were moved posteriorly about 8 millimeters. The posterior teeth moved forward on the right side about 4 millimeters and on the left side about 2 millimeters with a shift of the median line of the teeth to the left (Fig. 6, A). (c) *Mandibular Arch:* The anterior teeth were moved posteriorly about 5 millimeters. The posterior teeth moved forward on the right side about 4 millimeters and on the left side about 6 millimeters (Fig. 6, B).

3. *Mandibular Incisor-Axial Angle.*—As shown in the sectioned casts and graphs, this angle has been reduced from 113° before treatment to 109° after treatment. The lower incisors have been uprighted by 4° (Fig. 2, C and D).

Results of Orthodontic Treatment

Results of Tooth Movement:

(1) The relative molar relationship on the right side remained unchanged.

(2) The Class II molar relationship on the left side was corrected by a relative forward movement of 4 millimeters of the mandibular teeth.

(3) The overjet was reduced by a relative posterior movement of the maxillary anterior teeth of 3 millimeters.

(4) The mandibular incisor roots are well within alveolar bone. The crown axis shows that the root is in a safe lingual position to the labial alveolar plate.

Records at the End of Treatment:

Fig. 2, B and D shows dental casts after treatment.

Fig. 2, C and D shows reduced incisor-axial angle.

Fig. 3, B shows facial photographs after treatment.

Fig. 4, C shows dental roentgenograms after treatment.

Fig. 4, D shows lateral jaw roentgenograms after treatment.

Fig. 1, F shows oriented mandibular roentgenogram after treatment.

Fig. 7 shows dental photographs six months after the completion of treatment.

Comment

The case reported is representative of a class of malocclusions complicated by a facial involvement which, depending upon its extent, prohibits or limits the forward movement of the anterior teeth in treatment.

In these cases, disregard for these limitations of movement of the anterior teeth will invariably result in an objectionable fullness around the mouth. When this fullness is present at the beginning of treatment, it may be modified by the correction of the malocclusion. If, in the treatment of the malocclusion, the anterior teeth are moved posteriorly, there will follow a reduction of the fullness around the mouth. On the other hand, if the anterior teeth are moved forward in treatment, the fullness around the mouth will become aggravated.

When this condition follows orthodontic treatment, it is invariably due to a forward movement of the teeth in treatment. This forward movement of the teeth may be the result either of crowded dental arches that have been regulated, or the result of a Class II or Class III arch relationship that has been corrected with little concern for the dento-facial relationship present—a relationship that prohibits the forward movement of the anterior teeth in treatment.

Because of the complex nature of the phenomenon involved, the conclusion that these conditions exist can be made only by inference from clinical evidence obtained from the reduction or aggravation of the fullness around the mouth in treatment. It is from such treated cases that the criteria which will enable us to recognize these dento-facial relationships must be obtained.

The case reported was treated on the assumption that the unusual fullness around the mouth was at least partially due to a protrusion of the maxillary and mandibular dental arches. This dento-facial relationship was classified as a "Bimaxillary Protrusion." The treatment based upon this classification was planned to produce the changes in the irregularities and occlusal relationships of the teeth without a forward movement of the anterior teeth. Four first premolars were extracted in order to make this treatment possible.

An appraisement of the results shows: (1) There is a marked improvement in facial balance and harmony. While natural growth and development must not be excluded as a contributing factor for the marked improvement in facial esthetics, it is reasonable to assume that the change in position and axial inclination of the teeth in both dental arches was in a measure responsible for the reduction of the fullness around the mouth. (2) The occlusion is better than when it first presented itself. The Class II malrelationship on the left side has been corrected and a correct occlusal relationship between the maxillary and mandibular teeth was obtained.

The extraction facilitated a rearrangement of the dental units on this side toward a correct interlocking of the cusps without forward displacement of the anterior teeth. The alternative would have been a forward displacement of the teeth in both archs which in turn would have increased the objectionable bulging of the lips. An attempt at distal move-

ment of the maxillary teeth on the left side for the correction of the Class II mesio-distal relationship, would surely have resulted in failure.

While it is obvious that much more information must be gathered before diagnostic criteria can be established which would be applicable in every case, such clinical evidence as now exists seems to justify the following conclusions:

1. A large number of cases of malocclusion of the teeth with marked facial involvement have associated with them a dento-facial relationship which either prohibits or limits the forward movement of the anterior teeth in treatment.

2. Because of these limitations placed upon forward tooth movement, the objectives sought in treatment cannot always be attained without the removal of some teeth.

3. Disregard for these limitations will result in facial disharmony by producing an objectionable fullness around the mouth or by aggravating the one present.

4. The diagnosis of these cases is greatly facilitated, if they are classified as "Bimaxillary Protrusions" for the dento-facial relationship, while retaining the "Angle Classification" for the irregularities and occlusal relationships of the teeth.

Summary

The case reported was classified and treated as a "Bimaxillary Protrusion" with a "Unilateral Class II Molar Relationship of the Dental Arches". The assumption that the unusual fullness around the mouth was at least partially due to a protrusion of the maxillary and mandibular dental arches provided the dento-facial relationship upon which this classification was based. The malrelationship of the dental arches was diagnosed by means of Angle's classification. The treatment, based upon this classification, was planned to produce the following changes in the dento-facial and dental arch relationship: (1) A reduction of the protrusion of the maxillary and mandibular arches. (2) A correction of the unilateral mesio-distal Class II relationship. (3) Reduction of the overbite and the attainment of a correct occlusal relationship between the maxillary and mandibular teeth.

Four first premolars were extracted in order to make this treatment possible without moving the anterior teeth forward. An appraisement of the results showed that the objectives sought in treatment were attained.

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References

1. FISCHER, BERCU: The Denti-Phore, Am. J. *Orthodontics and Oral Surg.* 26: 941-954, 1940
2. IDEM: Orthodontic Photographic Recorder, Am. J. *Orthodontics and Oral Surg.* 26: 139-148, 1940.
3. IDEM: Recording the Frankfort-Mandibular-Plane Angle Using Oriented Mandibular Radiogram and Sectioned Oriented Cast, Angle Orthodontist 15: 30-36, 1945.
4. KALETSKY, THEODORE: A Simple Way to Produce Consistently Accurate Intraoral Roentgenograms and a Modification of the Technic of Dental Roentgenography, J. Am. Dent. A. 26: 390-398, 1939.
5. TWEED, CHARLES H.: The Application of the Principles of the Edgewise Arch in the Treatment of Malocclusions, Angle Orthodontist 11:5, 12, 1941.
6. STRANG, R. H. W.: Text-Book of Orthodontia, Philadelphia, 1943, Lea & Febiger.

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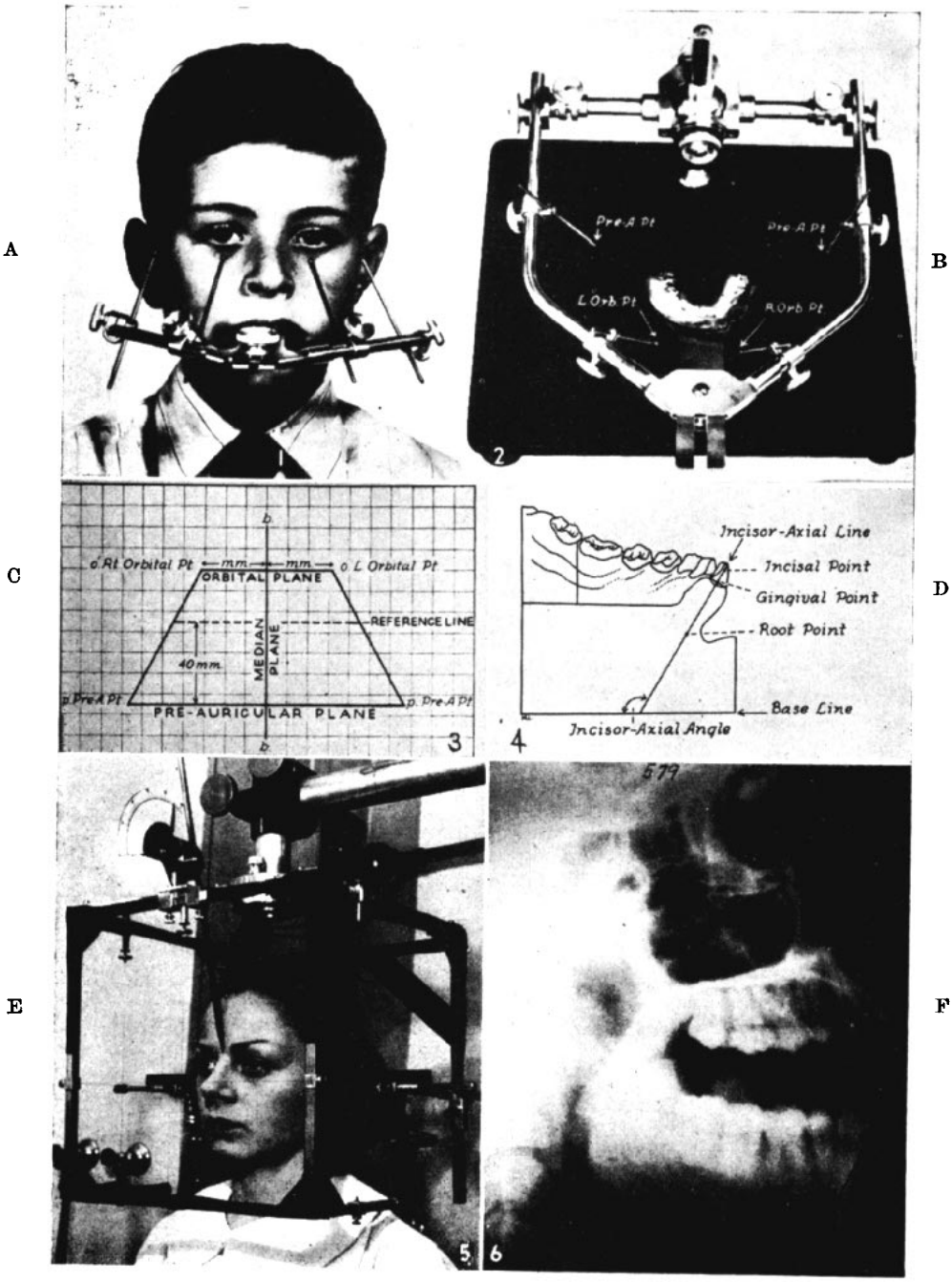


LEGENDS

Figure 1

Fig. 1.—Method of appraisement.—A, Face-bow of denti-phore adjusted on the face. B, Photograph showing complete denti-phore with pointers touching the platform. C, Frankfort quadrilateral drawn on millimeter graph paper. D, Sectioned oriented mandibular dental cast showing steps in determining the incisor-axial angle. E, Cephalo-phore in position for facial photograph. F, Oriented mandibular roentgenogram; A-B, crown axis; C-D, root axis; AOC, crown-root angle.

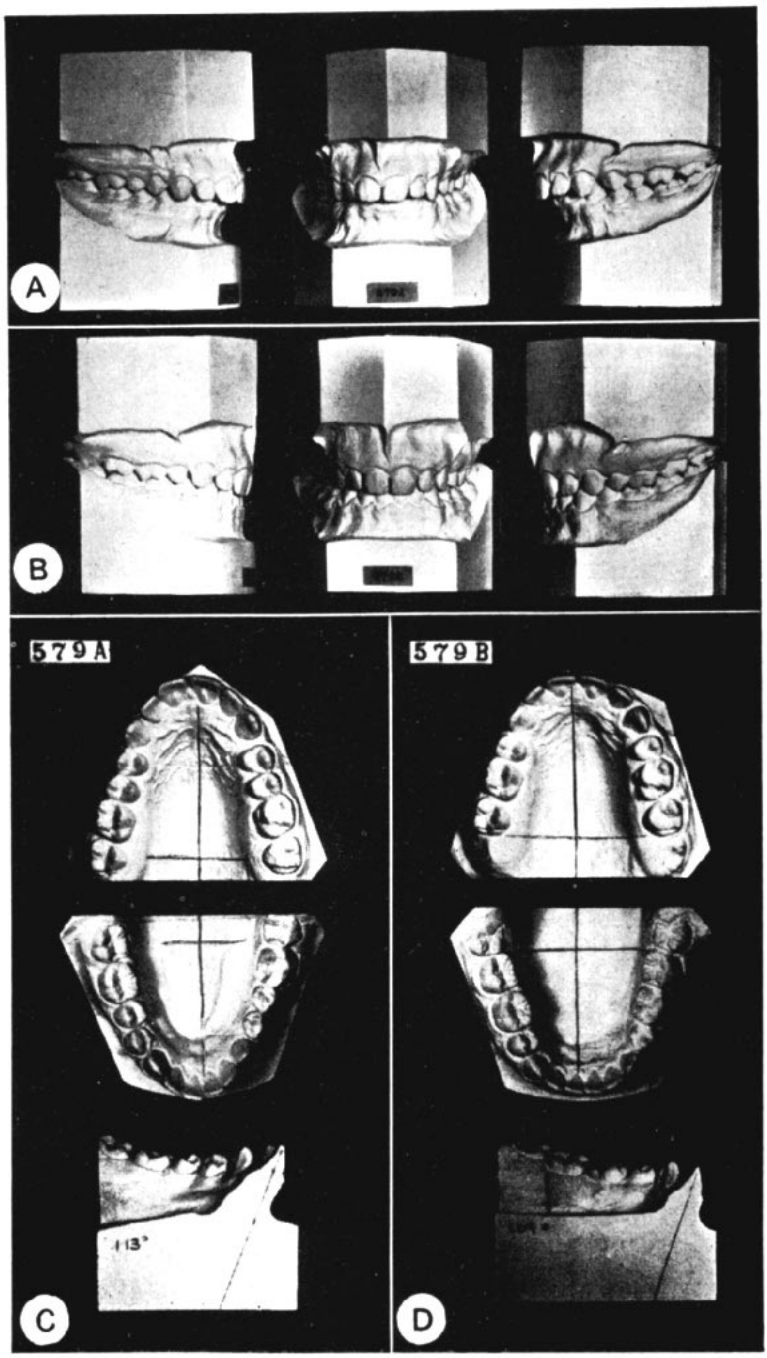


Figure 2

Fig. 2.—A, Oriented dental casts before treatment. B, Oriented dental casts after treatment. C, Occlusal view and sectioned mandibular cast before treatment. D, Occlusal view and sectioned mandibular cast after treatment.

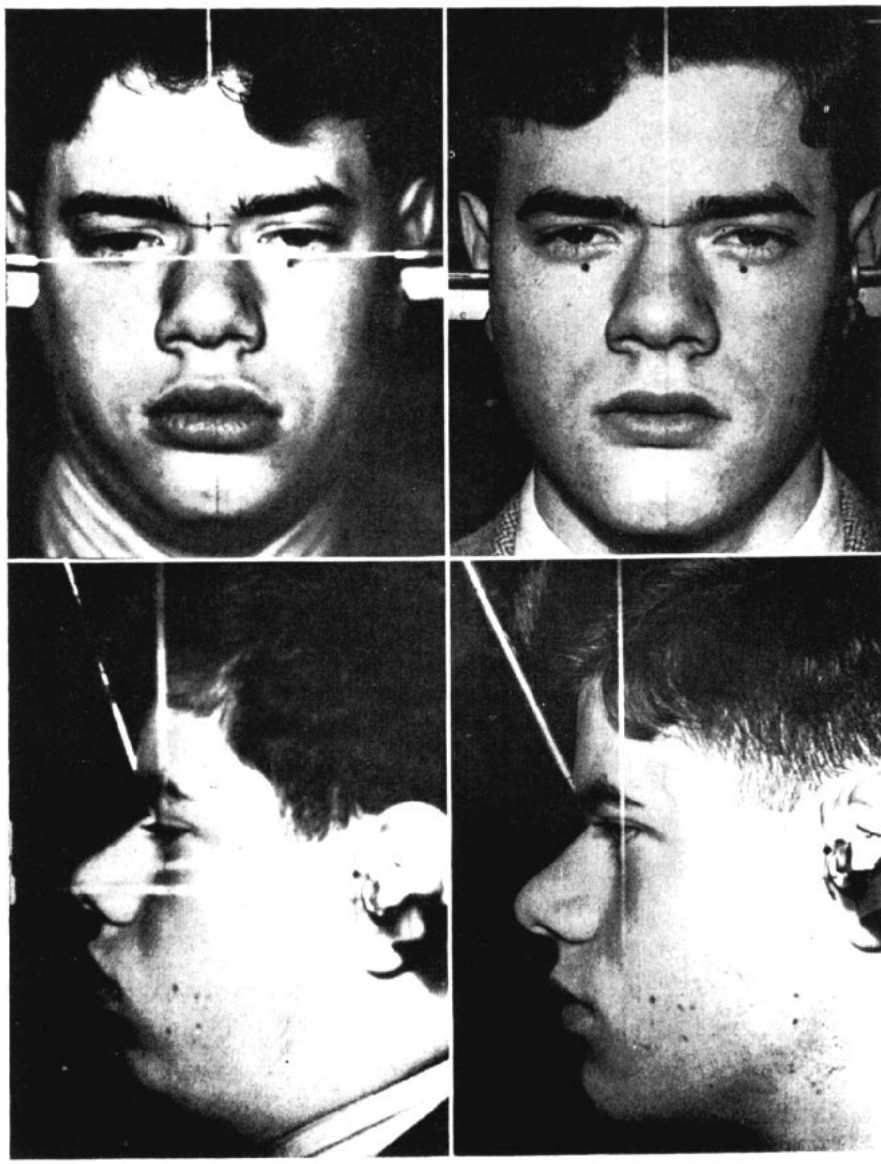


Figure 3

Fig. 3.—A, Oriented Facial photographs before treatment. B, Oriented Facial photographs after treatment.

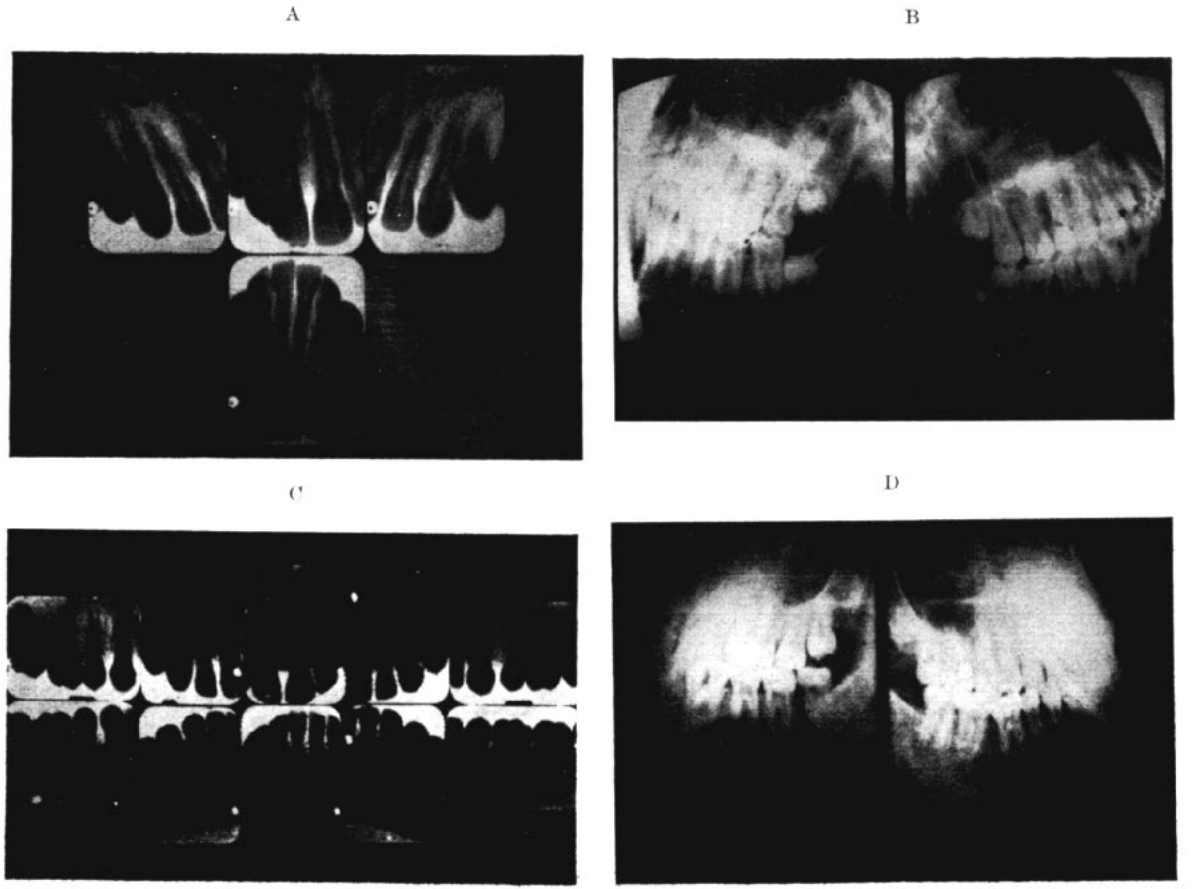


Figure 4

A, Dental roentgenograms before treatment. B, Lateral jaw roentgenograms before treatment. C, Dental roentgenograms after treatment. D, Lateral jaw roentgenograms after treatment.

Figure 5

Fig. 5.—Finishing assemblage. (See text.)

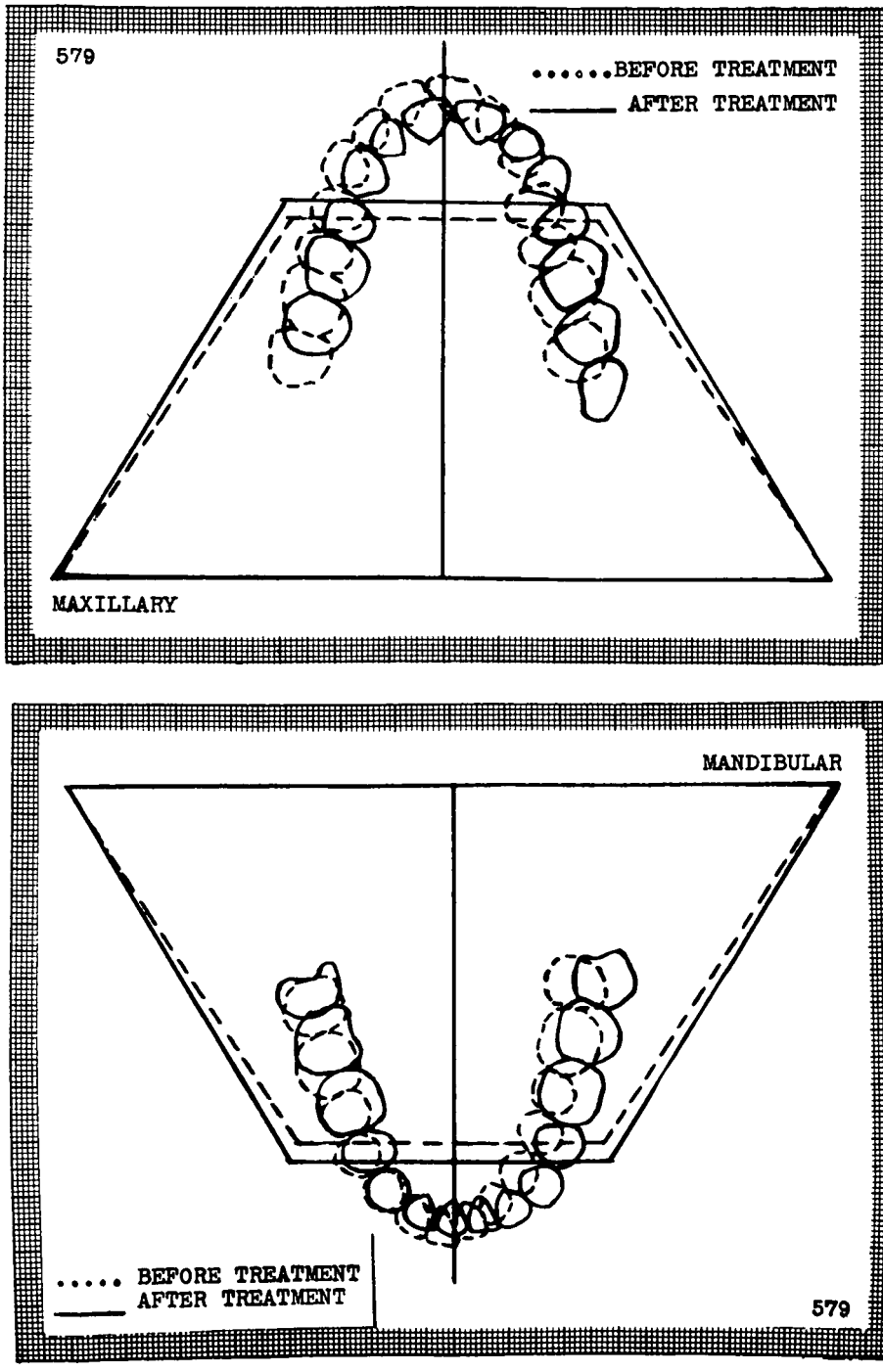
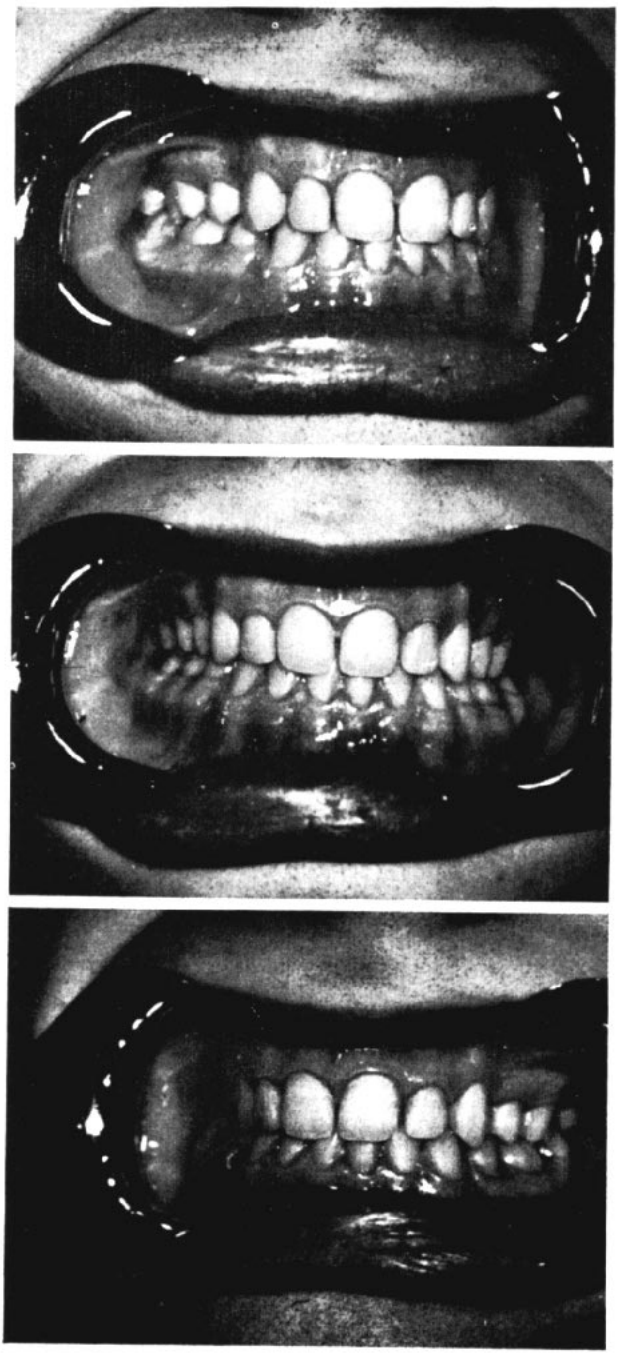


Figure 6

Fig. 6.—A and B, Maxillary and mandibular graphs representing projection of teeth on the Frankfort plane with reference to the preauricular and median planes before and after treatment. Dotted line, before treatment. Solid line, after treatment.



A, Right view.

B, Front view.

C, Left view.

Figure 7

Fig. 7.—Dental photographs six months after completion of treatment.