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TREATMENT OF OVERBITE*

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INTRODUCTION:

Severe overbite is one of the most common and baffling problems that confront the orthodontist. Correction of the severe anterior overbite is probably one of the most significant objectives in the treatment of malocclusion. There is an inter-relationship between severe overbite and oral health. I believe that severe overbite is a potential danger to the integrity of the dental arch, but I realise that all patients with severe overbite will not end up with full or partial dentures. The factor of tissue tolerance must play a part. Since I know of no specific method of assesing a patient's tissue tolerance or any way that I could foretell what his tissue tolerance will be when he is about 35-40 years old, I look upon severe overbite as a definite indication for recommending orthodontic treatment.

Case 1. Figures 1 (A, B, C) portray a 37 year old man with Class II Division I maloclusion. The overbite is severe and traumatic. The palatal gingivae of the upper incisors were being stripped off by the lower incisors, resulting in extensive mobility of the upper incisors.

The patient was treated by the Begg Light Wire Technique (Fig. 1D). Figure 1E portrays the patient's occlusion 9 months out of retention. It is reasonable to assume that the prognosis of his dentition is more favourable now when the mandibular incisors are occluding on the lingual surface of the maxillary incisors instead of the gingival margin as it was in the original condition.

DEFINITION OF OVERBITE:

The most common definition of overbite is that found in Strang's Textbook of Orthodontics—''The overlapping of the upper incisors over the lowers in a vertical plane.'' This definition is inadequate and lacks exactness. A term that is often found in orthodontic textbooks to denote severe overbites is ''deep bite.'' This does not mean or tell us very much about the degree of severity of the overbite. A patient can have a deep bite, i.e. ''excessive incisal overlap,'' but still have an acceptable overbite. In other words, his lower incisors are still occluding on the lingual surface of the maxillary incisors. The fact that the overbite is deep does not necessarily mean orthodontic treatment is indicated. On the other hand, a patient can have a correct degree of incisal overlap according to definition, but still have a severe and traumatic overbite.

Figure 2 (A, B) and Figure 2 (C, D) portray a 10 year old girl and a 23 year old man respectively. Both the patients have a severe and traumatic overbite but their incisal overlap is by no means excessive. The inclination and anatomy of the crowns of the incisors do have an influence on the degree of overbite. (Fig. 2E).

In analysing cases, I try to observe the area of contact of the maxillary incisors by the mandibular incisors and I classify overbite into four degrees:—

(i) Correct or acceptable—i.e. when the lower incisors occlude on the incisal half of the lingual surface of the maxillary incisors.

(ii) Moderate—i.e. when the lower incisors occlude on the gingival half of the lingual surface of the maxillary incisors.

(iii) Severe—i.e. when the lower incisors touch the soft tissues of the palate.

(iv) Incomplete—i.e. when the lower incisors have no occlusal contact in centric occlusion.

If the overbite is severe, it should be noted whether it is traumatic or non-traumatic. Clinical evidence of trauma from severe overbite can often be seen when the mandibular incisors occlude on the lingual gingival crevice of the maxillary incisors—sometimes the maxillary incisors can traumatize the labial gingival crevice of the mandibular incisors as in Class II Division II cases. Generally speaking the overbite becomes less traumatic as the overjet increases but is still considered severe.

Another term that is often found in orthodontic textbooks in denoting severe overbite is ''closed bite'' or ''close bite.'' There appears to be some confusion as to whether the word ''close'' should be in the present or past tense. Whatever it is, the term ''closed bite'' does not and should not mean severe overbite. That

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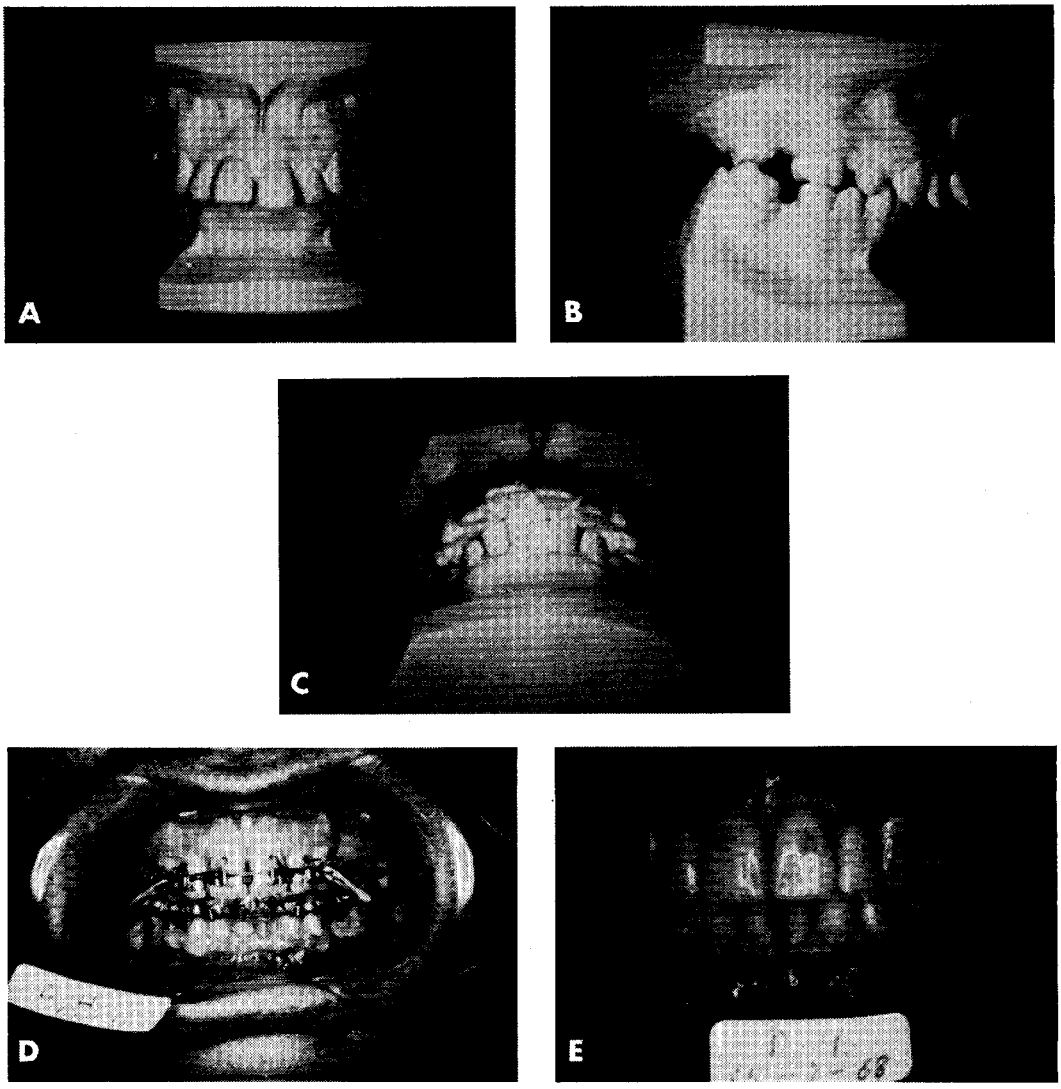

Figure 1. Case 1. Class 2 Division 1 malocclusion with severe and traumatic overbite. 37 year old man.

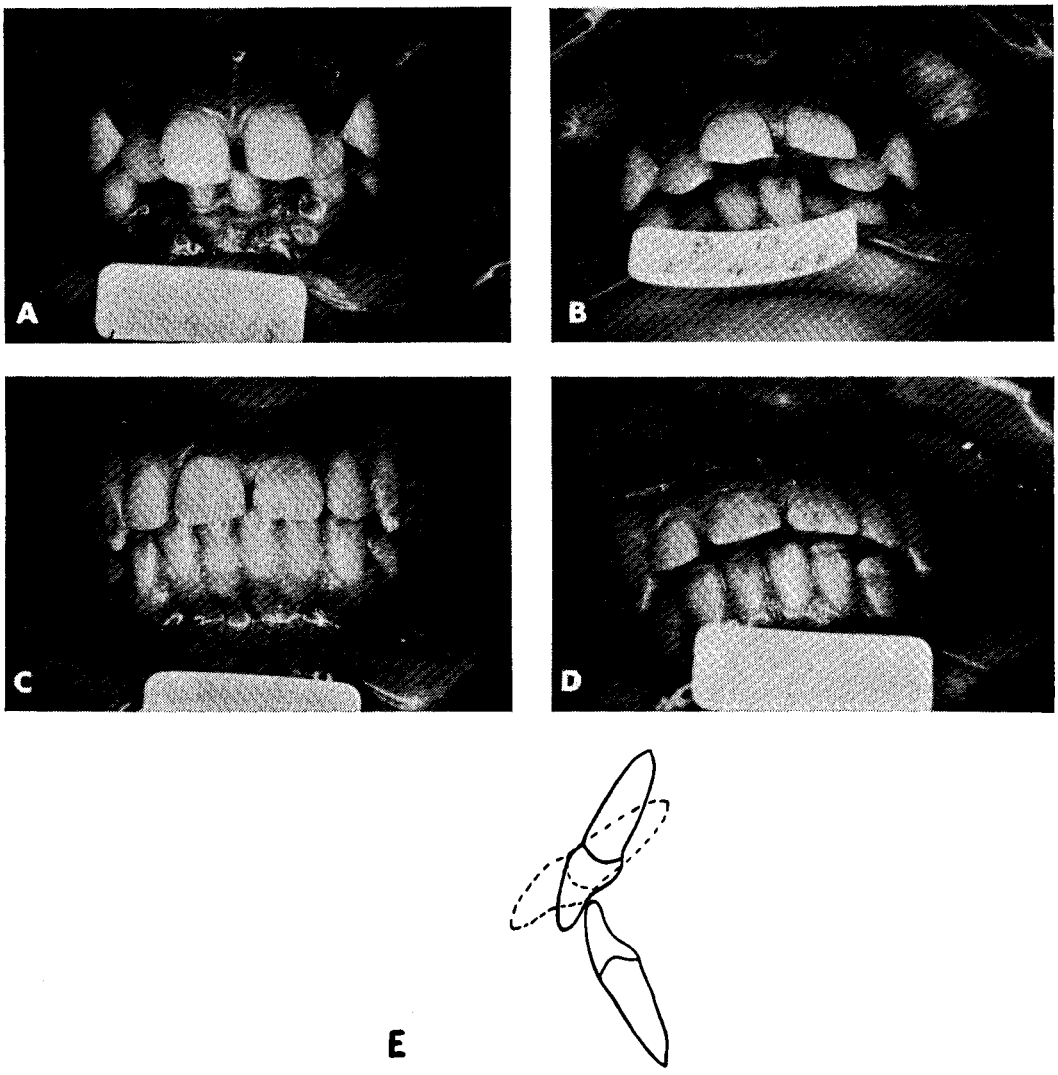

Figure 2. Overbite in relation to incisal overlap.

term should only be used to mean reduced occlusal vertical height. It is very doubtful whether the condition of reduced vertical dimension does exist in patients with the full complement or with most of the natural teeth present, which do come into contact on the occlusal surfaces in centric occlusion. This misused term of "closed bite" will be elaborated later.

AETIOLOGY OF SEVERE OVERBITE:

Anthropological studies have revealed that the incisors in uncivilised races, besides the Australian Aborigines, occluded edge to edge, which Begg[1] refers to as anatomically correct attritional occlusion. Incisal overlap became a common feature of the human dentition at about the era of the Saxons.

Clinical surveys have brought to light the prevalence of excessive overbite in modern man. It has been shown that there is a definite cycle to the degree of the vertical overbite which increases from 9 to 12 years of age and thereafter decreases[2]. Further it appears that the degree of overbite is not stable until after the eruption of all the pre-molars[3].

Cases 2 (Fig. 3A-D), 3 (Fig. 3E, F), 4 (Fig. 3G, H) represent three patients who all had a moderate to severe degree of overbite prior to the eruption of all the pre-molars. Case 3 (Fig. 3E, F) and Case 4 (Fig. 3G, H) were referred for orthodontic treatment because of the "closed bite" as suggested by the referring dentist. The over-erupted upper left first pre-molars must have given the dentist the impression of "closed bite."

It is obvious there is definite improvement in the degree of overbite in these three patients after eruption of all the pre-molars, as shown in the study models on the right. Originally the overbite was moderate to severe but now the lower incisors are occluding on the incisal half of the lingual surface of the maxillary incisors. No orthodontic treatment was carried out in any of the above three patients.

This brings out a point of clinical significance, viz. it is not advisable to try to correct the degree of overbite prior to the eruption of all the pre-molars. It can also be seen that besides the overbite there is improvement of the occlusion, the canine, pre-molar and molar relationship. It is also interesting to note that the over-erupted upper left first pre-molars have corrected themselves.

There are various schools of thought on the aetiology of severe overbite. Some believe it is due to over-eruption (known as supra-occlusion) of the maxillary and mandibular anterior teeth. Others believe it is due to under-eruption (infra-occlusion) of the posterior teeth. They also believe that since the posterior teeth are under-erupted in these patients with severe overbite, the freeway space is abnormal and incorrect since it does not conform to the supposedly "normal" limit of 2-3 mm. This commonly known "normal" freeway space is the usual space found in Class I cases, but in Class II cases, the freeway space is usually larger[4]. The large freeway space in the Class II cases should not be considered incorrect or abnormal. It is because of the larger freeway space found in such patients, i.e. Class II cases, that makes people believe the bite to be "closed." As said earlier it is very doubtful whether the true condition of "closed bite," i.e. reduced occlusal vertical dimension, can or does exist in patients with the full complement of teeth, except in patients with very extreme attrition where continuous eruption does not keep pace with attrition[5].

There is a definite inter-relationship between freeway space, overbite and overjet and it can generally be said that Class II cases have a greater freeway space than Class I. The freeway space should be considered to be a significant physiological space between the occlusal planes of the maxilla and mandible and is determined by the functional requirements of the masticatory apparatus of the individual. It is relatively constant in each individual and any attempt to alter that space in the form of reduction, must jeopardise the stability of the treatment result, be that of orthodontics, crown and bridge or prosthetics.

It is not possible for a severe overbite to develop in the absence of an overjet, as in edge to edge occlusion. Severe overbite is most probably due to over-eruption by continuous eruption of maxillary and mandibular anterior teeth. In cases where there is crowding of the mandibular incisors, with the lateral incisors crowded lingually, it can often be seen that the degree of overbite is greater on the laterals than the centrals, because the laterals, having a greater overjet, can erupt further than the centrals.

Teeth will continue to erupt until they meet an occluding surface which can be soft tissue as the palate, or the opposing teeth, as

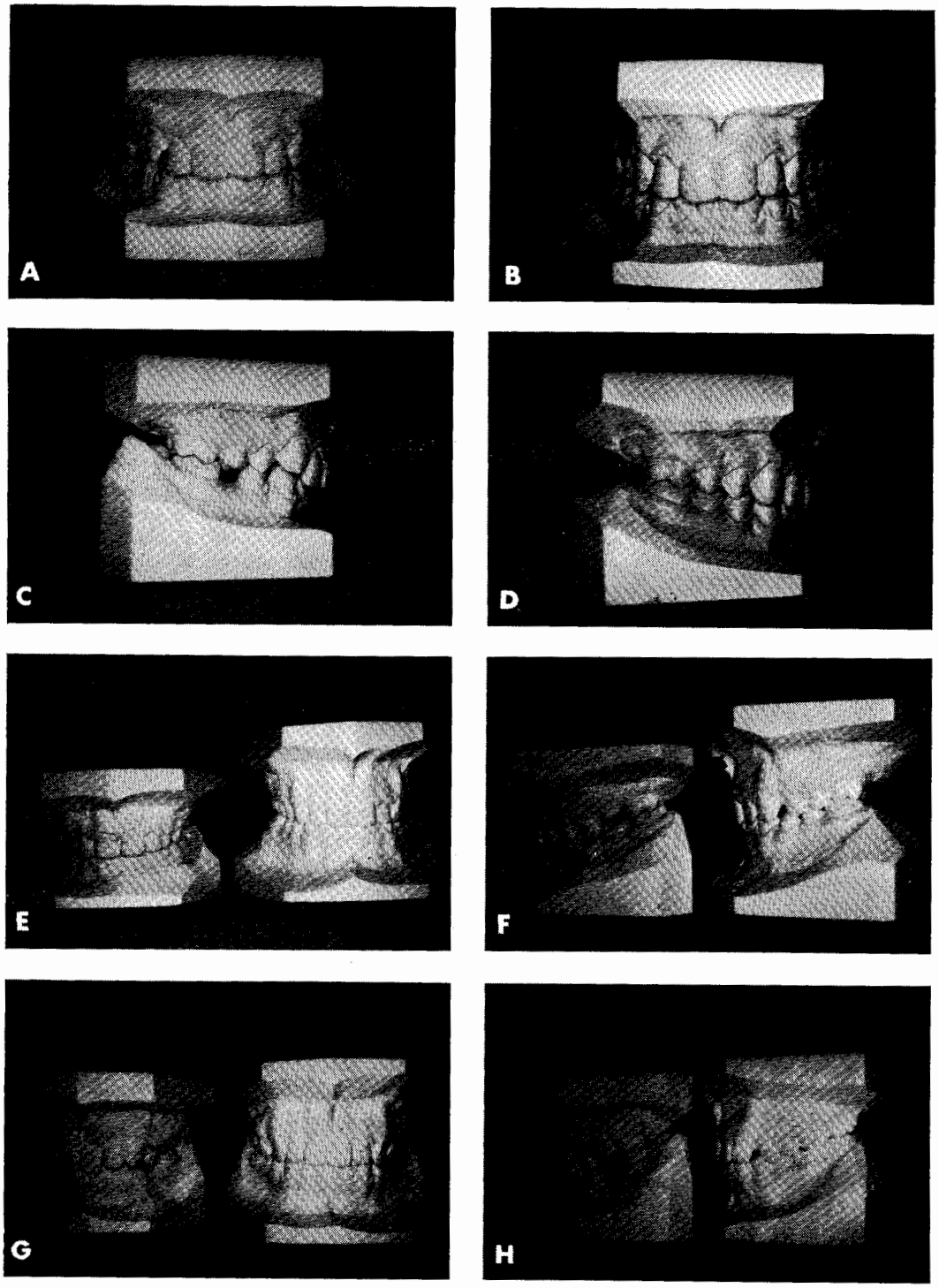

Figure 3. Improvement of overbite after eruption of pre-molars. Note improvement in canine, pre-molar and molar relation and self correction of the over-erupted $\underline{|4}$.

long as there is no pathological condition, such as ankylosis, associated with the teeth. As a matter of fact there is evidence that continuous eruption takes place throughout life6. It is logical to believe that continuous eruption and mesial migration are two processes which are built into the physiology of occlusion. If they did not take place, then the health and function of the dental apparatus in uncivilised races would be limited.

THE TREATMENT OF SEVERE OVERBITE:

In the treatment of severe overbite, the significance of the freeway space should be taken into account. It should be considered as as individual characteristic and if possible it should not be altered. Elevating the lower pre-molars in the treatment of severe overbite as advocated in the Tweed Technique, is a deliberate attempt to reduce the freeway space. There are indications that overbite treated by elevating the pre-molars, so as to flatten the curve of Spee, has a greater tendency to relapse than in cases where the lower pre-molars were not elevated. Similarly overbite treated with bite plates also have very poor prognosis. This observation supports the belief that the freeway space is an important physiological space and it should not be altered to any appreciable extent. Since I believe the severe overbite to be due to over-eruption of the maxillary and mandibular anterior teeth and not to the large freeway space, I direct my attention solely to the apical movement of the upper and lower anterior teeth in its treatment. No attempt is made at elevating the pre-molars, as a matter of fact the pre-molars are very seldom banded till after achieving an edge to edge occlusion, viz. in the second stage of the Begg Technique. An edge to edge occlusion should be the goal in the treatment of overbite for only then do we know that the overbite and overjet are completely eliminated. It is well known that over-correction helps to improve stability. It is important that the overjet be corrected at the same time because it is a causative factor in the aetiology of overbite.

Case 5. Figures 4 (A, B) was a 16 year old boy with Angle's Class II Division 11. The overbite was severe. $\frac{6|}{6|5}$ were hopelessly decayed. $\frac{6|4}{6|5}$ were extracted and the Begg Technique was used. Figure 4 (C, D, E) shows the occlusal plane of the mandibular arch at the end of Stage 1, 2, and 3 respectively, compared with the original model. Figure 4F shows the occlusal plane of the maxillary arch at the end of Stage 1 compared with original model. Figure 4 (G, H) show the occlusion 12 months after removal of appliances.

All the study models presented in this paper are gnathostatic models, i.e. they have been orientated to the Frankfort plane, by a method very similar to Dr. Bercu Fischer's Denti-Phore.

Figure 4 (C, D, E, F) show there is very little, if any at all, elevation or distal tipping of the anchor molars and the cant of the occlusal plane in relation to the Frankfort plane has not changed. Brodie states that when the occlusal plane is tipped as a result of orthodontic treatment, it tends to return to its original position.

Since the occlusal plane is commonly established by bisecting the vertical overlap of the disto buccal cusps of the first molars and bisecting the vertical overbite, it can be said that the occlusal plane in Figure 4 has been tipped down in the anterior region. But if the occlusal plane is interpreted as the mean slope of the pre-molars and molars as shown in Figure 4 (C, D, E) then it can be said that the cant of the occlusal plane has not altered. Personally, I prefer the latter definition of the occlusal plane.

As the cant of the occlusal plane has not changed it is safe to assume that the molars and pre-molars were not elevated orthodontically. It may be appropriate to repeat that I do not normally band the pre-molars, except if the first molar has been extracted, or if the pre-molars are positioned lingually or rotated, until the stage of an edge to edge occlusion.

Since it is possible to eliminate the overbite completely and without altering the cant of the oclusal plane, it is logical to believe that the overbite has been corrected by the apical movement of the upper and lower anterior teeth.

Case 6. Figure 5 (A - F). A 13 year old girl with Angle's Class II Division II. The overbite was severe and traumatic. $\lceil\overline{2}$ was extracted before she was referred to me. It was decided to have the $\frac{4|4}{}$ extracted and the Begg Light Wire Technique was used. Please note that none of the pre-molars were banded except the $\lceil\overline{4}$ which was to be substituted as the $\lceil\overline{3}$. Figure 5 (D, E, F) show

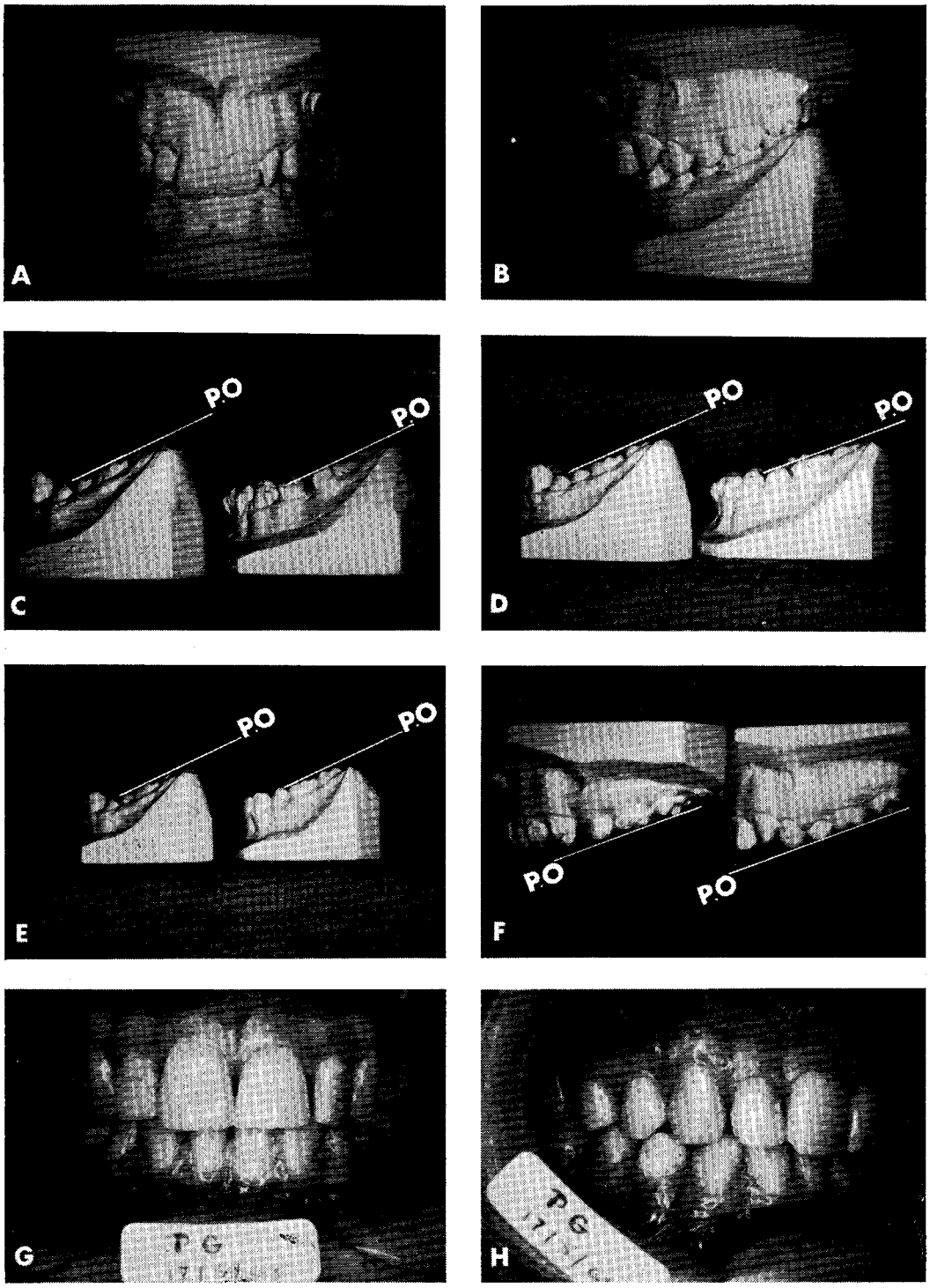

Figure 4. Case 5. Class 2 Division of malocclusion with severe overbite. PO — occlusal plane orientated to the Frankfort plane.

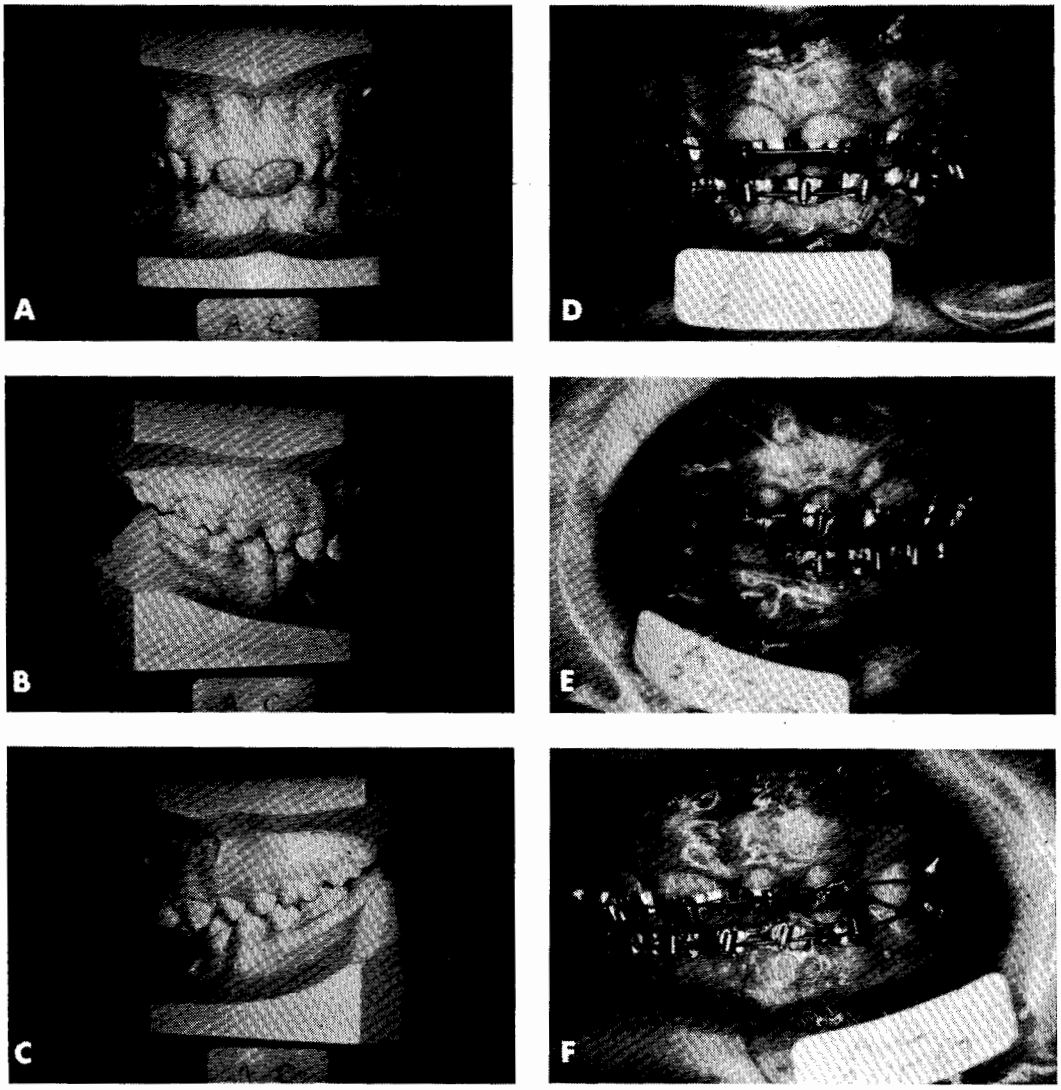

Figure 5. Case 6. Class 2 Division 2 malocclusion with severe overbite. Overjet and overbite eliminated without elevating pre-molars or tipping the anchor molars.

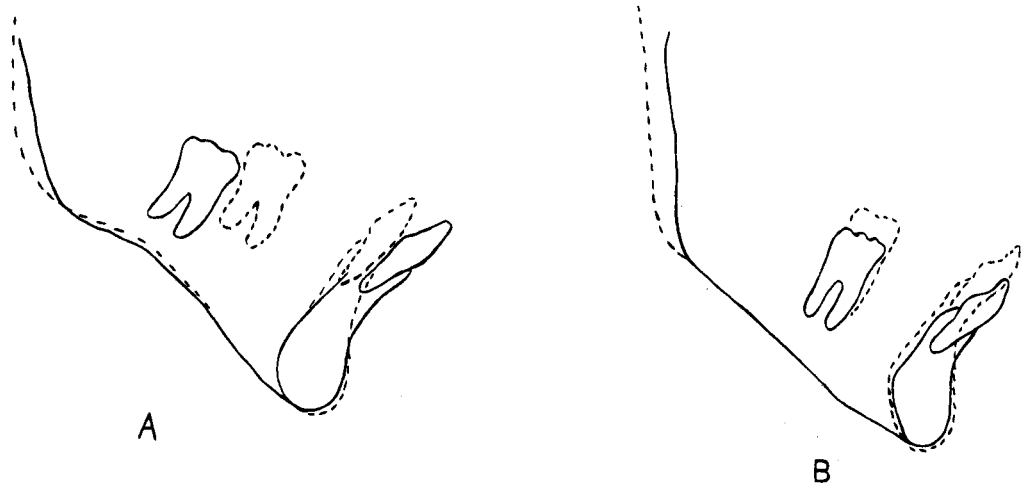

Figure 6. A. Tracing of a mandible after orthodontic treatment. Intermaxillary elastic traction was used. B. Tracing of a mandible which never had orthodontic treatment.

that the overbite and overjet have been eliminated completely without elevating the premolars or tipping of the anchor molars.

Cephalometric tracings are the most commonly used method of investigating the behaviour of the anchor molars during orthodontic treatment. Figure 6 (A, B) is the typical picture when the mandible is superimposed. It does appear that the lower molar has been elevated in both cases and the usual explanation is that the Class II elastic traction caused the elevation. The important difference between Figure 6A and Figure 6B is that the former had orthodontic treatment while the latter did not have orthodontic treatment.

So it seems that it is possible the molar in the first case (Fig. 6A), which received orthodontic treatment, could appear elevated on cephalometric tracings even without treatment. The likely explanation for the apparent elevation of the lower molars is due to continuous eruption.

After achieving an edge to edge occlusion, i.e. when the overbite and overjet are eliminated completely, the treatment of the overbite can not be considered completed yet. To improve the stability of the treated overbite, it is necessary to establish a favourable interincisal angle by the application of torque forces to the incisors.

This phase of treatment is just as important as the apical movement of the upper and lower anterior teeth in the successful treatment of severe overbite.

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