

THE PROS AND CONS OF THE EXTRACTION PROCEDURE IN ORTHODONTICS

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“It is much easier to extract teeth than to
determine whether it is absolutely necessary.”

Delebarre, 1815.

IN THIS paper an attempt will be made to present:

1. A brief résumé and interpretation of the viewpoint of several prominent orthodontists with regard to the extraction controversy.

2. A rationale of the possible reasons for relapses and generally unsatisfactory results as obtained by certain procedures.

3. A plea for early treatment, to preclude the need for extractions or at least to keep them to a minimum.

4. A modified Mershon lingual to facilitate distal movement of molars.

5. A number of cases typifying the several groups of malocclusions for which reduction of dental units is the procedure of choice; the latter actually becoming the conservative method to be employed, if the results obtained are to be stable and esthetic effects be satisfactory according to present-day standards.

6. A simple procedure for the bodily movement of cuspids and premolars.

To the conservative orthodontist, the procedure involving extraction of various dental units has lacked in appeal as it somehow implied his inability to fully cope with the orthodontic problem. To have to resort to extraction meant to compromise, to give in. However, we have to be realists and face the issues, and not avoid them. Needless to say, Tweed stirred up a hornet's nest. The fact that his results are beautiful cannot be denied, and we would all like to emulate his results, but we are reluctant to accept the “pre-molar massacre” before we are fully convinced that the procedure will stand the test of time.

Clinical evidence, as presented by non-Tweed men, does not support such a radical change in orthodontic procedure. Brodie¹ states: “It is dangerous for any profession to assume that everything that has been done in the past is wrong and that all its previous findings are fallacious.” On the other hand, Salzmänn² states: “Today there are few men who would insist that extraction has no place in orthodontic practice. The important question is not whether to extract but under what circumstances shall extractions be resorted to as an adjunct to orthodontic mechanotherapy. The rest is dogmatism which can lead but to further confusion.”

We have come to realize that the retrogressive evolutionary process that the jaws and teeth are undergoing at present points to a time when the average normal complement of teeth will be greatly reduced. This natural elimination

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may be seen in the increase in the number of congenitally missing lower second premolars and also upper laterals. The fact that there is a diminution in the size of the lower jaw as well as the narrowness of the lower third of the face of the Anglo-Saxons is becoming more and more evident.

This discrepancy between the size of the jaws and the amount of tooth material is the problem that Tweed and his followers are attempting to solve by reducing the number of dental units.

J. A. Salzmänn² states: "When the size of the jaws will not permit the correct positioning of all the teeth at the time of treatment, reduction must be made in the mesio-distal configuration in order to avoid toothiness and incidental relapse."

The extraction controversy is of long standing. Over 150 years ago, Hunter recommended the extraction of the upper first premolars and carrying of the anterior teeth back.

In 1865, Kingsley wrote: "An erroneous teaching has maintained that the full number of teeth must be retained in the mouth, regardless of their organization, the limited capacity of the arch, or the external features. The articulation of masticatory organs is of much more importance than their number, and a limited number of grinding teeth fitting closely in occlusion will be of far greater benefit to the individual than a mouth full of teeth with the articulation disturbed."

George W. Hahn⁴ writes: "As there is no known method of developing basal bone, these men felt that, although the integrity of the denture is an ideal to be held, the welfare of the individual patient, both esthetically and functionally, demanded the sacrifice of dental units in the treatment of certain types of malocclusion. It is a form of compromise that must be resorted to only when the most careful analysis of the individual case has been made."

The present-day thinking along this vexing problem has been well expressed by men like Tweed, Hellman, Brodie, Salzmänn, and Atkinson. A brief review of their viewpoints should prove enlightening.

Tweed⁵ feels that the stimulation of function will not cause new basal bone to grow forward and under protrusive dentures. Most orthodontic patients are not physically normal people. "If they were they would not have malocclusion." He also states that recent scientific findings show that when something is lost in bone growth, it is never regained at a future date. This, he says, results in the discrepancy between tooth pattern and basal bone. He therefore concludes that it is far better to remove dental units to bring about a balance between tooth anatomy and basal bone, thereby getting a nearer approach to the normal, than it is possible if we retain all the dental units and, in doing so, are compelled to displace all the teeth off the dental ridge and into protrusion. He also states that "the philosophy of the full complement of teeth was justified until it was conclusively disproved by recent findings." He believes Brodie is right in indicating that it is impossible to make basal bone grow. He also states: "Many brilliant men have spent a lifetime in orthodontics, butting their heads against the impossible, that has led to so many orthodontic failures and heart-aches."

Tweed's contention is that if the teeth in the maxilla and mandible cannot be placed in normal inclined plane relationships without tipping the anterior teeth or pushing the buccal teeth off their bony base, then we had better reduce the number of teeth in each arch and position them over basal bone.

On the basis of his thirty-three years of orthodontic experience and also as a research man, Milo Hellman⁶ is not favorably inclined to the Tweed philosophy. He implies that the latter does not have a basis on real fundamental principles. Resorting to compromise actually represents the giving up of accepted and proved principles. He does not consider a case a failure if one lower anterior is crowded out of the arch because, he points out, many museum skulls show normal functional dentitions where a lower anterior is either rotated or crowded out. He feels that extractions of premolars, as a general scheme, would result in crippling the dentition, and obtain esthetic effects at the risk of destroying anatomic integrity and physiologic efficiency. He states that even in "superb dentitions in normal occlusion it will be found that in none of them are the teeth so faultlessly aligned as to be considered orthodontically perfect."

He does not feel that the lower teeth must be placed on top of the ridge. The latter may be of importance to the prosthodontist and of not as much significance to the orthodontist.

He states that the "normal" is not "perfection" and cannot be measured by celestial or divine standards. The "normal" in anatomic and physiologic features need not be 100 per cent perfect to be adequate for the needs of life and health. Moreover, it should be realized that the "normal" in multiple organs cannot be perfect because they are never uniformly identical either in size, position, or function.

He feels that the orthodontist expects too much when he tries to get 100 per cent perfection in "reclaimed or salvaged dentitions, dentitions which started off and grew under abnormal conditions, such as are presented by some of the extreme forms of malocclusion. If so he might be reminded that the machinery he uses in doing it is far too dangerous. The damage he is inflicting, such as irritation of gums, resorption of cementum, dentine, bone, devitalization of teeth, is far too serious." He wishes the orthodontist to "at least learn to ponder on the significance of a comparison between a complete dentition with some crowded incisors or a crippled dentition with the incisors in even alignment."

Failures, he claims, are usually cases that were treated but not corrected. They are due to "incompetence and uncontrollable factors which interfere with the attainment of results."

Unfortunately, Dr. Hellman did not state whether the conventional treatment does or does not result in toothiness; also whether or not he compromises on esthetics for the sake of maintaining a full complement of teeth.

On the other hand, Dr. Tweed did not investigate the stability of cases which were treated by other methods, and, therefore, his conclusions are based on the reports of only a certain percentage of the orthodontists.

Allan G. Brodie¹ writes: Position of lower incisors is "dependent on such factors as ethnic origin and genetic admixtures" and that "to insist that all

lower incisors must stand upright to be considered normal is just as untenable as to insist that all foreheads be high or all noses of the Roman variety."

He advises to disturb lower anteriors as little as possible and, if possible, to tip them lingually. Brodie finds that axial inclination of lower incisors shows a great deal of variability and their mean value cannot be used as a norm for all cases.

"Nature has cast each of us in a different mold, and to attempt deliberately to alter the type of the face is presumptuous."

"The practitioner tends to look at extractions as an 'easy way out' whereas, in reality, it will frequently be found to complicate the treatment of a case."

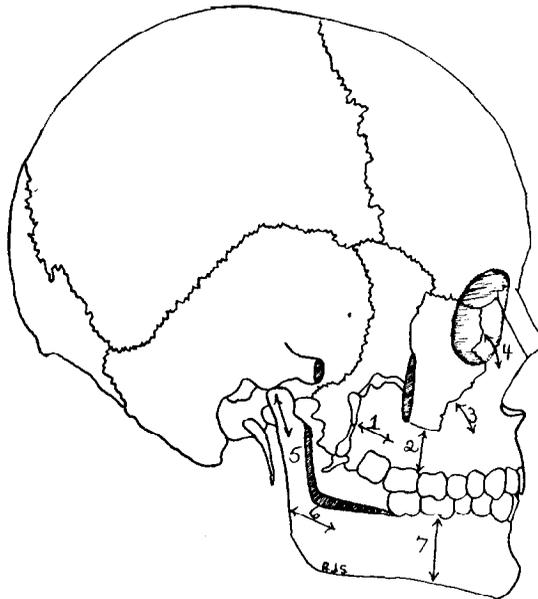


Fig. 1.—Profile view of skull showing main sites of growth in maxilla and mandible. 1, Growth at the maxillary tuberosity translated forward from the pterygomaxillary junction. 2, Growth at the alveolar process. 3, Growth at the zygomaticomaxillary suture. 4, Growth of the maxillary process in the floor of the orbit. 5, Growth at the head of the mandibular condyle. 6, Growth at the posterior border of the ramus. 7, Growth at the alveolar process. (From Salzmann, J. A.: *AM. J. ORTHODONTICS AND ORAL SURG.* 31: 181, 1945.)

J. A. Salzmann² points out that we deal with "two intimately associated structures of different embryological origin: (1) the teeth, ectodermal in origin, which 'achieve' adult dimensions early in childhood and (2) the jaws, of mesodermal origin, which take almost twenty years to complete their growth."

"It is readily understandable that postnatal growth is influenced by environmental factors of a developmental, functional, and pathologic nature. It is not surprising, therefore, that the jaws do not always achieve sufficient growth to accommodate the arrangement of all the teeth in an occlusion which meets or even approaches the so-called normal from the morphologic, physiologic, and esthetic point of view."

A study of profile view of skull (Fig. 1), showing main sites of growth in maxilla and mandible, should prove of interest.

Salzmann differentiates between the normal forward translation as a result of growth and the forward translation of only the tooth-bearing alveolar process in relation to the medullary bone, and concludes therefrom that deficient genetic growth results in a "constricted apical base." He also states that if general muscle tone is poor, typical bimaxillary protrusion is evident, while, if muscle tone is good, then crowding and/or impaction of teeth is severe.

This explains, in part, why Tweed and others claim that many cases are actually bimaxillary protrusions even though they do not exhibit typical protrusive features but which cases, if "rounded out," will be transformed into the protrusive type for which they were bound, but were kept in check by the abnormal muscle balance.

George R. Moore⁷ believes that, in cases of maxillary protractions of the hereditary type, the extraction of the upper second molars and quick distal movement of the first molars and premolars is indicated. The upper third molar, if properly situated, will drop into the place of the extracted second molar. This seems a very logical procedure and it would bear giving it a trial by more men.

Will McLain Thompson, Jr.,⁸ states: "It appears that we have for years been attempting to place a normal occlusion or a normal amount of tooth material into the faces of children with subnormal growth patterns."

Broadbent states that bimaxillary protrusion actually represents a dwarfed skeletal structure. "In other words, the condition and appearance is due more to the retarded facial skeleton than to the dentition being too far forward in relation to the cranial base."

From Broadbent's studies it appears that the retarded eruption of the third molars as well as crowded anterior teeth are "co-sufferers resulting from the failure of the facial skeleton to attain its complete adult size and proportion."

From the foregoing statements we gather the fact that there is much to be said in favor of either side of the controversy. One can find enough statements in orthodontic literature, written by equally great men, to build up a defense of either side. Although Hellman and Tweed represent the extremes of this controversy, there is a great deal of good orthodontic sense in both presentations. Neither one of the two extremes need be followed exclusively until further clinical evidence is presented. Hellman, holding to the nonextraction orthodox plan of treatment, should keep in check those of us who might fanatically follow Tweed's philosophy. We believe that a moderate course is the better choice.

It should be our aim to treat the majority of our cases without resorting to extractions. It would be well to bear in mind what Delebarre said in 1815: "It is much easier to extract teeth than to determine whether it is absolutely necessary."

It is quite possible that the many failures, to which some men are so bravely willing to attest, may have been due to the fact that their practices have been guided by the erroneous policy of delaying treatment until the second molars have erupted.

They have thereby "aided and abetted" the aggravation of the case and probably wound up in treating a much more difficult malocclusion than they would have had to if early orthodontic intervention had been instituted. Fig. 2 shows a case aggravated by a five-year delay in instituting treatment.

After studying for a period of years a large number of nontreated cases, Edward I. Silver³ has concluded that very few cases of distocclusion ever correct themselves.

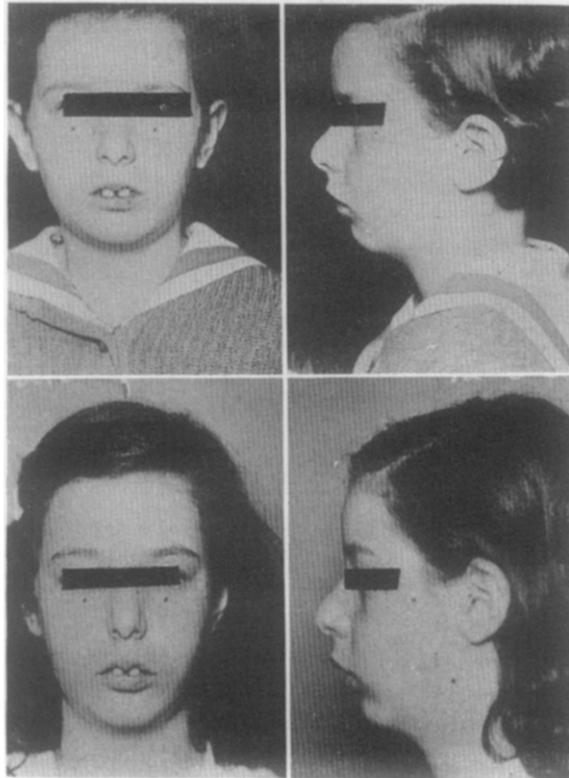


Fig. 2.—Untoward result of five years of waiting for self-correction.

Early treatment during the mixed dentition stage with its period of accelerated growth presents very favorable circumstances for the correction of incipient malocclusions. In this manner we remove impediments to normal growth and development. The objective of this limited treatment is to bring about a condition which, according to accepted standards, would be considered normal for the patient's physiologic rather than chronologic age.

Early treatment may consist of any or all of the following corrections:

(a) Widening of the upper cuspid area, thereby removing the impediment to the forward development of the mandible and permitting the masseter-temporal muscle group to develop and function normally.

(b) Reduction of protraction of the anteriors, thereby permitting normal unimpeded development of the orbicularis oris, which, in turn, affects the tonicity of the muscles attached to it.

(c) Correction of first molar interdigitation; if upper molars are found to be placed anterior to the "key ridge," they are carried distally; if they are correct in relation to the cranium, the forward movement of the mandible is induced, until the molars are established in good interdigitation.

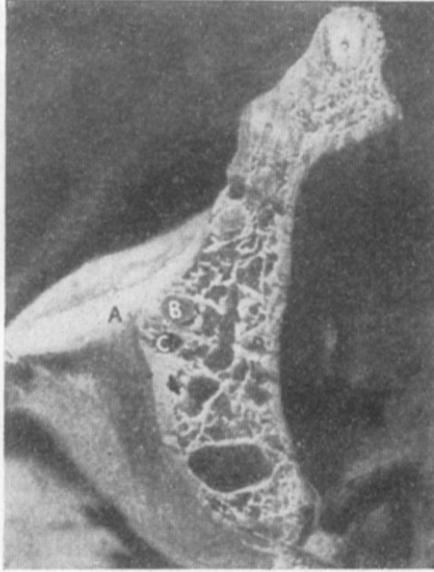


Fig. 3.—Horizontal section showing abundance of cancellous bone in molar area. (From Atkinson, Spencer R.: *J. Am. Dent. A.* 24: 560, 1937.)

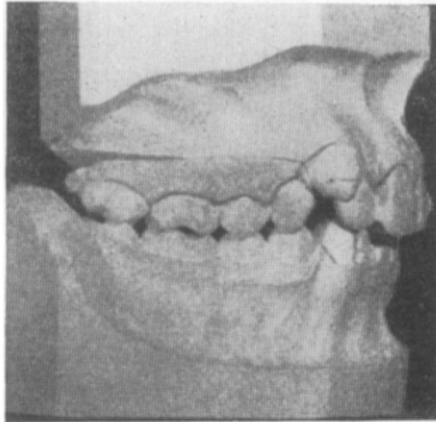


Fig. 4.—The Philosophy of Segmental Therapy. (From Atkinson, Spencer R.: *J. Am. Dent. A.* 24: 560, 1937.)

(d) Correction of deep overbites: after primary impediments are corrected, there may be a severe deficiency in vertical growth; this is usually recognizable by short unerupted lower premolars and by the presence of a pronounced horizontal ridge running from first mandibular premolar distally, about 2 to 3 mm. below the gingival line. An Oliver guide plane or the usual removable

Hawley with guide plane may be used to induce vertical growth in the posterior area. Of course, concomitant myofunctional therapy, especially that of the masseter-temporal muscle group should be instituted, if stability of results is to be insured.

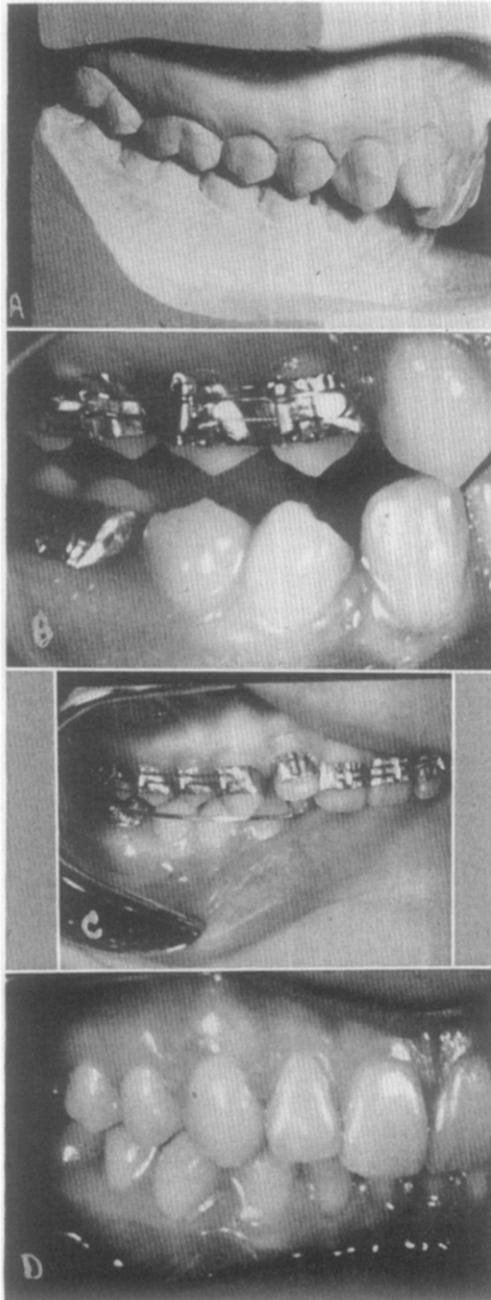


Fig. 5.—Atkinson segmental therapy for distal movement of premolars and molars en masse.

(e) Leaning habits, lip biting, tongue and posture habits should be corrected as early as possible.

Another stumbling block for a certain group of orthodontists may have been the fact that, with the technique employed, they found it difficult to move lateral segments distally. However, those who have taken advantage of the teachings of Atkinson and Johnson have been able to move the upper premolars and molars distally without too much difficulty.

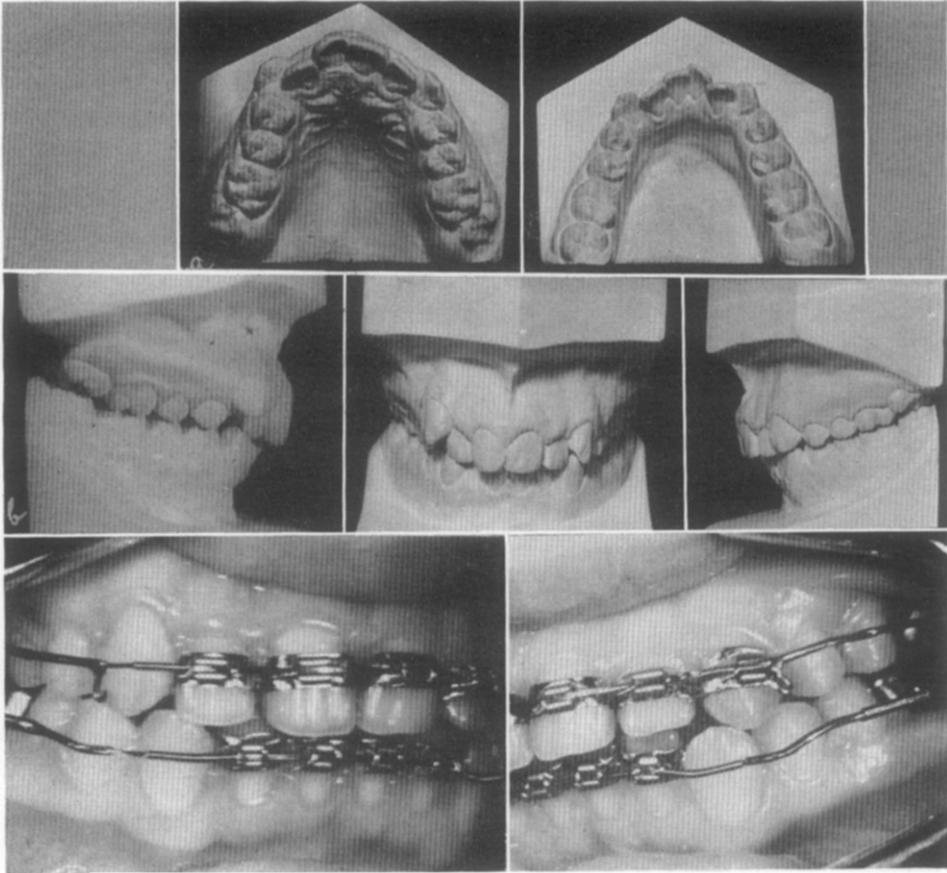


Fig. 6.—*a* and *b*, Borderline case which might be considered a candidate for premolar extraction but which responded well to segmental therapy; *c*, segmental therapy, no extractions; satisfactory results.

Atkinson⁹ states: "If the forward relationship of the molars is recognized, these teeth may readily be retruded through the cancellous bone lying between the lingual and buccal cortical plates. Normal cancellous bone is rich in marrow and has abundant circulation desirable for facile bone change." (Fig. 3.)

Fig. 4 shows how Atkinson demonstrates the rationale of en masse retruding of premolars and molars. "The cuspid and lateral will drop into place when misplaced buccal segment is moved posteriorly to proper position in relation to key ridge."

Fig. 5, *a* shows case requiring segmental therapy.

Fig. 5, *b* shows method used in banding the premolars and molars for distal movement en masse. The result obtained is shown in Fig. 5, *c*.

Fig. 5, *d* shows case two years after all appliances have been removed. No relapse has occurred.

Fig. 7.

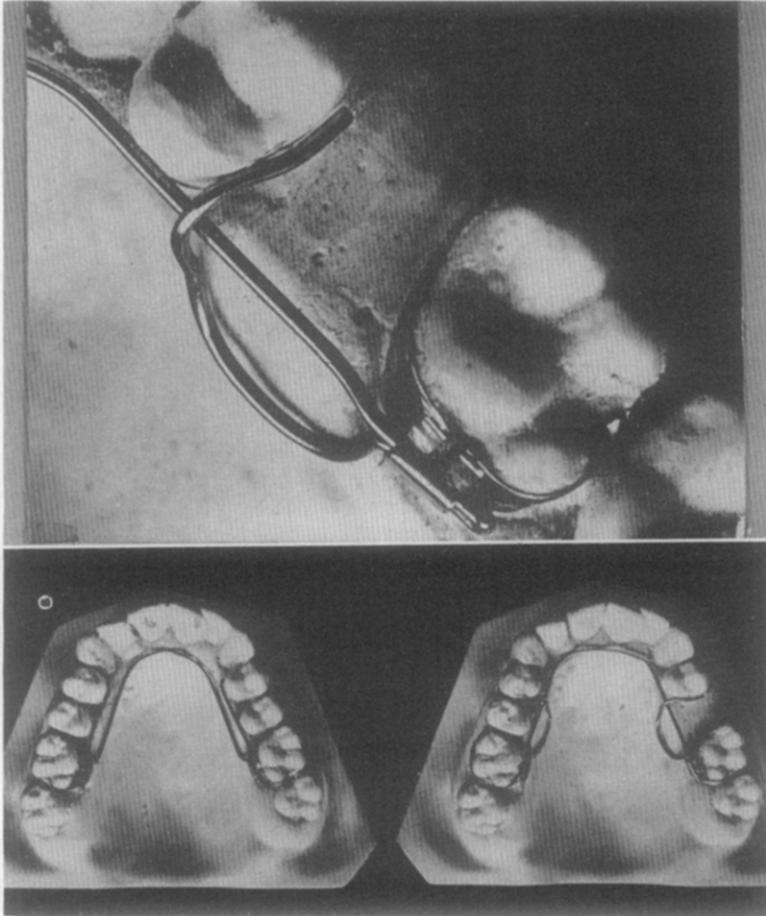


Fig. 8.

Fig. 7.—Atkinson lingual attachment, permitting distal movement of molars without the impediment offered by the usual vertical-post lingual. (C. F. Stenson Dillon.)

Fig. 8.—Atkinson lingual appliances. (C. F. Stenson Dillon.)

Fig. 6, *a* and *b* show a similar case, but one that borders on being a case of constricted apical base. This is the type of case where the orthodontist might as well give the patient the benefit of the doubt and, before deciding on extractions, institute conservative treatment. The segmental therapy was employed with the result shown in Fig. 6, *c*.

These cases show that, where basal bone is sufficient in size, blocked-out cuspids and crowded anteriors can be corrected by employing the segmental therapy of retruding the misplaced buccal teeth.

Another reason for "failures" may have been due to the fact that some practitioners failed to avail themselves of the benefits that can be derived from the use of a lingual appliance, be it Mershon, Atkinson, or Johnson.

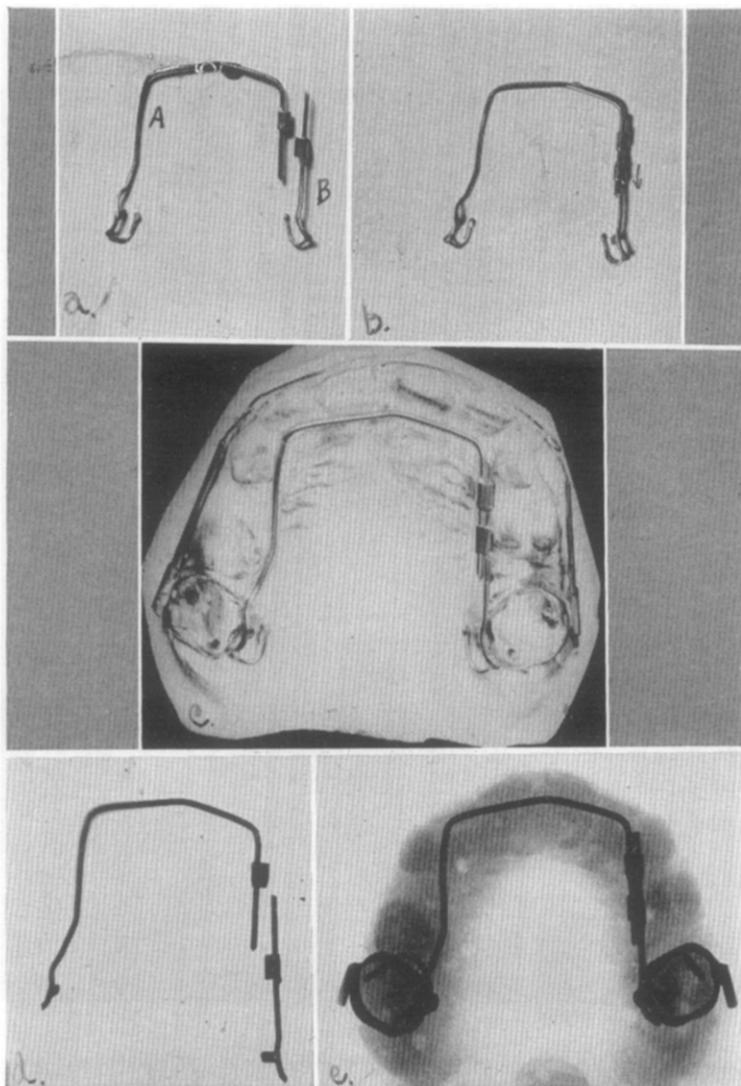


Fig. 9.—*a*, Modified Mershon lingual to allow for distal movement of molars while at the same time keeping them, by expansion, within cancellous bone. One Ellis tube is soldered to the lingual (*A*) and another to the segment (*B*) in such a manner that the segment (*B*) will slide distally unimpeded. *b*, Split lingual in working position. Arrow shows direction of movement. *c*, Split lingual on model. *d* and *e*, Prints from x-rays taken of split lingual on model and by itself.

Those employing a lingual appliance for many years have found great satisfaction and obtained stable results, even in cases requiring extensive expansion. The lingual appliance affords the use of a gentle, continuous force, which the tissues seem to tolerate in a gratifying manner. One sees little luxation of teeth and the gums remain pink and hard throughout treatment. This

is not always the case when traction or pulling force is used by means of almost any labial. The "pushing" force seems more compatible with the physiologic limits of tissue repair.

Since the majority of our cases require some lateral expansion, some form of lingual appliance should be a "must" in the armamentarium of every orthodontist.

During the distal movement of lateral segments, the molars need to be guided and kept within the cancellous bone, otherwise they have a tendency to drift lingually or palatally. A lingual appliance, such as the Atkinson lingual, is best suited for this purpose. Figs. 7 and 8 show the Atkinson lingual attachment, permitting distal movement of molars, without the impediment offered by the usual vertical-post lingual.

For those using the Mershon lingual, a split lingual, as described below, may be used to advantage.

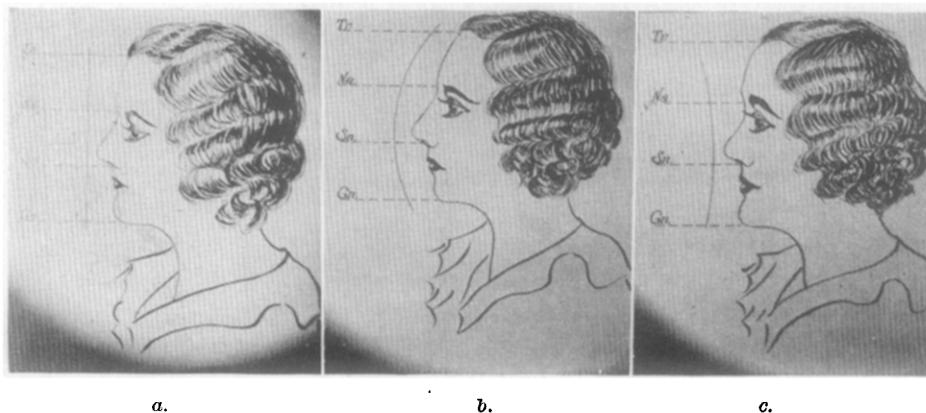


Fig. 10.—The three composite types of individual normal physiognomy. *a*, Straight, *b*, convex, and *c*, concave. (C. F. Stenson Dillon.)

This appliance is constructed according to the original Mershon idea of making the arch in two parts. The modification consists of making the "working segment" short, only up to the cuspid, while the longer, "stabilizing end" is made to extend to the distal of the second premolar. (Fig. 9, *a*.)

Construction of the appliance consists of soldering one 0.036 Ellis tube to the long end (*A*) and one to the short segment (*B*) while the body wires are kept perfectly straight to allow for the easy sliding of the "working segment" (*B*). Arrow on Fig. 9, *b* shows direction of unimpeded travel of working segment. Fig. 9, *c* shows appliance on model. A more graphic illustration of this appliance may be seen in Fig. 9, *d* and *e*, which are prints made from x-rays.

While the usual vertical-post lingual impedes the distal movement of molars, especially in unilateral cases, the split lingual permits retrusion of molars while, at the same time, allowing us to guide and keep the molars within cancellous bone by applying expansion adjustments, as the teeth move distally into wider areas.

Another cause for "failures" may be due to the inattention given to the correction of pernicious habits. Various leaning habits, sleeping habits, lip and

cheek biting, finger sucking, and bad posture have been shown to cause many malocclusions. They remain a deterring factor during active treatment. Atkinson⁹ states that if we would check back on our relapses, we would find that, in most cases, some pernicious habit has remained active.

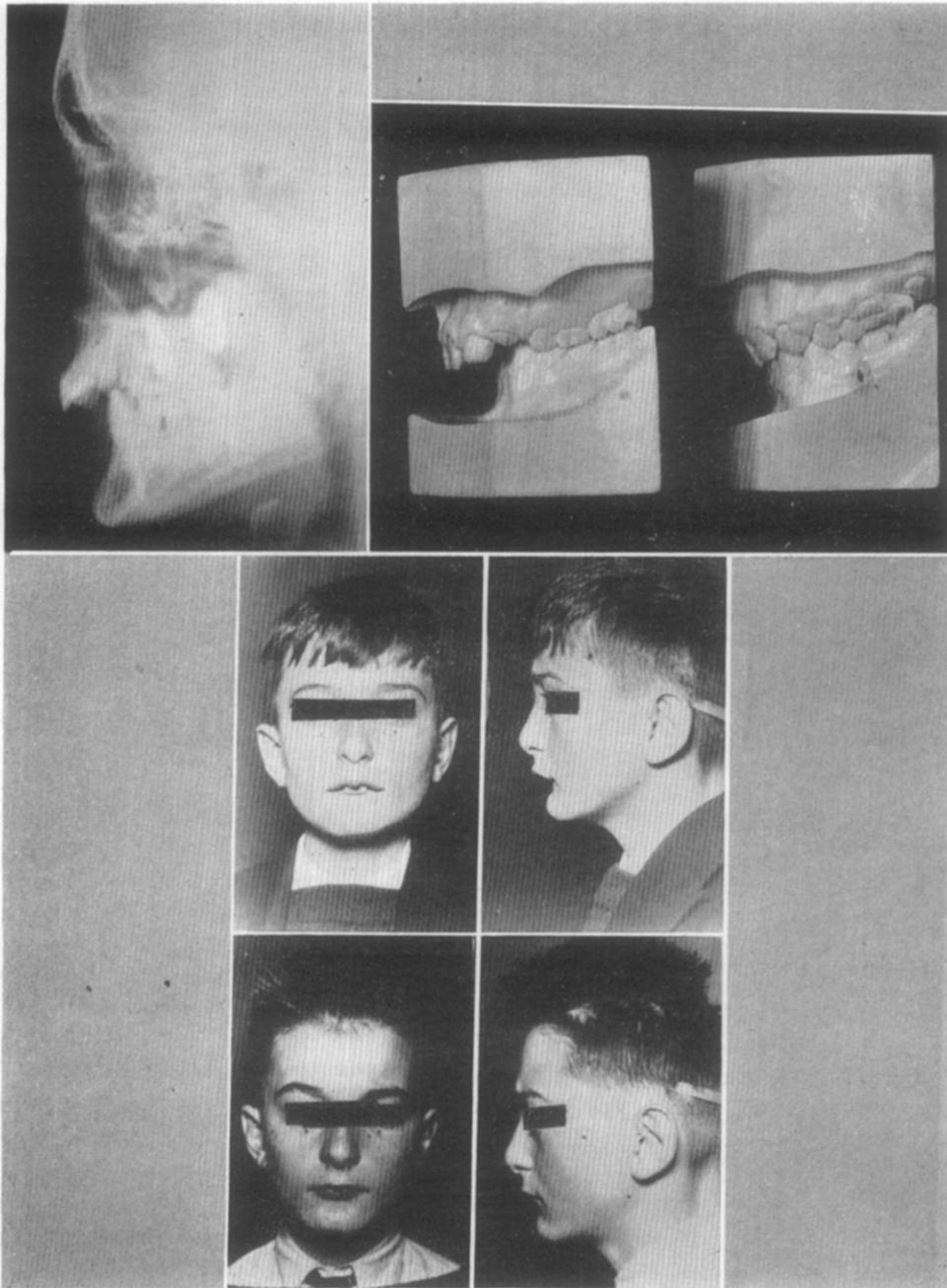


Fig. 11.—Extreme lower alveolar retraction. Satisfactory results with conservative treatment.

The attempt to mold, by orthodontic means, all faces into the ideal type may be another reason for the many so-called failures. Just because the patient's face does not turn into that of a Venus or an Adonis does not mean that the orthodontic treatment is a failure.

Brodie¹ states that it is presumptuous to attempt to change the individual normal pattern.

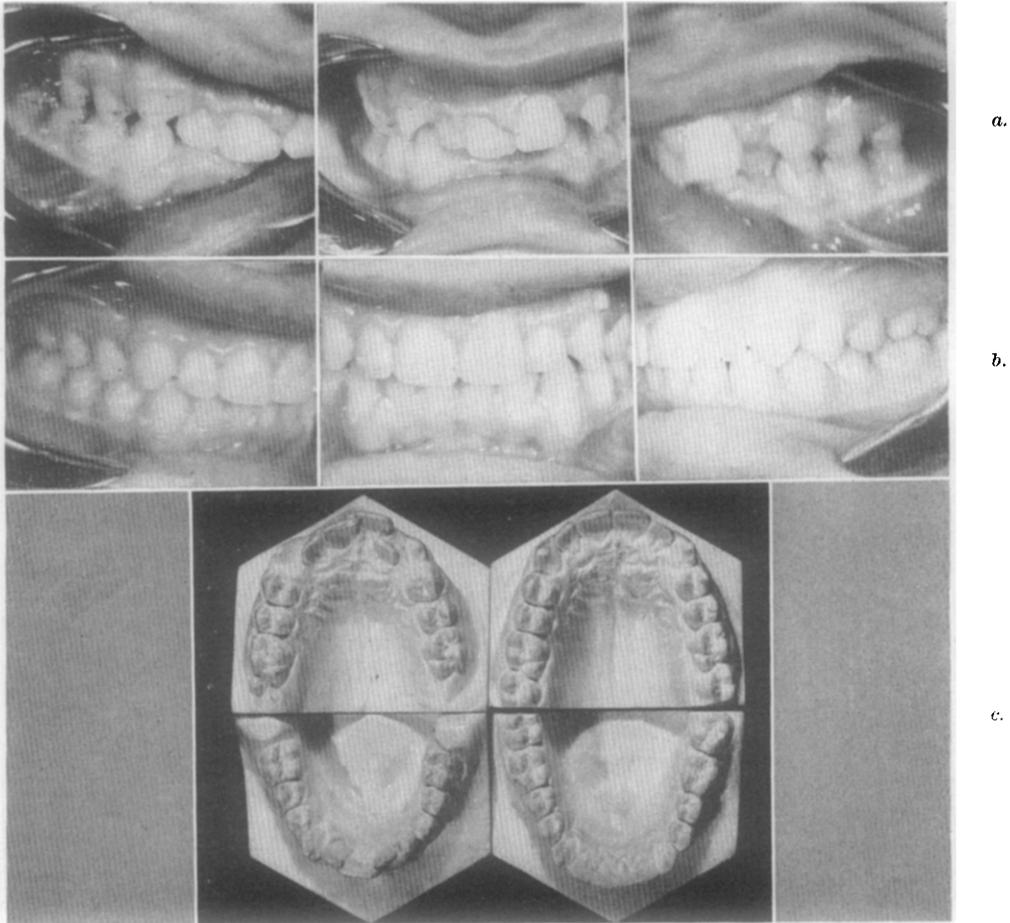


Fig. 12.—*a*, Case where mesial drift of lateral segments blocked out the cuspids and upper left lateral in lingual version. *b*, Conservative treatment employed; lateral segments were moved distally and anteriors lined up. *c*, Left, broad base of well-developed basal bone. Right, after treatment, full complement of teeth, lined up on ridge, with sufficient bony investiture.

C. F. Stenson Dillon divides normal physiognomy into three types of faces: (a) straight, (b) convex, and (c) concave. (Fig. 10.)

The orthodontist should not attempt to change the convex or concave type to the straight type, unless he wishes to invite a relapse after treatment.

From the foregoing, it may be reasoned that failures or relapses may have been due not so much to the procedures employed, but more to the lack of attention being paid to improvements and refinements in the various techniques

and philosophies and to the lack of so combining the many good points in the new procedures that a composite multideveloped *modus operandi* be instituted, which is at once rational and progressive.

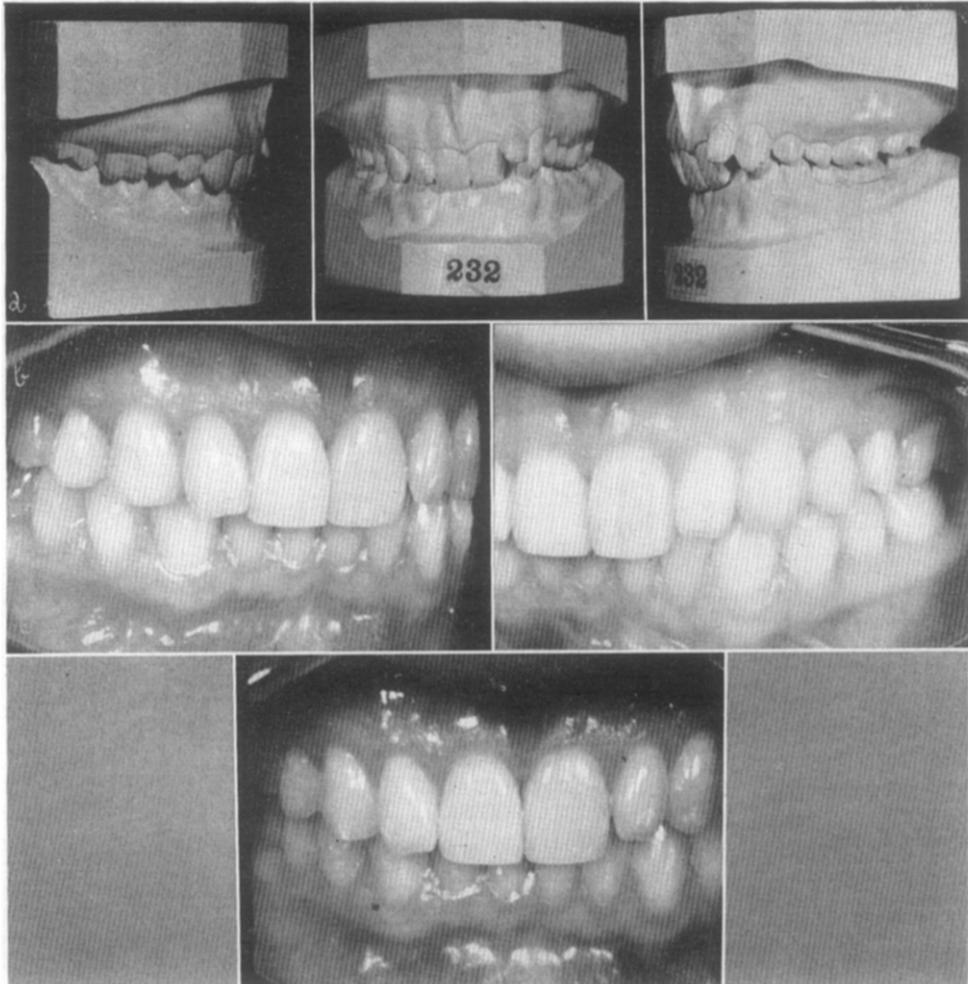


Fig. 13.—*a*, Extreme overbite, upper lateral segments mesial to normal. Atkinson segmental therapy employed to carry premolars and molars distally en masse. *b*, Intraoral views two years after all appliances were removed. Case is stable, no relapse.

Among these philosophies and procedures may be listed:

- a. Early treatment.
- b. Habit correction.
- c. Recognition of pattern of growth limitations.
- d. Nonconfinement to "one and only" procedure.
- e. Incorporation of advantageous features of other techniques.
- f. Rational and progressive *modus operandi*.
- g. The appliance adapted to the case, and not the case fitted to the appliance.
- h. Tolerance of the other man's viewpoint.

Clinical experience has proved, through the years, that the majority of our cases may be treated successfully by using conservative methods.

Fig. 11 shows model and photograph of a severe case treated with the labiolingual appliance. The result obtained was satisfactory both as to occlusion and esthetics. It should be noted that the teeth are on the ridge. No extractions were resorted to.

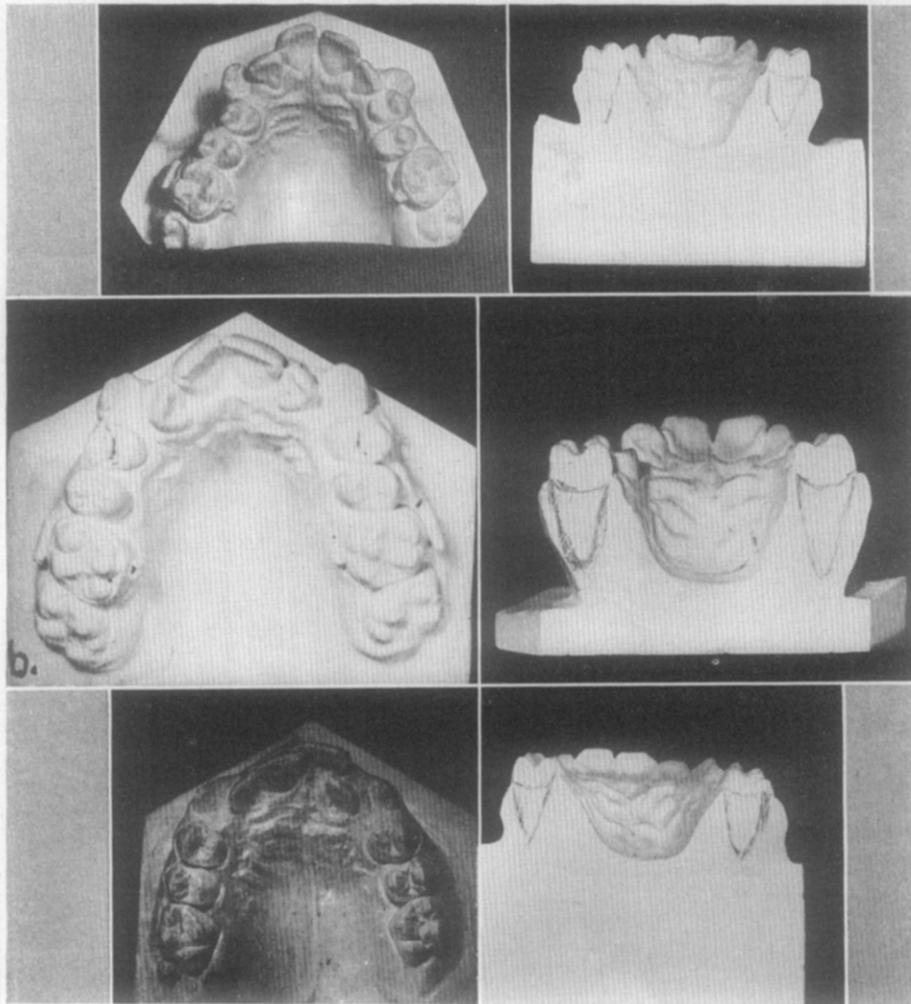


Fig. 14.—*a* and *b*, Left, models of cases with constricted apical base. Right, cross sections through premolar areas of the same casts. Proximity of roots to cortical plates precludes bodily movement of premolars. Insufficient medullary bone indicates need for extraction of some dental units. *c*, Left, wide alveolar process with broad basal bone underlying it. Ideal for expansion. Right, ample cancellous bone present between roots and cortical plates will permit for facile bodily movement of premolars.

Fig. 12, *a* depicts a case where a mesial drift of molars and premolars has blocked out the erupting cuspids; anteriors are in torsion and the upper left lateral incisor is crowded out.

The lateral segments were carried distally and the anteriors were lined up. Johnson twin wire was employed in conjunction with Mershon lingual. (Fig. 12, *b*.)

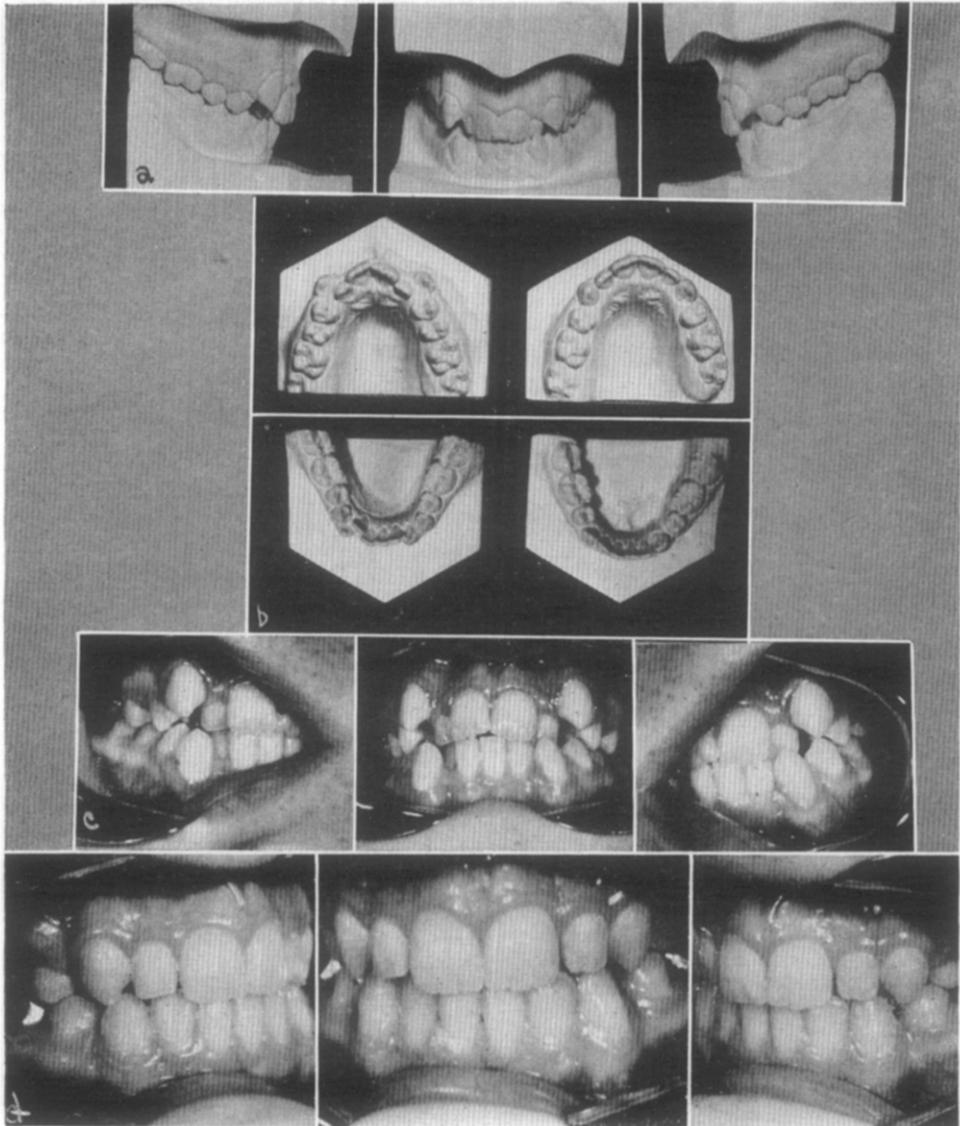


Fig. 15.—*a*, Pseudoneuroclusion, female, aged 13 years, 4 months. Blocked-out cuspids and crowded anteriors. *b*, Occlusal view shows insufficient medullary bone to accommodate all the teeth. *c*, Intraoral views before treatment. *d*, Intraoral views after eighteen months of treatment. Bodily movement obtained by employing the vertical double hook. *e*, X-rays of case showing correct axial position of cuspids and good proximal contact.

Occlusal views before and after treatment show well-developed basal bone. Relapse is unlikely as all teeth have sufficient bony investiture. (Fig. 12, *c*.)

Fig. 13 shows another case of mesial drift of lateral segments. In this case the Atkinson segmental therapy was employed to retrude the premolars and

molars en masse. Intraoral views taken two years after appliances were removed show no relapse. (Fig. 13, *b*.)

These cases are shown as evidence that cases requiring a great deal of expansion as well as distal movement of lateral segments will, if treated properly, maintain themselves and very little, if any, relapse may be expected.

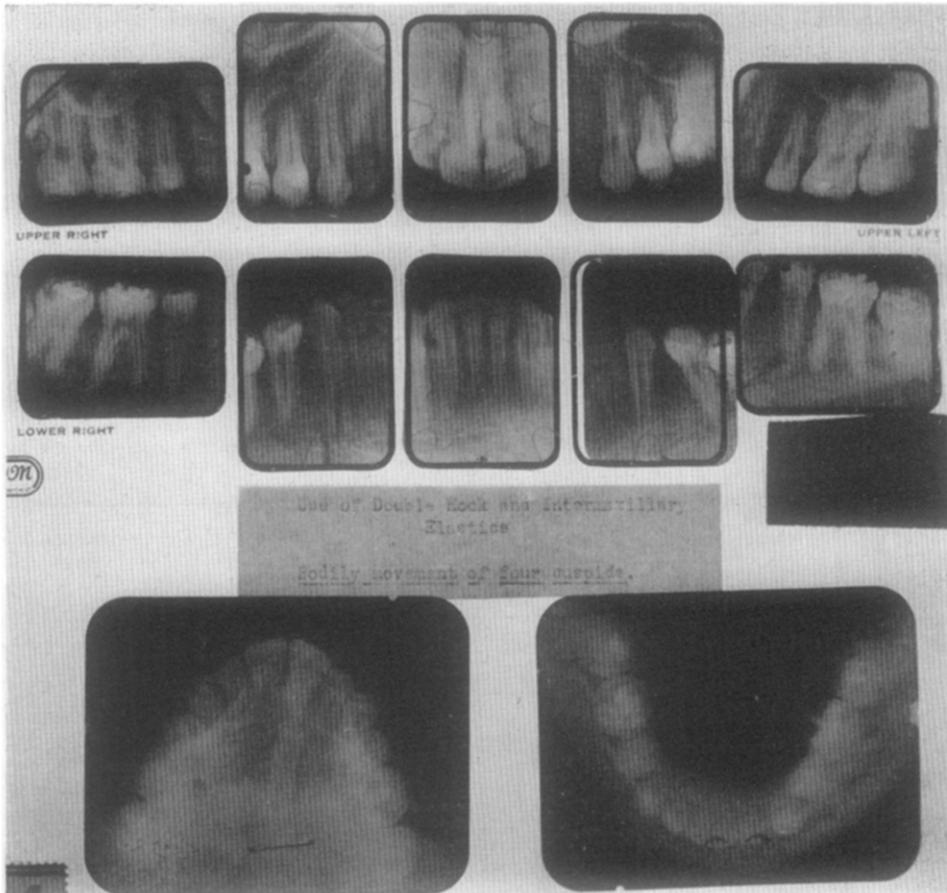


Fig. 15.—*e*, (For legend, see opposite page.)

These successful results were due, in large part, to the fact that the basal bone was of sufficient size to accommodate the full complement of teeth. However, there are many patients, especially those in their teens, that present quite a disproportion between tooth material and the size of the basal bone. Fig. 14, *a* and *b* depict such cases of disproportion between the small underdeveloped basal bone and the number of teeth present. Cross sections of the upper models of these cases in the premolar area show constriction in the basal bone area. The proximity of the roots to the cortical plates leaves little cancellous bone through which bodily movement of premolars could be obtained. Expansion will result in tipping the crowns buccally into a position which, according to clinicians and

theorists, is not stable and has a tendency to relapse. Reduction in the number of dental units becomes the procedure of choice.

On the other hand, Fig. 14, *c* shows the occlusal view of a case with a wide basal bone. The cross section made of this model in the premolar area shows the ample supply of cancellous bone between the roots and cortical plates. This would permit bodily movement of premolars.

Several cases will be shown which, for the lack of a better name, could be called pseudoneutroclusion. Actually, they probably are forward translations of the maxillary and mandibular alveolar processes, associated with strong abnormal muscle tone, the latter preventing the protrusion of the anteriors. Patients are usually in their teens.

The upper first molars are usually anterior to the "key ridge." The cuspal relationship of premolars and molars is usually satisfactory. Conventional methods of general expansion may disturb this nearly perfect interdigitation of the premolars and molars and would probably carry the anteriors off the basal bone. The result would be unstable, especially since the "abnormal muscle balance" will continue to adversely affect the growth and development of the alveolar bone and may cause a relapse.

The removal of a premolar in each quadrant should be the procedure of choice and would prove more conservative than the orthodox treatment of expansion. The cuspids are to be moved bodily to proper proximal contact with the second premolars, and the anteriors are to be lined up.

Fig. 15, *a* is an example of such a case. Note the case is in neutroclusion, but actually the four lateral segments have drifted mesially. All four cuspids are blocked out and both the upper and lower anteriors are crowded. There is a definite discrepancy between the size of the basal bone and the number of teeth to be accommodated (Fig. 15, *b*).

The patient, female, was over thirteen, and was informed that the four first premolars would have to be removed in order to get a stable result. Fig. 15, *c* shows intraoral views of case before treatment was started. Fig. 15, *d* shows case after eighteen months of treatment. The cuspids have been moved distally by means of elastic force and the vertical double hook which will be described later on. Fig. 15, *e* depicts x-rays of case showing correct axial position of all cuspids due to the fact that they were moved bodily and not tipped.

Fig. 16 shows another case of pseudoneutroclusion with mesial drift of lateral segments, causing the blocking out of the cuspids, the upper buccally, the lower lingually. Fig. 17, occlusal view of upper, depicts insufficiency of basal bone, definitely incompatible with the unusually large teeth. Conventional procedure of expansion to accommodate all the teeth would have resulted in "toothiness" and the result would be unstable. The patient, female, 19 years of age, was advised to have the upper two first premolars removed. The vertical double hook method was used with results shown in Fig. 18. Intraoral views taken two years after treatment show no tendency to relapse (Fig. 19).

If these cases had received the usual treatment, namely, rounding out of the arches by means of general expansion, the results would have had the characteristics of a bimaxillary protrusion. "We would just change one malocclusion for another," as stated by Tweed.

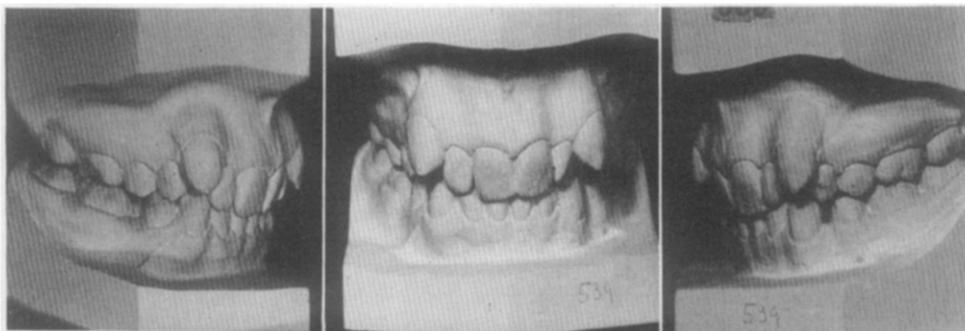


Fig. 16.

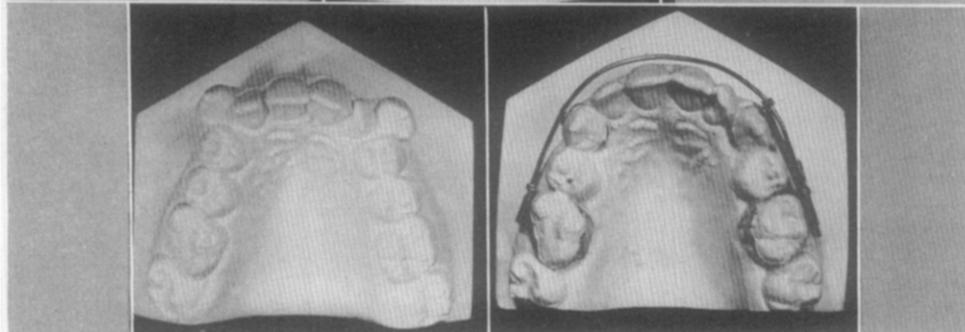


Fig. 17.

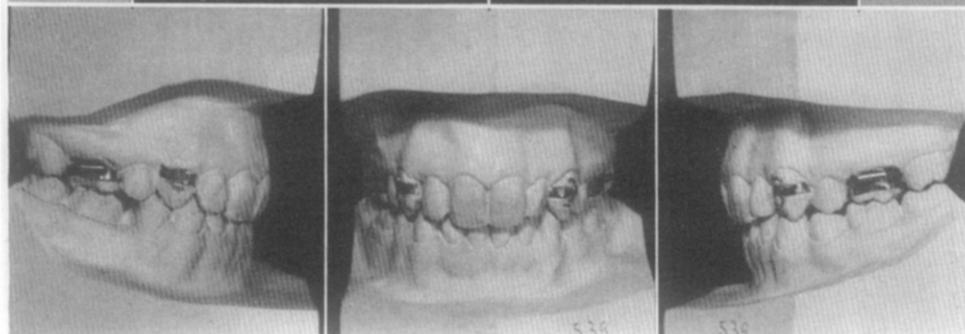


Fig. 18.

Fig. 16.—Pseudoneutroclusion, mesial drift of lateral segments.

Fig. 17.—Occlusal view of upper: left, before treatment showing deficient basal bone; right, after treatment, note symmetry of arch.

Fig. 18.—Models of case after treatment. Cuspids moved bodily by means of vertical double hook.

Another group of cases where reduction in number of dental units is indicated are those with congenitally missing lower premolars or in mutilated cases where one or two teeth have been lost prior to treatment. In most of these cases we find that the spaces have been closed up and the teeth anterior to the space have moved back bodily. The upper teeth are usually crowded, and one or two cuspids may be blocked out; both arches have underdeveloped basal bone.

It would prove impractical to open the space, nor can fourteen teeth in the upper be aligned with twelve in the lower.

Neither does it seem rational to expect any assurance of success if we attempt the bodily movement of eight to ten mandibular teeth. The removal of a corresponding number of premolars in the opposite arch should be the procedure of choice. A stable result may thereby be expected.

Fig. 20 shows a model of a case that is typical of this group. It is important to note that the lower is symmetrical in appearance, the teeth anterior to the space having moved distally and maintained a correct axial inclination (Fig. 21). To disturb this symmetry would be fallacious. We are, therefore, faced with the problem of lining up fourteen teeth in the upper with twelve in the lower. It was deemed advisable to remove two upper first premolars. This would allow the cuspids to assume their correct position in the arch.

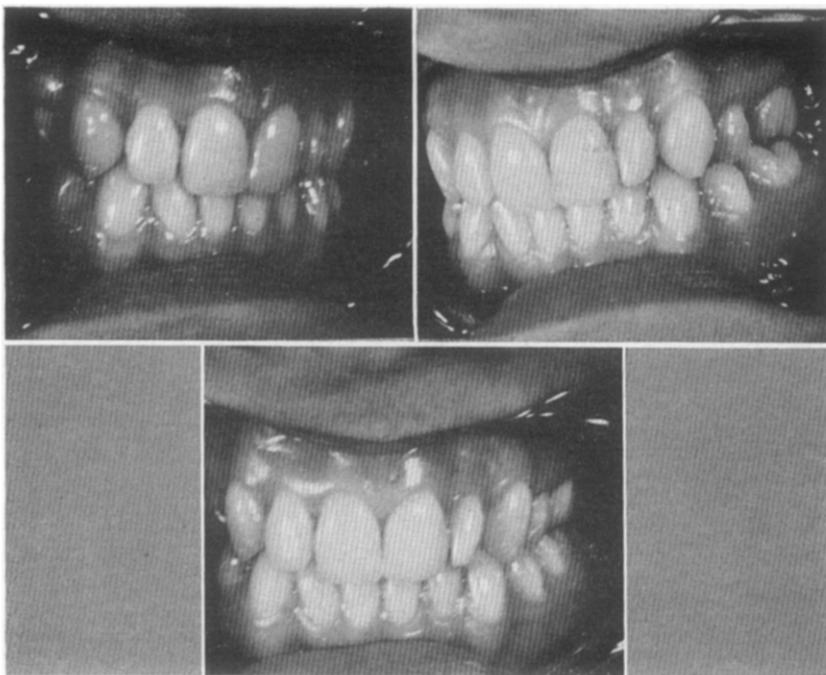


Fig. 19.—Intraoral views, taken two years after appliances were removed. Result stable.

Fig. 22 shows the case after fourteen months of treatment. Note bodily movement of cuspids, also depicted in x-rays (Fig. 23). Comparison of arch (Fig. 23) with the original emphasizes the logic of this procedure.

The following cases are of the mutilated type. These were due to the injudicious extractions of mandibular first molars without provision being made to maintain the space. The mandibular teeth anterior to the space usually drift distally and, in case of early extractions, the teeth move bodily and maintain satisfactory axial position.

Fig. 24 depicts such a case. It will be noted that the mandibular basal bone insufficiency would not permit the bodily movement of ten teeth.

The extraction of the upper first premolars seemed the only way to balance the upper teeth with the lower. Fig. 25 shows model of case before treatment. Fig. 26 shows model of case after treatment. Fig. 27 shows intraoral views of case after treatment.

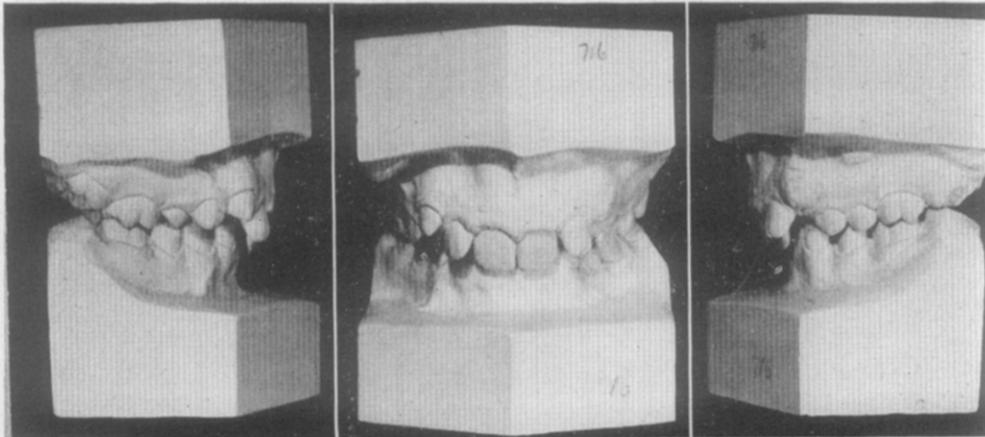


Fig. 20.

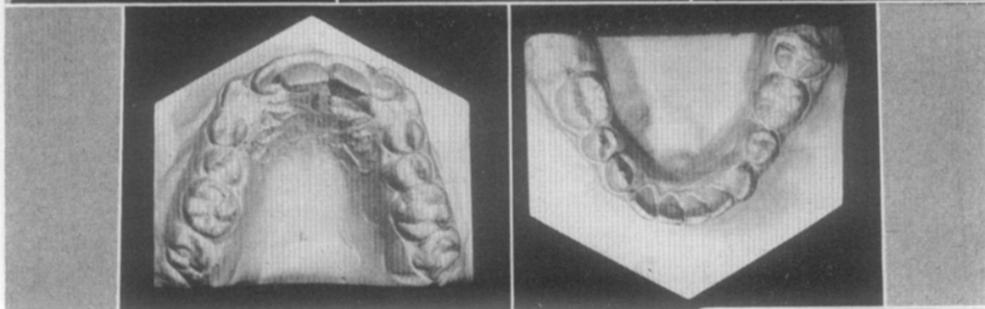


Fig. 21.

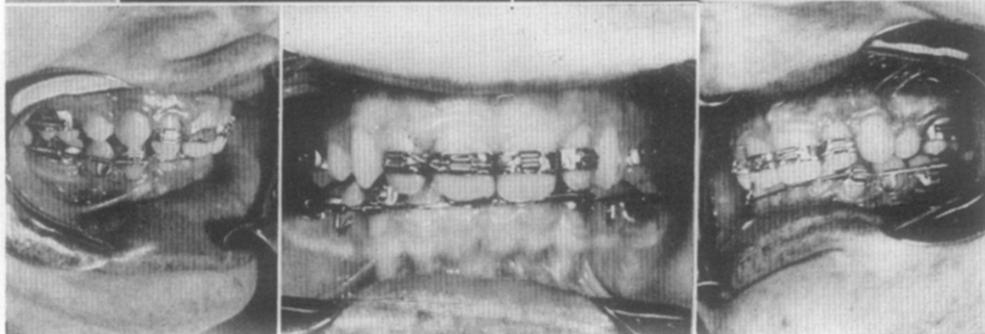


Fig. 22.

Fig. 20.—Congenitally missing second mandibular premolars.

Fig. 21.—Crowded upper arch, symmetrical lower, space of missing teeth completely closed.

Fig. 22.—Case after fourteen months of treatment. Note bodily movement of cuspid; bite improved.

A similar case, requiring the same procedure, is depicted in Fig. 28. Views on the left are before treatment and those on the right are after treatment. The lower first molars were lost due to decay. The teeth were unusually large

Fig. 23.

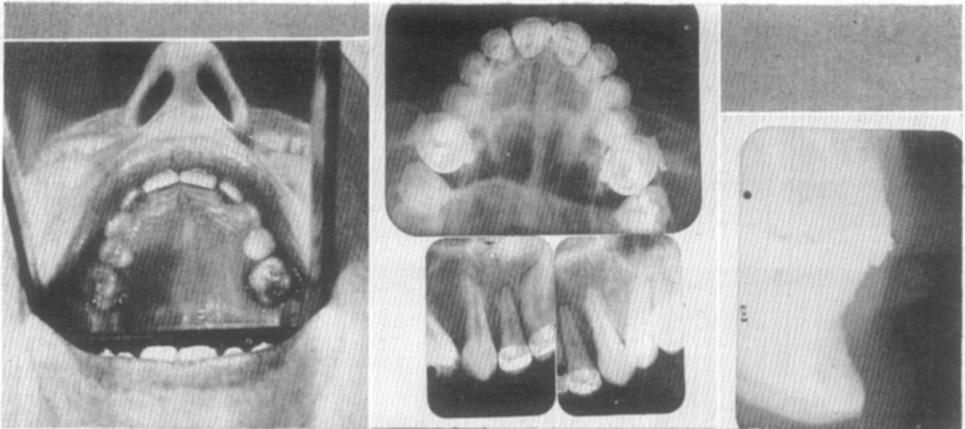


Fig. 24.

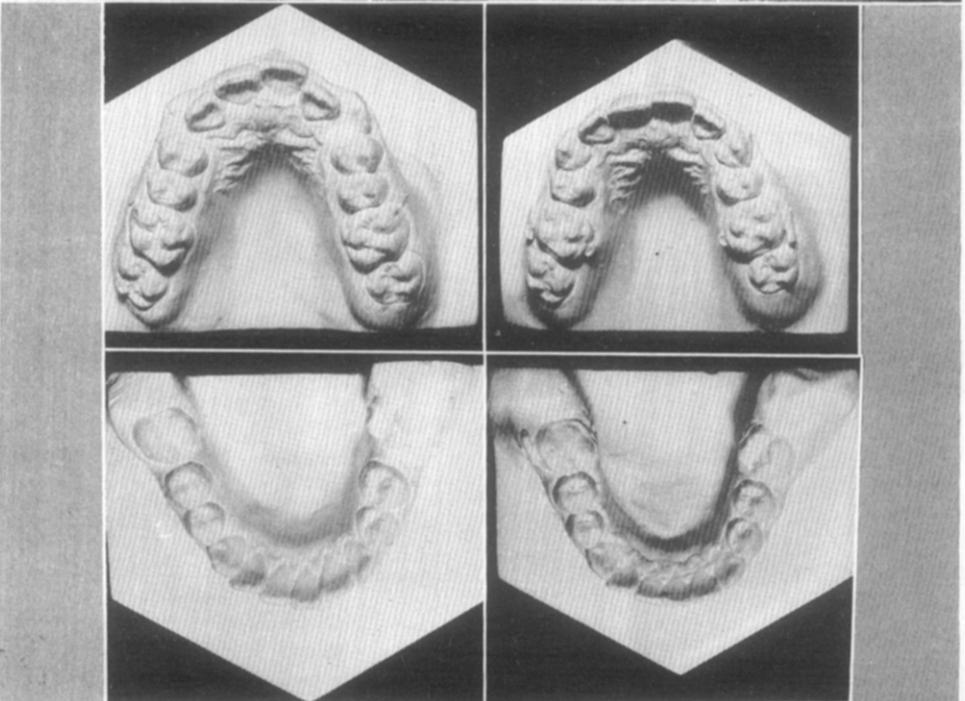


Fig. 25

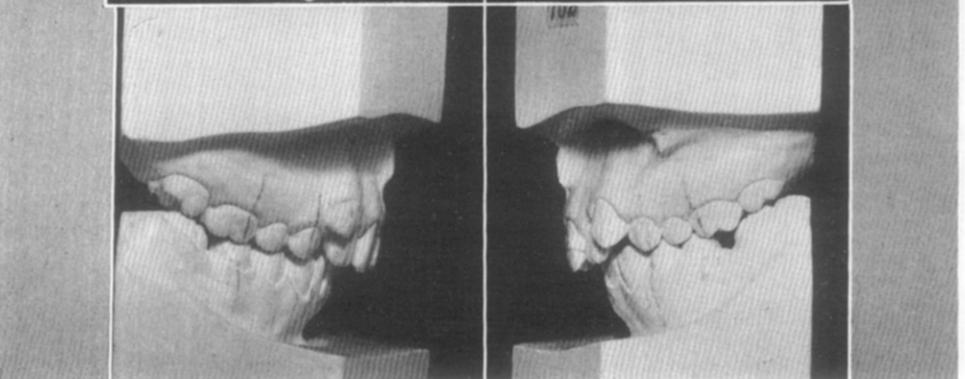


Fig. 23.—Symmetry of upper arch, after treatment. X-rays depict bodily movement of upper cusps.

Fig. 24.—Left, mutilated case. Lower first molars lost due to decay. Insufficient mandibular basal bone. Extraction of upper first premolars indicated. (Right, after treatment, note harmony between size of upper and lower arches.

Fig. 25.—(Models before treatment.) Blocked-out cusps; lower premolars and cusps in good axial position.

in size. The extraction of the upper first premolars was the only logical procedure. The result was satisfactory.

Fig. 29 depicts a case in which the lower first molars were lost due to decay. Due to the distal drift of all the lower teeth anterior to the space, the patient developed an extreme protraction in the premaxillary area, associated with crowded and rotated anteriors.

The upper first molars were badly decayed and had pulp involvement (Fig. 31). The extraction of these teeth was deemed advisable. The upper cuspids and premolars were moved distally en masse using the Atkinson segmental therapy. The bodily movement obtained can be seen in Figs. 30 and 31.

Fig. 26.

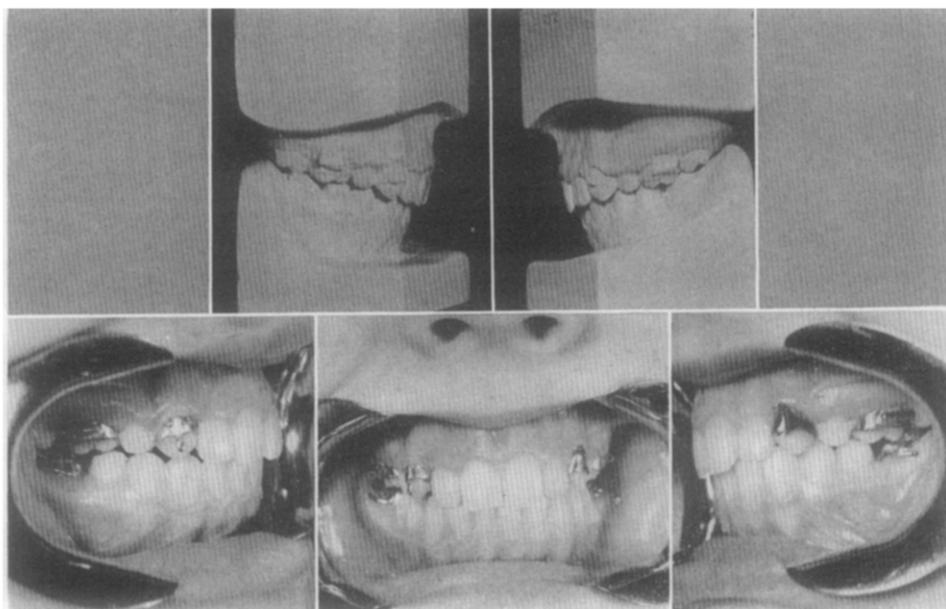


Fig. 27.

Fig. 26.—Model, after treatment, upper first premolars extracted. Note bodily movement of cuspids.

Fig. 27.—Intraoral views, after treatment. Note correct axial position of cuspids. The vertical double hook was employed.

The procedure employed in the bodily movement of cuspids and premolars consists in the use of an inter- or intramaxillary elastic which is stretched from a vertical double hook soldered to a band placed on the tooth to be moved. This vertical double hook is made by bending a 0.022 wire in the form of a "U" and is to be soldered the full height of the band, as seen in Fig. 32.

If the tooth to be moved is in infraversion, such as a blocked-out cuspid placed 3 to 4 mm. above the occlusal level, the case is started with an intermaxillary elastic, stretched from both arms of the hook to buccal tube of lower molar. In this manner, a distal as well as downward movement may be obtained.

When the tooth approaches the occlusal level, the patient is instructed to change to an intramaxillary elastic. Care must be exercised that the patient

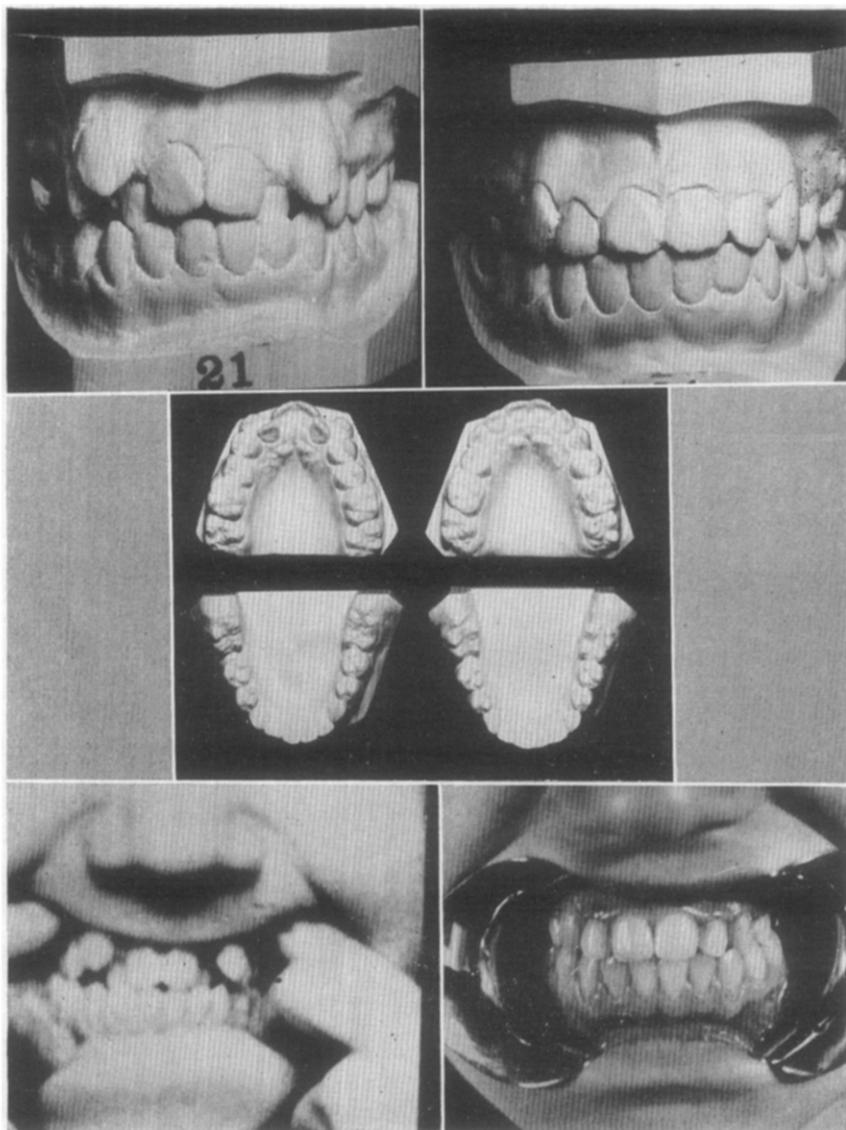


Fig. 28.—Mutilated case. Lower first molars lost due to decay. Insufficient basal bone required extraction of upper first premolars. Left, before treatment. Right, after treatment.

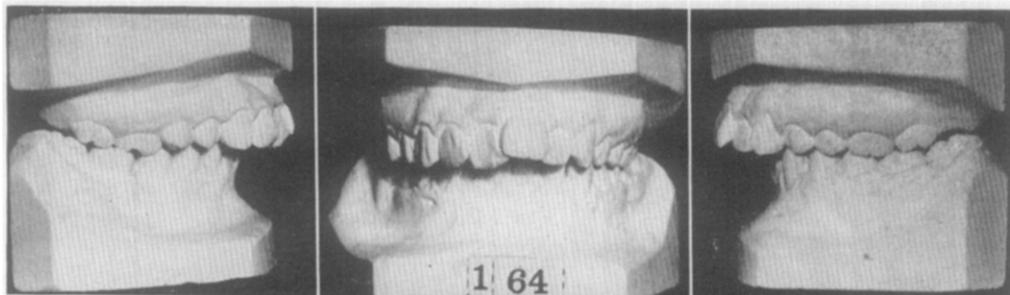


Fig. 29.

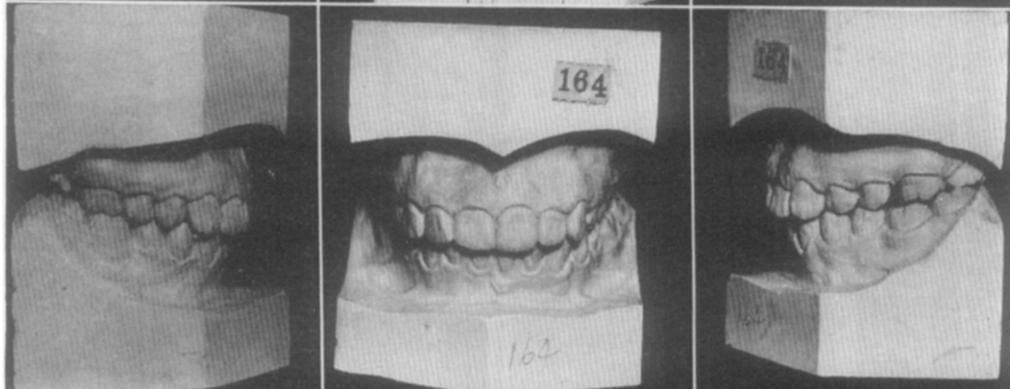


Fig. 30.

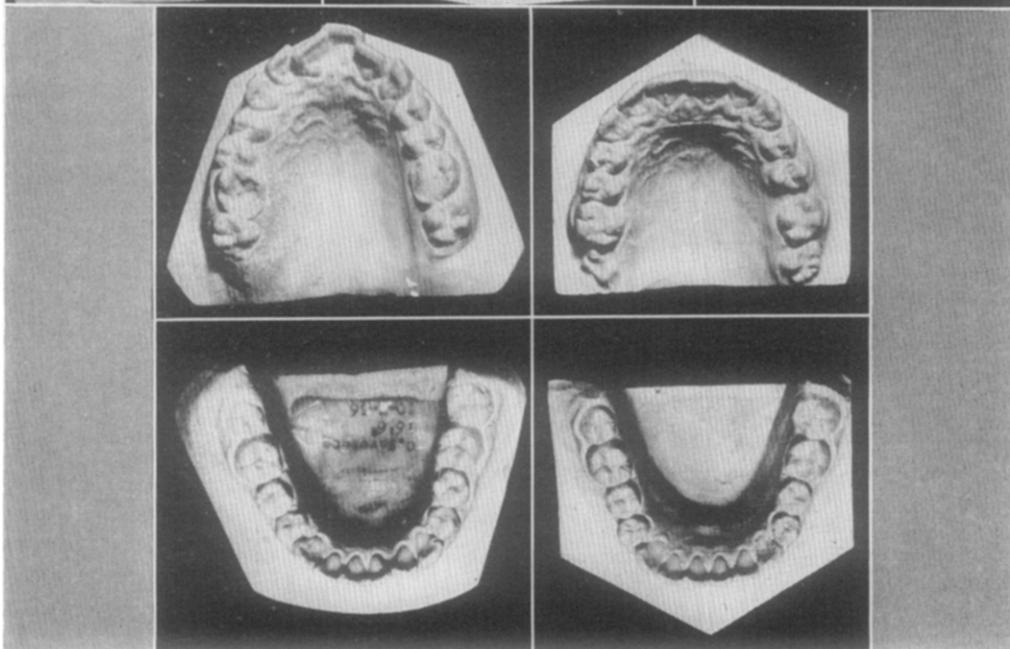


Fig. 31

Fig. 29.—Mutilated case, lower first molars lost. Extreme maxillary protraction and crowded and rotated anteriors.

Fig. 30.—Upper first molars removed, cuspids and premolars retracted, anteriors lined up.

Fig. 31.—Left, occlusal views before treatment. Note broken-down upper first molars. Right, after treatment. Note bodily movement of cuspids and premolars. Atkinson segmental therapy employed.

engage both arms of the hook when placing the elastics. This precaution will insure the bodily movement of the tooth involved; otherwise the tooth will be tipped, and the result will be unsatisfactory.

The rationale of the double hook may be depicted in Fig. 33. The base of the triangle formed by the elastic engages both arms of the hook and the force of the elastic is distributed along the long axis of the tooth, and only a bodily movement can ensue.

Fig. 32.

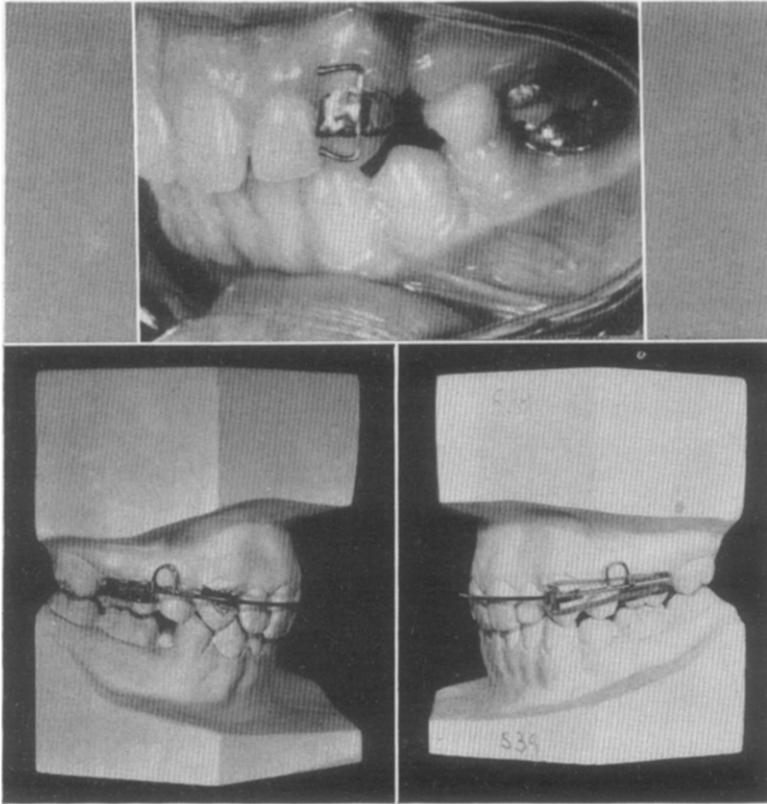


Fig. 33.

Fig. 32.—The vertical double hook.

Fig. 33.—Vertical double hook. Left, labial used to stabilize anchorage. Right, triangular use of elastic to insure bodily movement.

Fig. 34 shows a case requiring distal movement of cuspids in supraversion.

Fig. 35 shows same case after five weeks of wearing elastics from vertical double hook to lower molars, stabilized with a lingual appliance.

Fig. 36 shows three progressive stages in the use of the vertical double hook. The bodily movement proceeded satisfactorily.

The teeth used for anchorage are to be stabilized by either a labial or lingual appliance.

The molar bands should be cemented and the bands with the vertical double hooks, as well as the appliance, should be ready for insertion before allowing

Fig. 34.

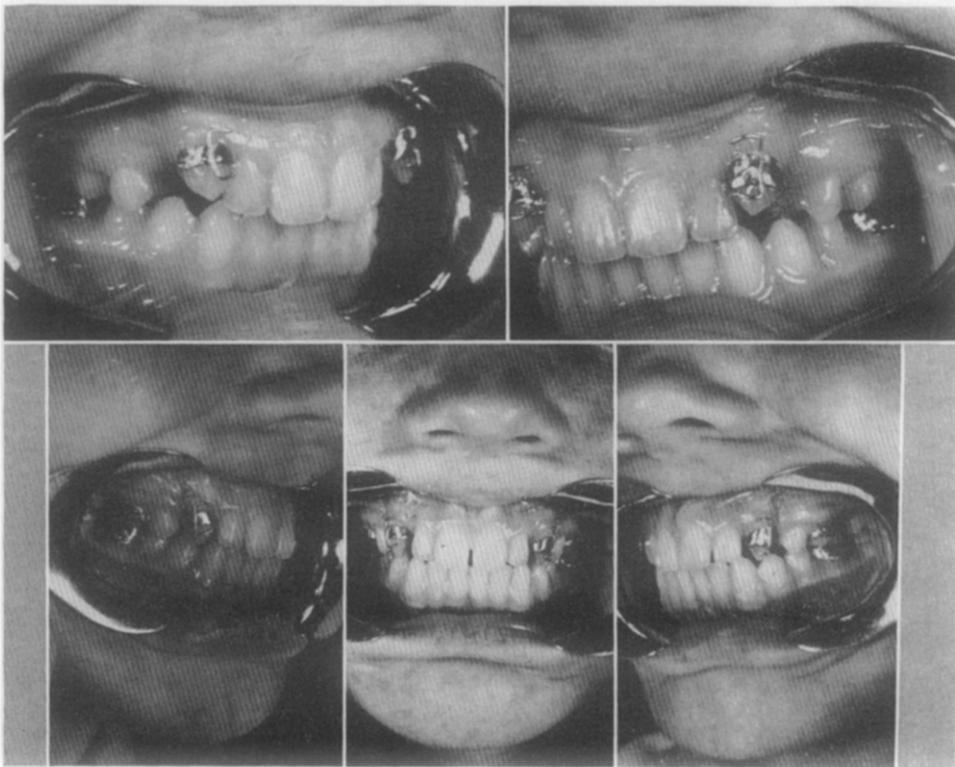


Fig. 35.

Fig. 34.—Cuspid in supraversion. Intermaxillary elastics used for downward as well as distal movement.

Fig. 35.—Five weeks later. Note the amount of tooth movement.

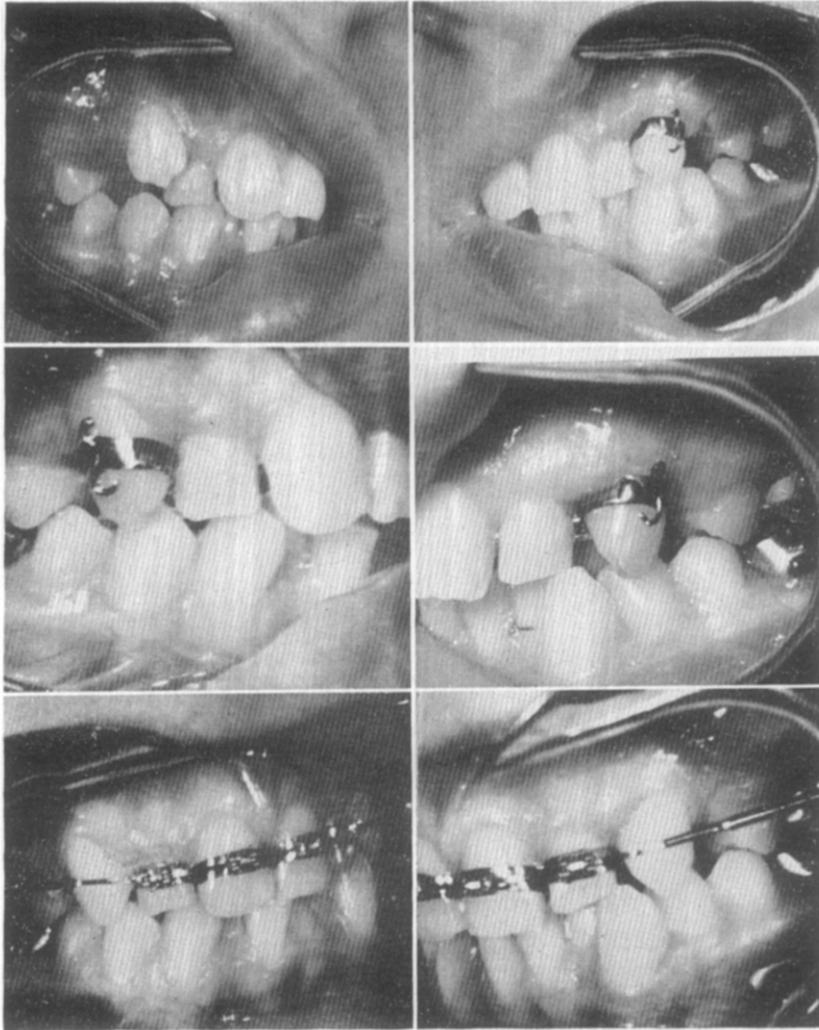


Fig. 36.—The use of the vertical double hook. Progressive stages, few months apart.



Fig. 37.—Constriction of alveolar bone at site of extraction.

the patient to have the premolars removed. Use of elastics should be instituted within several weeks after extraction. Should this precaution be overlooked and the use of elastics unduly delayed, there may occur, especially in the mandible, a constriction of the alveolar bone (Fig. 37). This would make the distal movement of the teeth through this constricted area quite difficult, if not impossible. The surgeon should be cautioned to exercise great care not to damage the cortical plates during the removal of the premolars.

SUMMARY AND CONCLUSION

It may be stated that the "extraction procedure" cannot and should not be considered the panacea of all orthodontic ills. Instead, it should be considered as a compromise to be resorted to only after all considerations have been given to the institution of conventional methods, that is, without extractions.

Judging from the opinions, based upon vast clinical material, of those men who base their plan of treatment on biologic principles and make use of mild forces obtainable through the use of simple mechanotherapy, the majority of the cases should be treated without employing extractions, especially if treated early in the life of the individual.

The answer to the challenge of the extraction enthusiasts lies in the method and approach to treatment; that is, in our ability to treat the malocclusions in their incipiency, and not try to unravel "un fait accompli." Early or primary treatment should not concern itself with minor tooth alignment, but, instead, should aim at the correction of the gross and important features of the malocclusion.

Primary consideration should be given to (a) constricted arches, (b) faulty jaw relationship, (c) faulty muscle development, (d) pernicious habits, and (e) mouth breathing.

In this manner, impediments to normal growth and development would be eliminated early in the life of the individual and, thereby, would allow natural tendencies to be directed toward normalcy in the size of the dental arches.

This, in turn, would be conducive to a better alignment of the individual teeth, even though the primary treatment were not directly concerned with their correction. The irregularities that would have to be treated during the secondary or final treatment would be of a minor character and amenable to simple corrective procedures that could be kept within physiologic limits.

As early as 7 to 9 years of age, the warning signs of severe malocclusion manifest themselves in one or a combination of the following symptoms: protrusive upper, retrusive lower, abnormal development of lip muscle, disturbed masseter-temporal function, mouth breathing, etc. These abnormal conditions, if not corrected, tend to become progressively worse. To allow them to prevail for five or more years until all the permanent teeth have erupted is probably the greatest mistake in orthodontics.

Maxillary protrusion and concomitant mandibular retrusion always cause a deformity of the lip muscle (orbicularis oris) to which are "attached" some sixty-four facial muscles. Poor tone of the orbicularis oris is reflected in an abnormal development of all these muscles resulting in the very Frankenstein that

Tweed now calls "the abnormal muscular balance" and which is now being given as the probable reason for the occurrence of relapses.

By postponing orthodontic interference until after the eruption of the second molars, this "abnormal muscular balance" will remain and act as a deterrent factor to the normal development of both hard and soft tissues of the lower third of the face.

To allow such an untoward force to be active for a period of six to seven years is to invite the development of severe malocclusions.

Early treatment could intercept the progressive development of the so-called "abnormal muscular balance" and thereby eliminate one of the outstanding causes of relapse.

C. W. Carey¹⁰ states: "The greatest opportunity for mandibular development lies in treatment in the primary or deciduous dentition stage, although the management of this treatment and preservation of the advantages gained are not often understood or appreciated by the profession."

Krogman's statement that only 15 to 20 per cent of growth increment remains as avenues of possible readjustment after 5 years of age emphasizes the need for early orthodontic interference which would stimulate the dormant growth potentialities.

In those practices composed mostly of patients under 12 years of age, it was found that extractions were needed in a very small percentage of cases. On the other hand, those orthodontists whose philosophy is to treat cases after the eruption of the second molars find that many of the malocclusions are too far advanced for orthodox treatment.

There are many ill-informed practitioners who indiscriminately advise their patients to wait until the full complement of teeth obtains. Consequently, these postponed cases, which may amount to 15 or 20 per cent of an average orthodontic practice, will require one or more extractions, if a stable result is to be obtained. No one should advise extractions except as an adjunct to orthodontic interference.

Before extractions are decided upon, an exhaustive study should be made from oriented photographs, oriented (gnathostatic) models, and x-rays. When the conviction is arrived at that conventional treatment, that is, without extractions, may result in an eventual relapse, then and only then, should a reduction in the number of some dental units be recommended.

Discrepancy between tooth material and supporting basal bone is one of the main factors to be considered. This is particularly evident in cases belonging to the following groups: pseudoneuroclusion, cases with congenitally missing mandibular premolars, and mutilated cases where lower molars were lost due to caries.

True double protraction may be improved by removing a premolar in each quadrant and retracting all the anteriors.

In some cases, any radical change from the pattern "laid out" by nature may prove unstable. This applies particularly to inherited Class II Division 1 cases, where parents or siblings show a family hereditary tendency toward deficient jaw development. The extraction of two upper second molars, as ad-

vocated by George R. Moore,⁷ seems a most logical course of treatment. The extractions are to be followed by a rapid distal movement of the molars and premolars. The third molars will normally take their place alongside the first molars in quite a satisfactory manner.

In adult cases, removal of one or two premolars may greatly facilitate lining up of the anterior teeth, in order to obtain an improved esthetic effect.

Judicious extractions of deciduous molars have their indications.

Those cases that, due to the "advice" of ill-informed dentists, have postponed orthodontic treatment until the late teens, may require removal of some premolars in order to insure a stable result.

Satisfactory function of the dental apparatus and pleasing features are, of necessity, the simple and concise demands placed upon the orthodontist; and to obtain these, extractions may have to be resorted to as the need arises.

I should like to conclude with Brodie's¹ statement: "My hope is that the present wave of enthusiasm for the extraction of teeth will recede to the place where the method is employed only when dictated by well-controlled evidence."

REFERENCES

1. Brodie, Allan G.: Does Scientific Investigation Support the Extraction of Teeth in Orthodontic Therapy, *AM. J. ORTHODONTICS AND ORAL SURG.* **30**: 444-460, 1944.
2. Salzmann, J. A.: The Rationale of Extraction as an Adjunct to Orthodontic Mechanotherapy and the Sequelae of Extraction in the Absence of Orthodontic Guidance, *AM. J. ORTHODONTICS AND ORAL SURG.* **31**: 181-202, 1945.
3. Silver, Edward I.: Forsyth Orthodontic Survey of Untreated Cases, *AM. J. ORTHODONTICS AND ORAL SURG.* **30**: 635-659, 1944.
4. Hahn, George W.: Orthodontics: Its Objectives, Past and Present, *AM. J. ORTHODONTICS AND ORAL SURG.* **30**: 401-404, 1944.
5. Tweed, Charles H.: Indications for the Extraction of Teeth in Orthodontic Procedure, *AM. J. ORTHODONTICS AND ORAL SURG.* **30**: 405-428, 1944.
6. Hellman, Milo: Fundamental Principles and Expedient Compromises in Orthodontic Procedures, *AM. J. ORTHODONTICS AND ORAL SURG.* **30**: 429-436, 1944.
7. Moore, George R.: Heredity as a Guide in Dentofacial Orthopedics, *AM. J. ORTHODONTICS AND ORAL SURG.* **30**: 549-554, 1944.
8. Thompson, Will McLain, Jr.: The Edgewise Arch Mechanism and Some Present Day Trends, *AM. J. ORTHODONTICS AND ORAL SURG.* **30**: 660, 1944.
9. Atkinson, Spencer R.: The Strategy of Orthodontic Treatment, *J. Am. Dent. A.* **24**: 560-574, 1937.
10. Carey, C. W.: Force Control in the Movement of Dental Structure: A Technique Designed to Apply Its Principles, *Angle Orthodont.* **14**: 47-66, 1944.