Static Anchorage in the Begg Technique

C. Stewart McDowell, D.D.S., M.S.D.

Introduction

One has to practice orthodontics for only a short time to see the desirability of maintaining the amount of anchorage necessary to accomplish his treatment goals. If the Begg operator is honest with himself, he sees that the classical Begg technique has not previously been able to maintain adequate anchorage in many cases. This is especially evident in those cases in which it is necessary to utilize most or all of the extraction site for uncrowding or retracting anterior teeth.

This paper will show that minor modifications in the Begg appliance enable us to utilize the entire extraction site for the distal movement of teeth, thus leaving the molars stationary in regard to mesial movement. Further, headgear is completely unnecessary for this static anchorage, although its anchorage value is equal to more than that of a headgear of one pound of force worn twenty-four hours per day.

In the past too little concern has been given by most clinicians to the patient who has had to wear headgear. An exception is Poulton,[1] one of the strongest advocates of headgear, who writes: "Of all the orthodontic appliances in use today, the headgear is the hardest for the patient to accept. Almost any malocclusion is far less noticeable than (this) remarkable arrangement of wires, straps, and elastics that the orthodontist prescribes for its correction."

We orthodontists see the patient for only a matter of minutes out of each month, whereas the patient must endure the headgear for a majority of the hours between these visits. The resistance to headgear by many patients is insurmountable and the acceptance of it by many others is because they have felt this is the only way their orthodontic problems could be corrected.

If we are truly humanitarians, we should strive to make our treatment of the patient as painless and comfortable as possible. This would exclude the use of headgear for the vast majority of patients and the remaining ones would wear it only a few months before full-banded treatment.

Until the rationale of truly stationary (hammock) anchorage was discovered,[2] achievement of treatment goals by the conscientious orthodontist was not possible for most patients without wearing headgear throughout treatment. However, the use of hammock anchorage enables the most particular operator to achieve his aims for most patients without their being subjected to headgear.

Review of the Literature

The desirability of being able to stabilize the anchorage in the Begg technique is obvious when one considers the following. Grafton[3] has shown that with this procedure the average mesial movement of the lower molars in Class II extraction cases is 97.2% of the width of the extracted tooth, and that the movement of the upper and lower anchor molars in Class I extraction cases is approximately half of the upper and half of the lower extraction spaces. This means therefore that the average anchorage loss in the Begg method is from approximately three and a half to

seven millimeters of each extraction site. However, in at least half our cases the total or most of the total extraction space should be utilized by the retraction or uncrowding of teeth anterior to these spaces, while maintaining the molars either exactly where they are or only slightly mesial to their original position. With the ability to control the anchorage as necessary not to lose any or, conversely, to purposely lose up to five or six millimeters, a modified Begg technique will allow us to keep the lower incisors exactly where we wish them to be. In other words, with static anchorage the lower incisors will often terminate four to eight millimeters more lingual than they would if treated under the unmodified Begg method, where the usual four to eight millimeters of anchorage is lost.

Until this writer published a previous paper,[2] stationary anchorage was considered a misnomer[4,5] and many questioned whether or not "prepared anchorage" was as reliable as an undisturbed tooth.[6,7,8] Extraoral force was the only anchorage considered stationary.[7,9,10] It was made most emphatic by many writers that stationary anchorage was an impossibility within the teeth alone.[6-16] Suffice it to say that most writers on the subject felt similarly to Moyers[17] who states that, "One of the most preposterous terms in use is 'stationary anchorage' to describe the resistance present when the anchorage can be moved bodily and not tipped. Stationary anchorage in the true sense of the word stationary is, of course, an impossibility."

The beliefs of these men, though erroneous, were logical at the time. They were unaware that stationary anchorage could be gained through the suspension of the anchor teeth in the tensed oblique fiber hammock, as a result of the reactive intrusive force exerted by the masticatory muscles when the anchor teeth are being used to stretch them slightly after the freeway is obliterated. This writer previously described how Begg and Tweed had unknowingly employed this principle in their techniques. Both achieved truly stationary anchorage through certain phases of treatment. However, with the Begg method some anchorage was lost in the early stages of treatment and lost freely in the third stage. Tweed was often able to maintain truly stationary anchorage not merely because he used headgear, but because he also unknowingly utilized the principle of hammock anchorage. (It was also pointed out that all examined patients who had completed treatment by either of these techniques had regained a freeway.)

Methods

Understanding the principle of truly stationary anchorage (hereafter called *static anchorage*) allows us to utilize it much more efficiently than it has been used previously. Aside from most nonextraction patients, there are few cases in which one would desire that the anchorage remain static in all four quadrants throughout treatment. The patient is usually one of the following: (1) one whose lower arch is good and in whom two upper extractions will leave his molars in Class II relations, (2) a bimaxillary protrusion case in which precisely all of the extraction sites are required for retraction of anterior teeth, or (3) a Class I extraction patient in whom the total extraction sites are necessary for the distal movement of crowded anterior teeth. Further, in each case the anchor molars within each arch must be nearly equidistant from the anterior midline. For one to show the cephalometric proof of static anchorage in each arch throughout treatment, a further qualification lies in the patient's not growing while under treatment. However, two such patients meeting these qualifications will be presented.

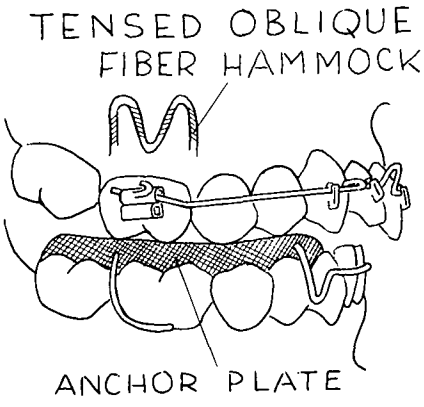

Fig. 1

The rarity of patients who fit the above requirements does not minimize the importance of static anchorage, for there are numerous cases in which one should lose merely one, two or three millimeters of anchorage in order to have the dentition arrive and remain in the proper position.

Static intraoral (hammock) anchorage is not achieved as a result of any particular orthodontic mechanism. Rather, it results from the utilization of the masticatory muscles in such a way that the anchor teeth are suspended in the oblique fiber hammock, often capable of totally resisting at least a half pound of constant mesial force in each anchor molar. The author has employed two mechanisms to accomplish this, but undoubtedly better ones can be developed. What is important is that one understand the principle behind this static anchorage, for it can be accomplished in a variety of ways.

Briefly, the freeway is obliterated before any mesial force is placed on the anchor molars. This can be accomplished in several ways. The one used in the case of D. N., a thirteen-year old female Class I nonextraction patient, was that of placing a lower "anchor plate" while banding the upper arch as it would have been banded in any conventional Begg technique (Fig. 1). The anchor plate is similar to a lower Hawley retainer except that plastic covers the occlusal surfaces of the lower posterior teeth sufficiently to contact all upper molars and premolars when the mandible is in its relaxed position. This means that there is no longer a freeway or rest position while the anchor plate is worn, and that the anchor plate causes the mandible to remain open very slightly into the postfreeway.

In D. N.'s case then, the freeway was obliterated by the insertion of the anchor plate and continued to be obliterated while this was worn. Consequently, on that same day an upper Begg Stage I archwire and upper horizontal elastics were placed. The tipback bend was much more extreme than in the usual Begg archwire, as it was known that the upper anchor molar could not tip distally. The masticatory muscles would resist the elevation necessary for such tipping. The severity of the tipback bend served to maintain sufficient tension in the masticatory muscles to hold the upper anchor molars stationary against the three ounces of force of the upper horizontal elastics. This amount of elastic force was maintained throughout this modified stage, which replaced the usual Stage I and II of the conventional Begg method. When the spaces were closed and the upper incisors were retracted completely, the classical Stage III was begun in the upper six anterior teeth (torque archwire and canine uprighting springs). Still the only banded teeth were the upper first molars and the six upper anterior teeth. However, the anchor molars held absolutely stationary to mesial movement through the completion of Stage III (Fig. 2).

B. C., on the other hand, required the correction of some rotations in the lower arch. Otherwise it was deemed advisable to leave the lower dentition in its pretreatment position mesiodistally, to extract only the upper first

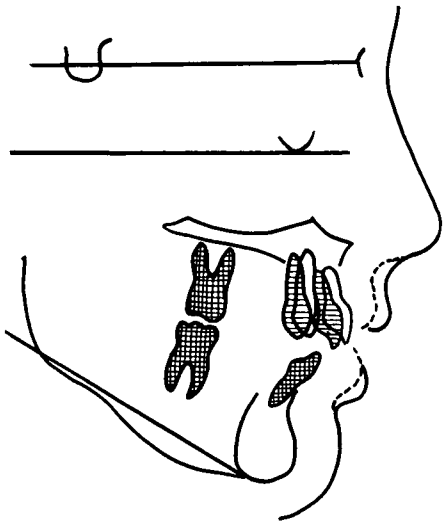

Fig. 2 Tracings of cephalograms taken in the rest position, superimposed on SN at S. (When rest position cephalograms of nongrowing patients are superimposed, only the true treatment changes vary from one cephalogram to the next.) One was taken before treatment and one was taken at disbanding (posttreatment). The lower teeth and the upper anchor molar can be seen to be in the identical positions on both tracings demonstrating static anchorage.

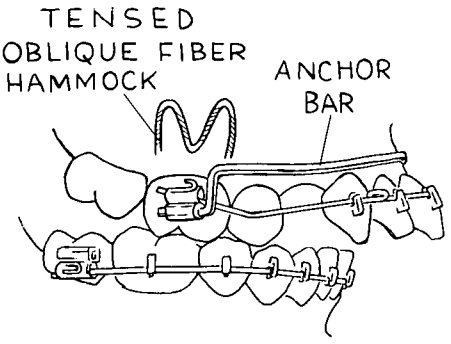

Fig. 3

premolars and to leave the molars in their Class II relationship (Fig. 3). In the upper arch the first molars and six anterior teeth were banded, with the anchor molars receiving double-buccal tubes (one of .036 and one of .022 x .028 diameters). The lower teeth were banded from second molar to second

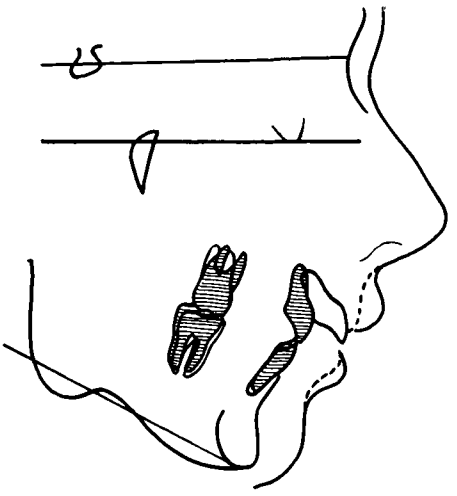

Fig. 4 Cephalograms of B. C. superimposed on SN at S. This shows the tipping of the upper anchor molar roots, the last cephalometrically discernible movement of these anchor molars throughout treatment. The reversed curve of spee to the second molar has taken the lower first molar slightly occlusally and distally.

molar using double-buccal tubes on these anchor molars and lightwire brackets elsewhere. A reversed curve of spee was placed in the lower archwire. This, plus the use of vertical elastics to the upper first molars, obliterated the freeway. Upper horizontal elastics were then used to close the extraction sites (Fig. 4). These elastics were three ounces each, early in treatment, but in late Stage I were changed to 4.5 ounces each. When the extraction spaces were closed, it was obvious that there was a need for severe uprighting of the upper canines and for strong torque of the upper incisors. Added to this was the force necessary to activate loops which were employed in the lower arch to close spaces opened in the lower anterior teeth by faulty handling of the reversed curve of spee. It was felt that the static anchorage might fail if only the tipback bend were used to counteract the severe mesial forces of this third stage. Therefore, an upper "anchor bar" was employed (Fig. 3). This anchor

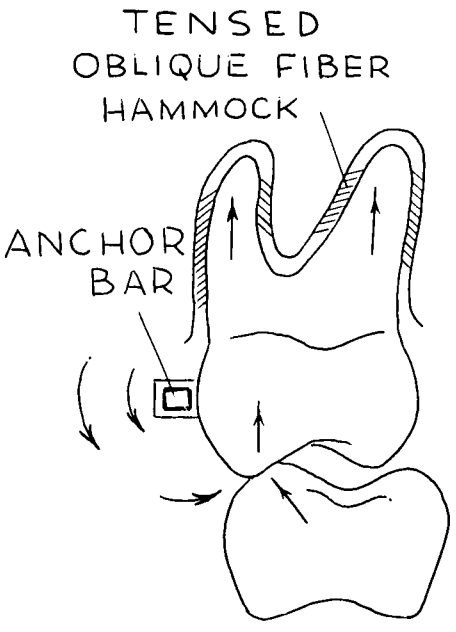

Fig. 5

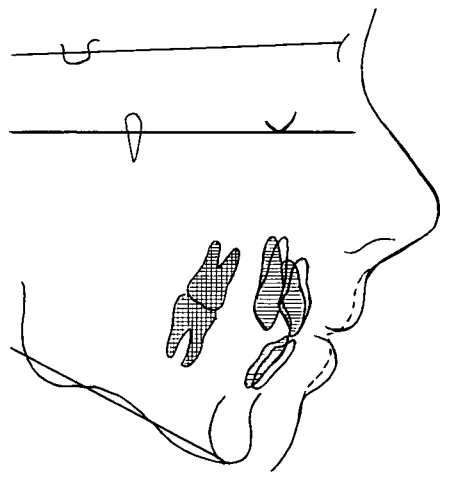

Fig. 6 Superimposed tracings of B. C. at the rest position, on SN at S. This shows the static anchorage exhibited by the anchor teeth in torquing and uprighting the six upper anterior teeth, and in retracting the spaced lower anterior teeth.

bar consisted of an .0215 x .028 edgewise archwire which fit the edgewise tubes of the upper anchor molars. In it was placed lingual crown torque which caused these upper anchor molars to undergo the pivotal phenomenon in the buccolingual plane. This, of course, caused a minute prying open of the mandible to the extent that it produced in the masticatory muscles a force equal to that remaining in the anchor bar. Thus, the residual torque of the anchor bar was resisted by an equal opposing intrusive force derived from the more intense stretching of the masticatory muscles. At this point the pivotal phenomenon ceased and the anchor molars were suspended in the oblique fiber hammock more forcefully than when the tipback bend alone was used (Fig. 5). This made them more resistant to dislodging mesial forces. Also, there was no concern that the molars would tip any farther and allow a return of freeway, which often occurs when a strong tipback bend is employed in a growing patient. If the anchor molar crown should go too far lingually (due to growth in the rami and masticatory muscles and the resulting tendency toward the re-creation of a freeway) the torque force can be reversed carrying the anchor molar crowns buccally under a new pivotal movement. The mandible is pried open again to the extent of the growth, this time using the buccal roots as the pivotal foundation; anchorage remains static. A look at Figure 6 shows that the anchor bar allowed no perceptible movement of anchor crown or root through nine months of Stage III treatment.

The anchor molars held firmly for B. C. against the mesial pull of the torque archwire and the canine uprighting springs which were estimated, using Clause's[18] figures, to be approximately eighteen ounces. At the end of Stage III the anchor molars had not come mesially whatsoever, nor had they tipped any more mesially than they had tipped when a cephalogram was taken at the end of Stage II (Fig. 4). The anchor bar had proved to be as

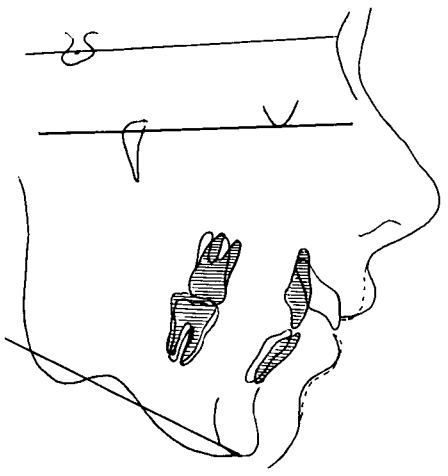

Fig. 7 Tracings of B. C. taken at the rest position superimposed on SN at S. This shows that the anchor molar crowns did not move mesially throughout the entire two years of treatment.

effective an anchorage device as a headgear of over one pound of force worn twenty-four hours a day, for it had held the two anchor molars static in resisting a force which would otherwise have required a headgear of no less than eighteen ounces of full time wear or its equivalent.

Figure 7 shows the superimposition of the posttreatment rest position cephalogram tracing over the pretreatment rest position cephalogram. It is evident that the upper anchor molars had not moved mesially. The roots had tipped, but this was the last cephalometrically discernible movement of these anchor teeth. There was no further tipping or movement shown throughout the entire third stage of treatment, as is seen in Figure 6. The truly stationary anchorage (without headgear) exhibited throughout nine months of intense Stage III treatment proves that properly prepared anchorage is infinitely more stable than an undisturbed tooth, and should settle the question of whether truly stationary intraoral anchorage is possible.

The anchor bar finds its greatest use in the Begg procedure in the numerous cases in which static anchorage is required through some phases of treatment. The writer has utilized this device in Class II extraction cases after the molar relations have been corrected. This has allowed the completion of Stages II and III without the creation of an iatrogenic bimaxillary protrusion. The molar relations in such cases can be corrected early in treatment by Class II elastics or, if the anchorage needs are more severe and the second molars have not erupted, by three to five months of headgear wear prior to full banding. (The headgear is not used after full banding, of course.) When once the molars are in Class I, static anchorage can be employed where necessary to hold the dentition in the correct position mesiodistally. M. R., a thirteen-year old girl, is an example of such a patient, being a full Class II extraction case. All efforts to have her wear a headgear to begin the molar correction were of no avail. Therefore, within a week after the four first premolars had been removed, the teeth were banded in the usual Begg method with the exception that double-buccal tubes were used on the anchor molars. She was treated routinely through Stages I and II. Shortly after Stage III was begun, an anchor bar was placed in the lower arch. A lower anchor bar is found to be much more effective an anchorage device than is an upper anchor bar which is not used in conjunction with a lower anchor plate.

The tracings in Figure 8 show that the molar crowns remained static throughout the third stage. Indeed, one can see that the Stage III molar anchorage was so stable that the crowns of the anterior teeth were carried lingually and distally as their uprighting consumed less space in the arch. This occurred despite the fact that often when the patient returned, the lower

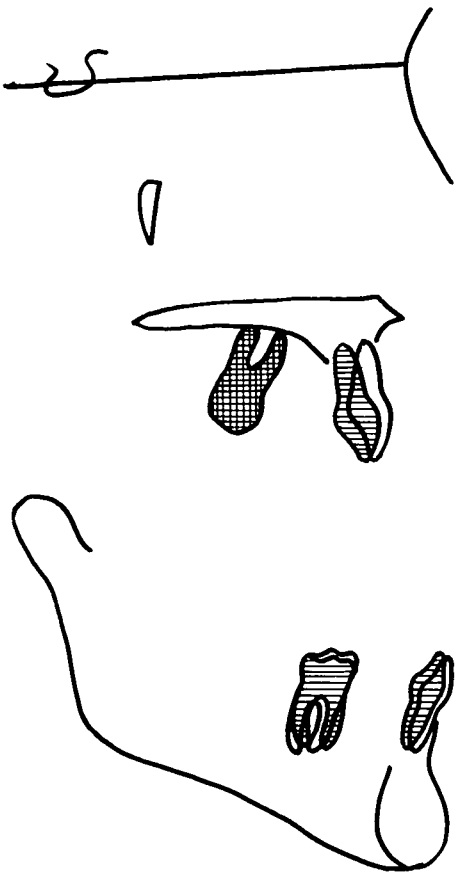

Fig. 8 Tracings of M. R. with the maxillary portion superimposed on SN at S. The mandibular portion is mandible on mandible at pogonion. The anterior teeth have moved lingually as the uprighting of the teeth has decreased the space in the arch necessary for each tooth.

molar tubes were bent gingivally from mastication. This negated much of the torque force of the anchor bar, but it was still adequate to hold the molar crowns static throughout Stage III.

In the conventional Begg method, labial crown torque is combined with the lingual root torque in achieving the desired root angulation in the anterior teeth, while the anchor molar slips mesially. However, when the molars remain static, labial crown torque is impossible and thus the six anterior teeth apices must move farther to achieve the desired angulation. When to this is added the condensation of the arch as teeth upright allowing the anterior crowns to be carried lingually, we can easily see why the third stage is longer with static anchorage, even though the usual magnitude of torque force is employed.

One of the benefits of this type of anchorage is the ability of the operator occasionally to treat a recalcitrant patient to the retention stage without any cooperation on his part. Had B. C. been uncooperative, one could have employed the anchor bar and lower reversed curve of spee to obliterate the freeway. Then light horizontal springs could have completed the upper space closure. As elastics are not necessary in Stage III when stationary anchorage is employed, the patient could have been treated to the retention stage without any cooperation on his part.

For those who would begin purposely obliterating freeway to achieve static anchorage, it is recommended they follow these basic guide lines:

(1) Gain a thorough understanding of a previous paper.[2]

(2) Never treat a postfreeway mouthbreather (one whose mandible remains open into the postfreeway in order to establish a satisfactory airway)! Before beginning any treatment, the patient should visit an otolaryngologist to have such mouthbreathing corrected. This particular type of mouthbreather is the only patient whose mandible can be opened measurably past the rest position, giving him a long face. He is also the only patient whose mandible can be opened into the postfreeway zone so far that he might never again establish a freeway.[19] Even conventional orthodontic treatment methods can result in such disasters for the postfreeway mouthbreather, and early obliteration

of freeway could aggravate the damage. It should never be forgotten that such patients are the only ones in whom a freeway might not be re-established after termination of orthodontic treatment. One could hardly imagine a more detrimental condition for the dentition than not regaining a freeway!

(3) Leave no teeth out of occlusal contact without their being attached to the archwire, unless there is no objection to their extruding. Such teeth can otherwise elongate past the plane of occlusion with problems often resulting.

(4) Be careful that the quickly achieved bite opening is not squandered. Once the freeway is obliterated there is very little future bite opening, unless the patient has much growth remaining. In the conventional Begg technique the lower molar extrudes slowly in obliterating freeway and opening the bite, and any anterior segments which do not have sufficient tipback bend intrusive forces, or any unpinned anterior teeth, usually contact the opposing teeth in function, after slight extrusion. This is because the overjet is often corrected concomitantly with the bite opening in the classical Begg appliance. In the case of static anchorage, however, the freeway is obliterated quickly by posterior extrusions (or immediately by the anchor plate), and the bite opening in the anteriors occurs just as quickly. Nothing has yet occurred to reduce the overjet, often leaving some teeth suspended far away from occlusal or incisal contacts. An unpinned tooth could extrude severely causing obvious problems.

(5) Be especially surveillant of growing patients under static anchorage. It is easy for the muscles and rami of such patients to grow sufficiently to re-establish a freeway causing the disappearance of static anchorage. This can also cause the molars to go into crossbite. An alteration of the torque in the anchor bar to the opposite direction or the addition of plastic to the occlusal of the anchor plate can remedy this. However, if he is in an active period of growth, the patient should not be left for long periods of time between visits.

(6) Do not obliterate freeway until the anchor molars are in the desired final relationship with each other. Otherwise static anchorage must be overcome before the cusps can be slipped by each other. It could be difficult to get a patient to wear elastics strong enough to accomplish this.

(7) If employing an anchor plate, one should be sure that treatment is terminated with a tooth positioner finished in the true hinge-axis relation. Usually at the end of such (anchor plate) treatment the molar teeth will be far out of contact and the anterior teeth will be the sole teeth in contact. The posterior teeth must be closed with a tooth positioner made in the patient's true hinge-axis relation. The rationale of this is too lengthy to enter here.

Summary

It has been shown how slight modifications in the basic Begg appliance, combined with an understanding of hammock anchorage and the resulting modifications in treatment theory, can allow the Begg technique to achieve anchorage equal to that of any other appliance and far superior to that of most other techniques, even those which employ much headgear wear throughout treatment. However, the simplicity of acquiring such anchorage, when one understands the rationale underlying it, renders its use much simpler for the operator and, much more important, less burdensome physically and psychologically for the patient. Thus the Begg therapy is now able, through these modifications, to achieve results far superior to those it was able to achieve formerly. However, a complete understanding of a previous paper is neces-

sary in order to be able to employ this controlled, static anchorage. Further, one should be cognizant of certain pitfalls in the modifications necessary to achieve and maintain hammock anchorage.

4516 South Dixie
West Palm Beach, Florida 33045

BIBLIOGRAPHY

1. Poulton, Donald R. The influence of extraoral traction. *Am. J. Orthodont.* 53:8-18, 1967.
2. McDowell, C. Stewart. The hidden force. *Angle Orthodont.* 37:109-131, 1967.
3. Grafton, G. H. Evaluation of anchorage in Class I and Class II, Division 1 malocclusions treated with Begg light wire differential force technique. *Master's thesis, U. of Tennessee,* 1967.
4. Lusterman, E. A. Cephalometric evaluation of orthodontic therapy involving the use of tissue- and toothborne anchorage. *Am. J. Orthodont.* 43:429-453, 1957.
5. Moyers, R. E. and Higley, L. B. The stabilizing plate, an adjunct to orthodontic therapy. *Am. J. Orthodont.* 35:54-60, 1949.
6. Joule, W. R. The Bull technique. *Am. J. Orthodont.* 46:245-252, 1960.
7. Rohde, A. C. Fundamentals of anchorage, force and movement. *Am. J. Orthodont.* 34:860-867, 1948.
8. Salzmann, J. A. *Orthodontic Practice and Techniques.* Philadelphia and Montreal, Lippincott, 1957. 497 pp.
9. Nelson, Beulah. What does extra-oral anchorage accomplish? *Am. J. Orthodont.* 38:422-434, 1952.
10. Strange, Howard E. Some thoughts about anchorage. *Am. J. Orthodont.* 37:324-331, 1951.
11. Barrer, Harry G. A survey of Begg treatment. *Am. J. Orthodont.* 49: 494-506, 1963.
12. Dewey, M. and Anderson, G. *Practical Orthodontics.* St. Louis, C. V. Mosby, 1948.
13. Allen, W. Mandibular stability with the twin wire appliance. *Am. J. Orthodont.* 52:483-494, 1966.
14. Shelden, F. Copeland. A clarification of fundamentals pertinent to the Tweed concepts. *Am. J. Orthodont.* 37:157-173, 1951.
15. Higley, L. B. Some thoughts on cephalometrics and anchorage. *Am. J. Orthodont.* 36:135-147, 1950.
16. Hellgren, Allan. *Introduction to Orthodontics.* Edited by Lundstrom, Anders. New York, McGraw-Hill Book Co., 1960.
17. Moyers, Robert. *Handbook of Orthodontics.* Chicago, Year Book Medical Publishers, 1963. 599 pp.
18. Clause, Arthur. An Evaluation of Begg light-wire forces, *Master's thesis, Fairleigh Dickinson University,* 1965.
19. McDowell, C. Stewart. From a yet unpublished paper.