THE EVOLUTION OF THE TREATMENT OF DISTOCLUSION*

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AS a result of the advancement of orthodontic methods in the past few years, the treatment of no other class of malocclusion has passed through such evolutionary stages as that of distocclusion. From the study of orthodontic literature, as has been taken up by Dr. Weinberger, it is very readily shown that certain conditions, which we now recognize as distocclusion, must have been recognized very early in the history of medical science. I do not, however, care to take up your time by going into the various ancient methods of the treatment of this condition, which is also known as Class II, Division 1, but the protrusion of the upper central incisors was recognized very early, and such protrusions undoubtedly were associated with distocclusion as we know it today.

If we simply take up what might be termed modern orthodontia, we will find at least four different plans of treatment which have been advocated in the last ten years, and one or more of these plans are still followed by some men. Those of us who have had any experience realize that the majority of our patients with distocclusion and labioversion of the incisors, or Class II, Division 1, cases, come to us primarily to have the protrusion of the upper incisors corrected. A great many of them do not understand that the real, serious condition exists in the distal relation of the lower dental arch along with the underdevelopment of the mandible, which accompanies such types of malocclusion. It is the symptom of the labial protrusion of the upper incisors that causes the majority of patients to seek relief. It is, therefore, logical to conclude that the early treatment of distocclusion was directed toward the symptom rather than toward the treatment of the condition. While it is a fact that the relation between mouth-breathing and distocclusion was recognized very early by the dental and medical professions, it is also a fact that it was comparatively only a short time ago that these two professions began to comprehend the correlation which existed between the orthodontic and rhinological treatment of those cases, and it is for this reason that one of the earliest plans of treatment of distocclusion consisted in the retraction of the upper anterior teeth. In other words, the plan may be stated as consisting of the reduction of the size of the upper arch to make it harmonize with the lower arch, and has for its object merely the improvement of the occlusion and restoration of harmony in the sizes of the arches. While this statement is not exactly anatomically correct, nevertheless the upper anterior teeth were moved distally after the extraction of the first premolar on each side and made to harmonize with the lower anterior teeth. Now, this line of treatment appealed to a great many patients because the protrusion was the objectionable feature. They did not know that the distal movement of the upper incisors would produce a facial deformity equally as obnoxious from an artistic standpoint as the protrusion of the upper incisors; they did not understand that, by retracting the upper anterior teeth and mak-

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ing them conform to the lower anterior teeth, there would be produced a facial deformity equally as undesirable as the first. In fact, one facial deformity was created in an attempt to correct another. The facial outline obtained by such a treatment may at first seem to be an improvement, but it is inclined to become more objectionable as the individual grows older. Owing to the abnormal position of the anterior teeth in such cases, the muscles of expression, especially the orbicularis oris and labial muscles, are in such a position that the expression of the face is always very unpleasant. The mandible, being underdeveloped because of the distal relation of the lower teeth, always remains underdeveloped if nothing is done to cause it to develop forward.

This type of treatment may be said to have for its object the reduction of the anterior teeth without any idea as to the improvement of the occlusion of the molars and premolars. Nothing is done to improve nasal breathing because the upper arch is not expanded; nothing is done to produce the development of the

Fig. 1.

Fig. 2. (After Angle.)

mandible because no effort is made to move the mandible forward. Of course, with this plan of treatment,¹ occipital anchorage (Figs. 1 and 2), is employed to move the upper anterior teeth distally. An objectionable result of this treatment is the excessive overbite, which is always produced by the distal movement of the anterior teeth without moving the lower arch forward (Fig. 3). While this plan of treatment is not adopted to any great extent by many orthodontists at the present time, still the plan is being followed by some in the dental profession, and is even being advocated by a few orthodontists as the proper treatment for extreme labioversion of the upper incisors. We know that this plan of treatment is the oldest that was used for distoclusion, and which, by the way, did nothing to correct the defect, but simply dealt with one of the prominent symptoms.

What I believe to be the second distinct plan in the evolution of the treatment of distoclusion was the method originated by the late Dr. Norman W. Kingsley, which became known to the dental profession as "jumping the bite."

¹Angle: *Malocclusion of the Teeth*, 6th ed., p. 235.

While there is no question that Dr. Kingsley appreciated the occlusion of the teeth, especially from an artistic standpoint, he has laid very little stress in his writings on the normal occlusion of the teeth as a factor in the masticating efficiency of the teeth. It seems as if his idea in the treatment of distocclusion was to devise some plan which would improve the facial outline to a greater extent than the method that was being followed up to that time as the universal practice.

Dr. Angle, in the sixth edition of his work,² says: "The second plan of treatment is toward the ideal—the establishing of normal occlusion, normal relations of the dental arches, and normal facial lines, as we have already noted." This plan of treatment had for its object the expansion of the upper arch, the reduction of the protrusion of the anterior teeth, and the forward movement of the mandible, thereby establishing normal occlusion and improving the facial outline by the forward movement of the mandible. This plan consists in the expansion of the upper arch and the retraction of the anterior teeth by means

Fig. 3.

of a skull cap, the expansion of the lower arch so as to place each tooth in its proper position with the line of occlusion, and then the forward movement of the mandibles by the voluntary action of the external pterygoids. Dr. Angle says: "This means the retention of all the teeth, the restoration of each to harmony with its line of occlusion, the changing of the teeth from distal to normal occlusion by moving the lower jaw forward and compelling normal closure of the jaw by some form of device until normal occlusion shall have been thoroughly established, and the jaws and muscles, and especially the temporo-maxillary articulation, shall have been modified into this changed occlusion." By this plan much better facial outlines were obtained than was possible by the older plan, because this plan was actually the treatment for distocclusion, and overcame, to a certain extent, the underdevelopment of the mandible by its forward movement, thereby bringing the chin forward—very nearly, if not entirely—to its proper position. By this method certain conditions known as "before and after results" could be obtained very readily, for there was no question about securing the expansion of the upper arch and the retraction of the

²Angle: *Malocclusion of the Teeth*, 6th ed., p. 247.

anterior teeth by means of a skull cap; neither was there any difficulty in expanding the lower arch, and there was no difficulty in having the patient move the mandible forward by voluntary muscular action. So far as the treatment was concerned, we might say that it was very simple.

The difficulty, however, which arose was the matter of retention. In fact, Dr. Kingsley contended up to the time of his death, that retention was the problem of orthodontia. He claimed that teeth could be moved to almost any position, almost any distance, but stated that the perverseness of inanimate objects to return to their former positions was something that would always have to be contended with. Part of his argument for considering retention a problem was probably because with this plan of treatment, which was called "jumping the bite," the holding of the mandible was a very difficult procedure. How to secure retention was the question, and it was a problem because the treatment, as outlined here, was not along anatomical lines. The treatment will remove the difficulty, overcome the facial deformity, and correct the distal relation of the dental arch, but, in doing so, certain parts are thrown on a stress or strain, which makes it very difficult to retain them in position. By that we mean that in the forward movement of the mandible the head of the condyle leaves the glenoid fossa and rests on the eminentia articularis, with the result that the fibers of the external capsular ligament are placed on a strain. In the same manner the fibers of the temporal muscles, which are so constructed that, when they act, the mandible is moved distally, are always struggling and pulling to bring the mandible back to the old position during the process of mastication. The other ligaments in the temporo-mandibular articulation—namely, the sphenomandibular and stylo-mandibular ligaments—are also on a stress, for, when the mandible is protruded, they are necessarily put on a strain because their attachments are moved forward, which has the effect of shortening the ligaments, and pulling the condyle up against the interarticular cartilage and compressing it between the eminentia articularis. For that reason, after the mandible has been moved forward by voluntary action and attempts are made to retain it, there are active forces continually struggling to pull the condyle distally, and therefore it requires a continual effort to keep the mandible forward; if the mandible is not kept forward, of course, the dental arch will also return to its old position. Part of the trouble in retention was on account of the faulty means employed for the purpose at that time, the retaining appliances being of a weak variety, and generally with very insecure anchorage (Fig. 4). As a result, the appliances were constantly breaking, the mandibles drifting back, and the teeth resuming old positions. Some cases appeared to be successfully treated by this plan because the appliances retained the teeth, but it is the belief of the writer that the condyle eventually slid back to its old position. There were strong arguments pro and con for this plan of treatment, and owing to the improved facial results which were occasionally obtained by this new plan, it was continually tried, with more or less success, by men who had a high appreciation of artistic results. But, on account of the difficulty of retention encountered in the second plan of treatment, known as "jumping the bite," and because of the unsatisfactory results from a facial standpoint, obtained by the first plan, a certain number of men were continually making efforts to perfect

a technical procedure which would overcome some of the objections of the two plans.

With the publication of Dr. Angle's work on malocclusion and the founding of his school, a method of treating distoclusion was developed known as the Baker anchorage. It will probably not be amiss to give a short history of the Baker anchorage, which has been described as various forms of intermaxillary anchorage, but to Dr. Baker, of Boston, belongs the credit of having brought to the attention of the dental profession a plan which, with certain modifications, has been revolutionary in the treatment of distoclusion. Up to the time of Dr. Baker's description of his use of his intermaxillary rubbers, the profession knew very little about reciprocal intermaxillary anchorage. Now, it is probable that Dr. Baker was not the first one to use intermaxillary anchorage, but it was he who brought it to the attention of the profession—not so much through his writings as by the literature of Dr. Angle and some of his students. Intermaxillary anchorage as used by Dr. Baker, was very crude compared with intermaxillary anchorage of today (Fig. 5), but it was the beginning of the scientific treatment of distoclusion, and his work and the plan as explained by

Fig. 4. (After Angle.)

Fig. 5.

Dr. Angle in his seventh edition may be said to be the third plan of the treatment of distoclusion. This plan was not devised entirely from an anatomical standpoint, nor was it intended to completely remove the pathological conditions as they may exist, but it was devised more to overcome the difficulties which were encountered in the previous two plans of treatment and present a procedure which would be much more simple and be scientifically correct from a mechanical standpoint.

It has been stated that the objection to the plan recommended by Dr. Kingsley, known as "jumping the bite," was the difficulty of retention on account of the condyle "insisting" on moving back into the glenoid fossa after the mandible had been moved forward. With the use of the Baker anchorage, as described by Dr. Angle in his seventh edition, an effort was made to shift the mesio-distal relation of the teeth and avoid a forward movement of the mandible. It was the belief that by shifting the position of the teeth and bringing the inclined planes in proper relation, there would be a development of the mandible, which would tend to overcome the facial deformity which was present in those malocclusions. The object of this plan was the distal movement of the upper incisors and the enlargement or expansion of the upper arch, as well as the distal movement of the molars and premolars of the upper arch.

The lower dental arch is moved forward about half the width of the premolar, and, as the upper teeth have been moved backward half the width of the premolar, there would be a normal mesio-distal relation of the teeth to each other, with the result that there would be more or less tipping of the upper and lower teeth. The forward movement of the lower teeth improved the facial deformity to a certain extent, but the distal movement of the upper molars and incisors beyond what is now believed to be the anatomical position in the majority of cases produced a facial outline which was not very pleasing. In a number of cases treated by this plan it was found that, while a great improvement of the facial outline was produced, the position of the mandible, so far as mesio-distal relation was concerned, was not exactly what it should be, although in some of the cases, where the mesio-distal relation of the teeth remained normal, there was a development of the mandible, which, to a certain extent, overcame the deformity or lack of development which existed immediately after treatment. The retention in the cases treated by this plan was not as difficult as the retention in the cases treated by Dr. Kingsley's method, known as "jumping the bite," because the teeth had been moved only in their processes, and that was all that was required. The mandible, having remained in its proper position so far as the condyle was concerned, did not require any retention to prevent the condyle from slipping back in the glenoid fossa. The retention in these cases, when this plan of treatment was first used, was not, however, as easy as might be supposed, owing to the faulty method of retention which was employed.

Of these three plans of treatment, passive intermaxillary retention was the kind which was usually employed; in fact, so far as I know, it was the only plan or type of retention which was used for a number of years. The experience with this kind of retention, which consisted in the use of some form of the plane and spur, led Dr. Watson to make the statement several years ago that while we could regulate teeth with a certain degree of nicety, move them practically where we desired, we nevertheless encountered great difficulty in retaining them. In other words, in the evolution of the treatment of distocclusion the theory of treatment progressed much more rapidly than the fact of retention, and this condition prompted various persons to endeavor to develop some practical method of retention.

Law, of Berlin,³ and Dewey began working on a certain principle of procedure at about the same time, the two methods being somewhat similar, and a little later, Watson, of Detroit, read a paper before the American Society of Orthodontists on this subject, referring to retention as a problem, which indicated that practical retention was not a success at that time, as the men engaged in the development of a new method were working along different lines. As a result of the work of these men, active intermaxillary retention was finally evolved, which was the simplest method that could be adopted, for it can readily be understood that if a certain force is used to move a tooth, the same force is necessary to retain it, and therefore the intermaxillary rubbers which have been used in tooth movement are now employed in retention. Of course,

³The Retention of Class 2 Cases—The Staple and Hook Sectional Retainer. A paper read before the European Orthodontia Society. Published in the *American Orthodontist*, Vol. i, No. 4.

this was a revolutionary principle so far as the old idea of retention was concerned, for it had been held in times past that in order to retain a tooth it must be held rigid. It is now the opinion of men of experience, among them Dr. Noyes, whose reputation as a histologist is beyond question, that the way to retain a tooth is not to hold it rigid, but to hold it in such a position that it will respond to all the forces of mastication, or what is now known as the "forces

Fig. 6.

Fig. 7.

of occlusion." Retaining appliances are divided into active and passive devices and the forces of retention are divided into natural and mechanical. Mechanical retention is only a means of assisting the natural forces, and therefore retention, after the treatment of distoclusion, is more easily secured.

With this third plan of treatment, after retention had been worked out, it was still the desire of some men to have a greater facial improvement than had

been previously obtained. A treatment, based entirely on the pathological conditions as found in this class of malocclusion, and with the aid of regulating appliances now obtainable, was therefore devised which had for its object the elimination of all the deformities and pathological conditions which a case may present.⁴ In other words, that treatment was to produce a normal occlusion

Fig. 8.

Fig. 9.

with a normal facial outline. If one will consider this matter for a few minutes it will be realized that the pathological conditions found in this type of malocclusion are distoclusion and labioversion of the upper incisors—or, in other words, Class II, Division 1 (Fig 6)—consisting in an underdeveloped mandible,

⁴See treatment of Class II, Division 1, *Practical Orthodontia* (Dewey).

with a distoclusion of the lower arch, a narrow upper arch, and protruding upper incisors, abnormal lip action, and abnormal breathing (Fig. 7). The breathing must be treated by rhinological interference. Taking each arch separately, the treatment of the upper arch should be its expansion and moving distally the incisors, so as to make a normally shaped dental arch. As the upper molars and premolars are not forward in the majority of cases, no effort should be made to move them distally. In this plan we notice that the differ-

Fig. 10.

Fig. 11.

ence between this treatment and the one outlined by Dr. Angle in his seventh edition is the manner in which the upper dental apparatus is treated. The attempt is then made to move the lower teeth forward the entire distance, or move them from the position of distoclusion to one of normal occlusion as compared with the upper teeth. This means a forward movement of the lower arch practically twice as far as recommended by Dr. Angle. The forward

movement of the lower arch causes the development of the mandible, which development is in the body of the mandible and not produced by a forward movement of the condyle. Realizing the difficulty that Dr. Kingsley encountered with his plan of "jumping the bite," we have planned to avoid such a condition, and, believing that we can get a development of the body of the mandible by the proper application of mechanical force, we endeavor to obtain that development by using intermaxillary rubbers to move the teeth forward.

The objection to the third plan of treatment was that it produced too great a

Fig. 12.

Fig. 13.

tipping of the molars and premolars; but, with the proper application of force, which may be produced by putting spurs on the front part of the lower arch to prevent the tipping of the lower incisors, or by a slow movement of the lower teeth, depending on the occlusion to keep them straight, we are able to move the lower arch forward the entire distance and still preserve the teeth in an upright position. In adjusting the mechanical appliances to produce such a tooth move-

ment, the alignment wire is first adjusted on the upper dental arch, with the wire resting against the incisors in the anterior region, and the nut being away from the tooth on the molar band (Figs. 8 and 9)—that is, the initial force of the intermaxillary rubbers must be exerted directly upon the upper incisors, with the canines ligated to the alignment wire in such a manner as to expand them (Fig. 10). After the arch has been expanded in the canine region and the incisors moved distally, the nuts on the upper alignment wire are allowed to rest against the tubes on the upper molar bands. All the upper teeth are then ligated to the alignment wire to produce as much resistance as possible, which resistance is required to move the lower dental arch forward. In moving the lower arch forward, the teeth are brought forward in mass (Fig. 11)—that is, the molars, premolars, incisors, and canines are moved forward at the same time—and any expansion which may be required is also produced at that time in order that the lower arch will fit the upper arch when the lower teeth have been moved forward.

Now, this plan of treatment differs from other methods practiced by some

Fig. 14.

Fig. 15.

men in that they would first move the incisors and canines forward in the lower arch, then the premolars, and, lastly, the molars. The objection to the plan of moving the teeth forward in sectional groups is that it prevents the approximal contact of the lower arch, needlessly destroys a large amount of alveolar process by causing absorption and rebuilding, and, to a certain extent, lengthens the time of treatment. If the necessary resistance is obtained in the upper arch with the proper application of the alignment wire, it is possible to move the entire lower dental apparatus forward at one time, thereby preserving the approximal contact and keeping the teeth in a much better position, making it easier to retain them than if they had been moved in groups. After the teeth have been moved, they are, of course, retained by active intermaxillary retention, which consists of a lingual arch on the lower teeth, with the use of a labial arch in the molar and premolar region above, and a fine bar running labially to the upper incisors (Fig. 12). In this plan of treatment we almost invariably

elongate the lower molars, which is to be desired, for the reason that the majority of distocclusions, with labioversion of the upper incisors, are complicated by an infraocclusion of the molars. By moving the teeth forward, there is a tendency for the lower molars to be elongated, and as stated, this elongation is desirable, as it also has a tendency to produce a development of the mandible, increasing the length of the lower part of the face (Fig. 13). By examining results obtained in this plan of treatment with patients of various ages, it has been found that a much better facial effect is obtained, as the object is to remove the prevailing pathological conditions and thereby establish normal occlusion and normal facial outline. Case No. 141 (Fig. 14) is a distocclusion which was treated by this method and Fig. 15 shows the finished results.

The full report of a class of distocclusion in which the fourth plan of treatment was employed was published in the *International Journal of Orthodontia*, November, 1915, to which those interested are referred.

A REPORT OF A CASE TREATED WITH THE PIN AND TUBE APPLIANCE

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THIS case report is intended to show the superiority of the Angle pin and tube appliance over the older form, that of the plain arch and ligature wire, where the bodily movement of the teeth is required. Not only was the bodily movement of the incisor teeth necessary, but the apices required moving farther than the crowns.

The upper model shows the case before treatment. The second model shows the same case after the use of the plain arch and wire ligature for five and one-half months. The result was the best possible with that appliance. Note the decided slant of the incisors and the lack of development in the apical region,—truly a great opportunity for “bone growing.”

At just this time in the treatment, Dr. Angle gave us his new technic for bodily tooth movement. The pin and tube appliance was adjusted and after its use for twelve months, the result as shown in the lower model was obtained.

This case is, in my estimation, a very graphic illustration of the superiority of bodily movement of teeth in this type of case.