THE POSTOPERATIVE TREATMENT OF CLASS II*

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IN CONSIDERING the postoperative treatment of this class, the general principles of retention as affecting all classes of malocclusion will not be reviewed except as they apply in some especial way to this particular class.

Retention is the exercise of either an active or a passive force as a means of combating the retroactive forces that tend to induce teeth that have once been moved to return to their former positions. Postoperative treatment includes other means of maintaining a corrected occlusion.

We might enumerate the necessary retention in this class as follows:

- I. Maintenance in proper position of teeth that have been rotated.
- II. Maintenance of the proper inclination of the incisors.
- III. Maintenance of the overbite.
- IV. Maintenance of the exact corrected sizes and forms of the arches.
- V. Maintenance of the normal mesiodistal relation as corrected from distal occlusion.

Only the last is peculiar to this class alone, the others occurring also in other classes of malocclusion.

As to the first, the retention of teeth that have been rotated, we have the same problem in this class as in all others and the method requires no especial consideration. It is usually accomplished by banding the teeth, using spurs soldered to the bands and resting on the adjoining teeth in such a way as to counteract the retroactive force of rotation.

Second, in the majority, if not all, of Class II cases, there is an abnormal inclination of the incisor teeth. In Division I they have an outward and in Division II an inward inclination. The mechanical retention in Division I has usually been accomplished by the high Lourie wire with finger springs, accompanied by a lingual wire resting at the gingival, or by a lingual wire lying at the linguogingival border and a labial wire resting near the labial incisal edges, both soldered to canine bands. This mechanical retention should be succeeded by exercises to strengthen the orbicularis oris muscle and the abandonment of all lip-biting, thumb-sucking or similar habits.

In III, the maintenance of the overbite, we must assume at this place that it has been corrected during treatment, although the bite-plane, the universal appliance for its retention, is also used for its treatment during the first stages

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of retention. We can only consider retention proper, however, when the condition is reduced to normal. The usual method of retaining the overbite is some kind of bite-plane, either a solid plane attached to bands on the maxillary incisor teeth or in the form of a skeleton wire, loops also soldered to bands or to the lingual wire. The object of the wire loops is to prevent the proliferation of the gum tissue, which often occurs under a solid bite-plane. The author has also used single wire loops attached to the individual teeth, thus permitting considerable individual movement of the teeth, as rotation, when the bite-plane is desired during the treatment.

The importance of IV, the maintenance of the exact corrected sizes and forms of the arches, can hardly be overestimated, for upon its success often depends the success of the retention of the mesiodistal relation.

In a neutroclusion with normal arch forms, the occlusal lines if superimposed upon each other will be a uniform distance apart, approximately twelve-one-hundredths of an inch, throughout the whole arch forms; the arch form of the mandibular, of course, lying on the inside of the maxillary. This uniform relation of about twelve-hundredths of an inch between the lines of occlusion of the maxillary and mandibular obtains in all neutroclusion cases and may be called the *harmony of the arches*, and is necessary for a perfect interdigitation of the cusps. Now if the mandibular arch remains normal or the same size and the maxillary becomes narrowed, the mandibular, in order to obtain this harmony in the molar and premolar region, must move backwards to find a comfortable occlusion. This action carries the lines apart in the incisal region, exactly what happens in posterior-occlusion cases. Of course, the mandibular arch in these cases is not always normal and must be widened, but always the maxillary must be widened more than the mandibular.

With this in mind, it can be seen how important it is that the maxillary arch be successfully retained, for if it once commences to narrow, the mandible will be likely or sure to seek again its distal position. Unfortunately, we generally have associated with this class adenoids and nasal and throat disturbances, which may persist long after orthodontic treatment has been concluded and exert a retroactive effect upon the arch. So while the widening of the maxillary arch in this class confers great and lasting benefits, it must also be understood that it renders the retention more difficult. In Class I, or neutroclusion, the results of the narrowing of the maxillary arch after retention is removed, are not the same. The mesiodistal relation not having been changed, the narrowing maxillary arch usually carries the mandibular with it, with no change in the mesiodistal relation. Also there are usually no lingering nasal disturbances which stimulate this tendency.

The *crux* of the situation in this class is, of course, the retention of the mesiodistal relation. In discussing the retention, it is presumed that in the treatment, the mesiodistal relation has been thoroughly established, either by intermaxillary elastics, or muscle exercises, or in many cases, when the maxillary arches are widened so that the arches are in harmony, the normal mesiodistal relation is automatically resumed. If this relation is well established dur-

ing treatment, the overbite normal, and there are no interfering cusp relationships, very little mesiodistal retention in itself will be required in the majority of cases, and the most important retention required will be that to maintain the harmony of the arches. For this purpose the soldered or removable lingual wire may be used, accompanied with a bite-shelf if the overbite has been abnormal. In cases that show a persistent tendency to return to the former distal relation, arrangement should be made for the use of light intermaxillary elastics for a long time, and the muscle exercises should be faithfully adhered to.

On account of the long retention, especially of the maxillary teeth, often necessary in this class, I have been more successful with the removable retainer, which has previously been described before this Society. The great advantage is that, while successfully retaining all the malocclusions of this class, viz: rotated teeth, the inclination of the incisors, the overbite and the width of the arches, it is removable and patients are content to wear it the necessary length of time. Its weak point for this class is that it can have no provision for intermaxillary rubbers. These, however, in most cases can be superseded by the bite-plane and muscle exercises. In cases of persistent tendency to recede, fixed retention can be worn for six months or a year, then succeeded by the removable retainer.

I have spoken in other papers of the advantages of this retainer from a hygienic standpoint and of the great advantage of having the teeth free from bands during retention. In this class its advantage lies in the fact that retention can be kept up for so much longer time without danger to the teeth and without disagreeable disfiguration of the patient.

Great emphasis must be placed upon the removal of slight interferences in the occlusion, upon the abandonment of deleterious habits, upon the use of Dr. Rogers' muscle exercises and the conscious effort to bite forward in the proper occlusion until the inclined planes and cusps of the teeth are firmly and accurately settled into place, and the muscles have strengthened and developed to the natural tone and function.

There are, no doubt, cases that have reached or passed maturity where the cusps of the teeth have been worn smooth, in which it would be unwise to attempt to change or retain the mesiodistal relation. In this paper I have been referring to cases younger than about eighteen and where the cusps and fissures of the teeth have not been seriously mutilated.

As to the matter of the influence of inheritance on the retention of this class of cases, I have never yet in my own practice been able to discover this influence to such an extent as to interfere with their final successful retention. Nor do I know of any orthodontist, except Dr. Case, who has noted such influence to any great extent. I do not question, however, the influence of heredity as a causative factor in this class and all other classes of malocclusion. Normal occlusion, however, has been inherited by the human race for tens-of-thousands of years, and the influence toward normal occlusion seems potent enough to overcome and upset the persistency to return, when these abnormal conditions have been removed by proper treatment.

DISCUSSION

Dr. Samuel Herder, New York, N. Y.—I would like to ask a question with regard to muscular exercises. I have been quite interested in Dr. Rogers' work along the line of exercising the muscles of the face, and I feel that most of the men here would be glad to know what Dr. Hawley does and his exact process of exercising the muscles of the face and jaws to develop them in Class II cases or other cases. I would like Dr. Rogers to say something himself on this subject, but I feel Dr. Hawley could help us out, as he mentioned the subject in his talk.

Dr. Hawley.—In that work I am simply a pupil of Dr. Rogers, and as Dr. Rogers is here, I would much rather he would answer the question himself.

Dr. Waldron.—Dr. Hawley in the beginning of his paper gives us a definition of retention, and admits of a passive and an active force, and in addition states that postoperative treatment includes other means of maintaining a corrected malocclusion.

He further enumerates five requisites in the retention of this class of irregularities which are as follows:

- I. Maintenance in proper position of teeth that have been rotated.
- II. Maintenance of the proper inclination of the incisors.
- III. Maintenance of the overbite.
- IV. Maintenance of the exact corrected sizes and forms of the arches.
- V. Maintenance of the normal mesiodistal relation as corrected from distal occlusion.

These various steps in his so-called postoperative treatment, come under this active or passive retentive force or both, and are therefore covered by his definition of retention.

Now these so-called retaining appliances do not retain, and the occlusion is generally improved during the period of time these appliances are worn, due to the various forces of occlusion functioning. The appliance meanwhile prevents the teeth from returning toward their original positions.

In view of these facts that term "Post Treatment Maintenance of Mal-Occlusion," which this Society adopted last year to replace the term "Retention," more fully covers this subject, and should be used until a better terminology is adopted.

Therefore, I sincerely hope every member of this Society will use the nomenclature adopted by the American Society of Orthodontists.

The author has well covered the ground in his explanation of these five essentials for the proper maintenance of normal occlusal relation after treatment of these distocclusion cases have been completed, and he favors the removal maintenance appliance which he introduced to this Society a few years ago as the one best suited.

He says it has two weak points, and these are its failure to maintain rotated premolars in the mandibular arch, and its lack of provision for intermaxillary elastics.

These are easily overcome; instead of banding the mandibular premolars and soldering a lug perpendicular on the lingual surface of the band, this lug fitting into a slot in the vulcanite portion of the appliance, as recommended by the essayist, you can band these premolars and have a horizontal lug or spur soldered to the band on its buccal surface and extending mesially and distally to the adjacent teeth and resting against the latter.

This will maintain the rotated teeth in their new positions, and will not interfere with the removable maintenance appliance when inserting or removing the same.

Hooks for intermaxillary elastics can be soldered at convenient points on the maintenance appliance, and the latter can be stabilized by banding the first maxillary premolar and soldering a horizontal lug to the band on its buccal surface, which will prevent the clasp of the appliance from slipping off the banded tooth. This will not elongate the banded premolar unnecessarily, as the occlusal contact with the first and second mandibular premolars will prevent this.

It has been my experience in some older cases where the cusps of the molars and premolars are not so pronounced, and there is a tendency for the mandible to seek its former distal position, that it is unwise to use a lingual wire for the maintenance of the mandibular teeth, and a Hawley application on the maxillary teeth, because the bite-plane on

the maxillary teeth will maintain the mandibular incisors, but the premolars and molars seem to settle back leaving a space between the mandibular first premolar and the canine.

This however, can be overcome by using a Hawley appliance on both maxillary teeth and mandibular teeth, the mandibular labial wire preventing the mandibular incisors from moving forward, and vulcanite festooned about the lingual surfaces of the molars and premolars will prevent them from moving distally.

We all agree in the treatment of distoclusion cases that we usually accomplish the following:

- I. Equalize maxillary and mandibular arches.
- II. Bring the mandible forward.
- III. Change the angle of inclination of the incisor teeth, (Maxillary and mandibular).
- IV. Correct the supraocclusion of incisor teeth if necessary, (Maxillary and mandibular).
- V. Induce vertical development of premolar and molar area, (Maxillary and mandibular).

With these forms of postoperative maintenance appliance as devised and recommended by Dr. Hawley, we can maintain and sometimes correct several of the above steps which are necessary requisites in the treatment and maintenance of distoclusion cases.

Dr. C. A. Hawley, Washington, D. C. (closing).—There is practically nothing further I wish to say in regard to the muscle exercises. This subject is very clearly and completely covered in the admirable papers by Dr. Rogers.

In regard to what Dr. Waldron said about bands on the mandibular premolars, I have practically abandoned these slots myself. I find a spur on the buccal surface is better. However, that is a mere detail. While I think very highly of a lower removable retainer, yet it is more difficult than an upper. If you are using a lower retainer at the same time with a bite-plane, there can be no protrusion of the mandibular teeth, as they are held in place by the labial wire. Every year I use this retainer I am more and more impressed with its desirability in this class of cases on account of the possibility of the long retention necessary. It is surprising to me how quickly patients will grasp the theory of this retainer and understand the principal points of its use. Patients come to me and say, "I have experimented; I have left it out so long; it would not work. I am not going to leave it out so long again." Or, "I have left it out two weeks and it is all right." They grasp the idea of keeping them as an index of the positions of the teeth. I have been much gratified to see how quickly they grasp the principle. Also, I am impressed more and more with the potency of small interferences with the cusps, that is, in the necessity of removing all slight interferences. In that connection, one value I have found in removable retention is that the molars have a certain freedom of movement in settling to place. I have several cases where when I retained them I found I did not get the exact relations of the arches, and so I left the maxillary retainers off for about a week, and then trimmed the retainer slightly and put it back in. The cusps moved into perfect adjustment. Sometimes I make a new one after a week or two and let the teeth settle exactly and accurately in their proper place.

In illustration of the effect of slight interferences, I had two months ago a case thrown into distoclusion from the rising of a mandibular second molar from pressure of an impacted third molar. This molar was pushed upward in the socket. It was thrown against the distal surface of the maxillary first molar, and it caused the mandible to move back. I had the third molar removed, expecting that the second molar would settle down, but it did not do it, and as the boy was going away to school, I ground some of the enamel off the maxillary tooth and dismissed him for a week. When he returned, the bite was back into proper place. I found in one case an erupting third molar, where the second molar had been extracted, was coming forward with the inclined occlusal surface against the maxillary teeth, throwing the mandible back. When the third molar was straightened up the jaw came forward again. These interferences are very important in this class of cases.