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A magazine established by the co-workers of Edward H. Angle, in his memory. . . . . .

AN ANALYSIS OF THE MOST IMPORTANT DIAGNOSTIC METHODS USED IN ORTHODONTIA

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THE Angle system of orthodontic diagnosis and treatment is one of the most comprehensive, useful, and practical methods given to the profession. It is not complete, but the principles enunciated form the basis of all orthodontic knowledege at the present time, and it is hardly conceivable that it will be replaced by other methods that will greatly deviate from the fundamental conceptions of Angle. That it is not complete is definitely indicated by the constant effort of several men of high standing and extensive experience to establish other diagnostic methods which will properly take care of such cases as distinctly cannot be diagnosed by Angle's method.

The striking point in these various attempts is that the basic diagnostic conceptions are different, and the advocates of the particular systems assign different degrees of importance to the numerous diagnostic factors. In some instances the belief in the correctness of the basic principles is so pronounced that the importance of other conceptions are unwarrantedly minimized. If we take a broader view of the situation we will readily see that none of the proposed systems is beyond criticism, and no matter how complete they may appear, there is something lacking in all. If we admit the possibility that equal weight can be given to the several principles which form the basis of the various methods, then we may also see the possibility or reconciliation between apparently divergent systems, and instead of considering them as contradictory, we may regard them as complementary. In other words

each system, while not complete in itself, yet contains several points of truth, which, when collectively taken and properly connected, must necessarily form the most complete diagnostic system available at present. The system thus formed should be so constructed that any disclosures of further research and study may easily be connected with it, if found desirable. The acceptance of dogmatic principles should not be encouraged for it has a retarding influence on progress, as is clearly shown by the attitude of the followers of the Angle School.

The proposition as here given may seem to have a tendency to create an extremely complicated diagnostic method, for the individual methods in themselves are very involved. However, this does not mean that the composite system would be more complicated, but rather that it would be more thorough, and the information obtained from it more reliable.

In developing a new system, the greatest error is made in assigning especial importance to a fundamental factor which dominates the whole system to such an extent that it excludes the possibility of future additions which, obviously, may become necessary. Such is the case with the new commonly used Angle system, which is based upon the truth that occlusion is the basis of all orthodontic operation. But while a great deal of importance is given to occlusion, the position of the first molar is arbitrarily accepted to be *nearly* always correct. The whole system is built upon this supposition so solidly that when attempts are made to add newer conceptions to the system, they must be rejected, for the very foundation of the Angle system is affected. This is also the case in nearly all attempts with later methods. The position of the first molar is no longer considered as the starting point in diagnosis, so that there seems to be a general incompatibility between the various systems. Yet, when the Angle system is carefully examined, it will be found to express general truths that cannot be changed by a change in the diagnostic system. While not correct in every detail it expresses the relationship existing between maxillary and mandibular arches in malocclusion, and the remedy is suggested for its correction. This in itself is a very important step toward the establishment of a reliable standard and when we consider that the supposition of the constancy of the molar is not too far from being correct, or at least as near to being correct as that established by any other method, the general acceptance of the method becomes logical. The principle of the constancy of the molars was very severely criticized by Simon and rejected on the ground that it is a mere fiction and affords no reliable information relating to a particular case. In its place he gave us the *"Canine Law"*, which, in fact, is nothing more than the constancy of the canine, although not in the same sense as the constancy of the molars. From his studies,

Simon came to the conclusion that under normal conditions the canines occupy a position in a plane determined by the lowest points of the inferior orbital ridges, perpendicular to the saggittal plane and the Frankfort horizontal plane. By a laborious, supposedly accurate method, the orbital plane is constructed on the models of the case, by the aid of the original impression and certain suitable instruments.

On further reflection we must come to the conclusion that the principle of the constancy of the molars is more logical to adopt than the *"Canine Law"*, for it is clear that we are dealing with extremely small differences of position and it is exceptionally rare to find a molar more than 2 millimeters between Simon and Angle, even if the same degree of importance can be displaced from its normal position. It must be admitted however, that a molar may drift mesially 7 or even 8 millimeters, but in such cases its eyes of the most ardent Angle followers.

On the other hand, it is common in the Simon system to find that the canine must be moved 8 to 16mm., mesially or distally. Then, according to the laws of this system, the whole maxillary arch must be moved a proportionate amount. This, in itself, points to either a fallacy or an error in the diagnosis, for such a feat has never been accomplished in orthodontia.

Regardless of the fact that the Angle system was so severely criticized yet, as previously stated, it contains elemental truths and in the construction of newer systems these cannot be disregarded. The differences of opinion given to their respective observations, is not vital and the work of one cannot be discredited by the work of the other. On a closer examination we will note that instead of being contradictory, their work is complementary, for Simon is concerned chiefly with the determination of the position of the maxillary arch with respect to the cranium, which is usually assumed to be correct in the Angle System. Even if it be granted for a moment that Simon is able to determine the above relationship accurately, the Angle system will find its displacement is so evident that it loses its diagnostic importance even in the application in every case. Thus it is seen, that although these two systems are not properly connected, their basic principles are acceptable in a composite system.

The Stanton system is not in direct opposition to either the Angle or Simon method. It resembles the Angle system in that its basic principle is occlusion. The main object, however, is the predetermination of arch outlines and of individual tooth movements, which is not a feature in the other

methods. In this system, one point so forcefully stressed by Angle, is clearly disregarded. It is the relation of the mandibular arch to the maxillary arch. This seems to be contrary to the main purpose of the Stanton system but on second consideration it becomes apparent that this point has been entirely overlooked and all proposed tooth movements are entirely through the alveolar processes. The mandible is seemingly fixed in one position, although this may not have been intentional.

That this system may be regarded as an essential addition to the Angle and Simon systems, can be easily seen when the relative importance of each system is considered. Each concerns itself with a different phase of diagnosis and although there may be distinct contradictions they essentially form part of a much broader diagnostic conception.

The writer's system may also be considered in this connection. In purpose it resembles the Stanton system and while occlusion is an important consideration, the arch form is shown to be the result of function. It fills the gap between the Stanton and Angle systems for the bodily change in position of the mandible is also taken into account. Furthermore, this change of position is definitely indicated.

If we form a composite picture of these diagnostic methods, we will appreciate the importance of each and readily understand what part they may play in a comprehensive diagnosis. We may note, however, that, with the exception of Angle, no attempt is made to include the etiologic factors. Neither is the prognosis considered. These should form a necessary part of a complete diagnosis for there may be influential factors present, etiologic or otherwise, that may greatly affect the probable outcome of a case. In this connection the work of Lundstrom on the *"Apical Base"* should be considered.

It is to be especially noted that in general the main purpose of each diagnostic method is to indicate how the work of the orthodontist is to be accomplished. The other important factors associated with the case are left to the orthodontist's judgment, which must necessarily vary.

Thus it is seen that diagnosis is broader than any of the present systems indicate it to be and every orthodontic case must be considered from the etiologic point of view in addition to the manner in which correction is accomplished. Another extremely important consideration is prognosis, which should accompany every orthodontic diagnosis. The greater the consideration given to this subject, other things being equal, the more gratifying will be the work of the orthodontist both to himself and to his patient.

In order to bring about a closer relationship between the systems considered, a detailed description will be given of each, with criticisms and recommendations. It is hoped that the purpose of this work will not be misunderstood. Primarily the intention of the writer is to show that we are all working toward the same end and the only difference is the degree of importance attached to each particular phase of diagnosis. However, all the various conceptions find a place in thorough orthodontic diagnosis and the sooner we assume this attitude toward the work of other men the sooner will our problems be solved.

The criticisms given in that which follows are personal criticisms and as such are subject to corrections by those who perhaps better understand the particular phase of the subject under consideration. They are given with an open mind and from the point of view that they may be of benefit to the profession.

AN ANALYSIS OF THE ANGLE SYSTEM

As it has been stated before, the Angle system forms the basis of orthodontic knowledge. The principles upon which it is built are clearly defined and a logical sequence of procedures is established from impression taking, through diagnosis and treatment, to retention. In this respect it is more complete than the other methods under consideration and while at present we are only concerned with diagnosis, the thoroughness of the work must be commended. The diagnosis of Angle includes the consideration of etiologic factors, the possible effect of the malocclusion and its correction upon the facial expression, the classification of malocclusion and to a lesser extent, prognosis. Thus it is seen that the system was designed with a thorough understanding of conditions, taking into consideration all the important diagnostic factors. Etiology will not be discussed in this article for there is a general agreement on this subject, with minor exceptions, but the classification must be carefully examined and its shortcomings, if there are any, carefully noted.

The Angle classification is based upon the axiomatic condition that the *"first molars are the most constant of all teeth, in taking their normal positions".** Using these as points of reference, malocclusions are classified in three classes. *"These classes are based on the mesio-distal relations of the teeth, dental arches and jaws, which depend primarily upon the positions*

*Angle;—Malocclusion of the teeth 7th Edition page 17.

*mesio-distally assumed by the first permanent molars on their erupting and locking."**

"Class I is characterized by normal mesio-distal relations of the jaws and dental arches, as indicated by the normal locking on eruption of the first permanent molars, at least in their mesio-distal relations, though one or more may be in lingual or buccal occlusion."**

"Class II. When, for any cause, the lower first molars on their eruption, lock distally to normal with the upper 1st molars to the extent of more than one half of the width of one cusp on each side, it must necessarily follow that every succeeding permanent tooth to erupt must also occlude abnormally, all the lower teeth being forced into positions of distal occlusion, thereby causing more or less retrusion or lack of development or both, of the entire jaw. This condition of distal occlusion is the determining characteristic of this great Class of which there are two *Divisions* each having a *Subdivision*. The great difference in the occlusion of the teeth in these two Divisions is manifest in the positions of the incisors, the one being protruding and the other retruding. Each of these Divisions has a subdivision."†

"*Division 1* is characterized by distal occlusion of the teeth of both lateral halves of the lower dental arches, the lower molars having taken this position on their eruption and locking; a narrowed upper arch, lengthened and protruding upper incisors; a short and practically functionless upper lip; lengthened lower incisors and thickened lower lip, which rests cushion-like between the upper and lower incisors, increasing the protrusion of the former and the retrusion of the latter. This form of malocclusion is always accompanied and at least in its early stages aggravated, if indeed not caused, by mouth breathing due to some form of nasal obstruction."††

"*Subdivision, Division 1,* has the same characteristics as the main division, except that the distal occlusion is unilateral."†††

"*Division 2* is characterized specifically also by distal occlusion of the teeth in both lateral halves of the lower dental arch, indicated by the mesio-distal relations of the first permanent molars, but with retrusion instead of protrusion of the upper incisors."††††

*Angle;—Malocclusion of the teeth 7th Edition page 35.
**Angle;—Malocclusion of the teeth 7th Edition page 36.
†Angle;—Malocclusion of the teeth 7th Edition page 44.
††Angle;—Malocclusion of the teeth 7th Edition page 46.
†††Angle;—Malocclusion of the teeth 7th Edition page 49.
††††Angle;—Malocclusion of the teeth 7th Edition page 50.

"Subdivision, Division 2 has the same characteristics as the main Division except that one of the lateral halves of the dental arches only is in distal occlusion, the other being normal."*

"Class III is characterized by mesial occlusion in both lateral halves of the dental arches. The extent to which the mesial occlusion must exist in order to place the case in this class is slightly more than one half the width of a single cusp on each side."**

"Subdivision, Class III, differs from the Main Class in that only one of the lateral halves of the lower arch is in mesial occlusion, the other normal."***

This classification is comprehensive and clearly indicates that Angle had a thorough understanding of the conditions which form a necessary part of diagnosis. The outstanding feature of this classification is that the mal-relation of the arches is given the first place of importance. This, according to Angle, may be determined by a study of the relations of the first permanent molars. Simon and others refuse to accept this tooth relationship as an index of arch position. On a closer study however, it may readily be seen that there is some justification in selecting the first permanent molars as the *"Keys to occlusion"* (Angle).

The ultimate purpose of all orthodontic procedures is to establish occlusion, in the way we understand it as normal. This implies that in order to establish normal occlusion we must strive to bring about a standard positional relationship between all teeth. Now it is immaterial whether the permanent first molars are selected as the teeth of reference, or any other teeth, for we have a definite conception of this standard positional relationship. The canines or the premolars may just as well be favored, but since the first permanent molars make their appearance in the mouth long before the other permanent teeth, and since orthodontic treatment is frequently begun before all the permanent teeth are in position, the selection of the first permanent molars seems to be logical, because a system based upon them must necessarily have a wider range of application.

Perhaps there is not so much objection to the selection of the first molars as points of reference as there is to the statement of Angle, that "of all

*Angle;—Malocclusion of the teeth 7th Edition page 51.
**Angle;—Malocclusion of the teeth 7th Edition page 52.
***Angle;—Malocclusion of the teeth 7th Edition page 54.

teeth the first permanent molars are by far the most constant in taking their normal position." This statement must not be taken at its face value. Even Angle himself recognizes that this is not an absolute truth, for he writes on page 20 in his book (7th Edition) as follows. *"Probably they (first molars) are never exactly constant as to the sides, but we insist that this is but natural, and in keeping with the rest of the anatomy and should no more be regarded as an abnormality when slight than the almost universal slight difference in the positions of the eyes or the ears."* On the same page we find the following also: *"The Author is well aware of the criticisms to the acceptance of the first permanent molars as a basis for diagnosis of cases of malocclusion in contradistinction to the only heretofore known plan, which is entirely empirical and depends upon the judgement of the operator, but he feels sure, that an unbiased and more thorough study of the subject will demonstrate that the first permanent molar furnishes more nearly than any other tooth or point in the anatomy an exact scientific basis from which to reason on malocclusion."*

From this we can readily understand the attitude of Angle. That his statements were taken up in a more restricted sense than they were originally intended can not be denied, and a broader interpretation of his teachings would be of advantage. He does not tell us that his system is infallible, but he expresses universal truths in his classification. The classification is general and by no means quantitative. It merely indicates the direction in which an intelligent treatment of malocclusion may be undertaken and beyond that nothing is said. That the conditions included under the classification exist and that the classification includes practically all possible conditions of malocclusion, must be admitted. If we repeatedly encounter cases that under this classification cannot be successfully treated, it only means that the quantitive side of the science of orthodontics is not as yet developed. The conditions expressed in the classification, however, must necessarily dominate orthodontic thought.

The constancy of the molar may be given a different interpretation without materially affecting the soundness of the classification. The classification deals mainly with relationship of the maxillary and mandibular arches. The molar is used as a point of reference. Since even Angle admits that the principle of the constancy of the molar is propounded, then, in the absence of a better point of reference, we must accept it provisionally until a more

stable guide is found. Furthermore, the principle of the constancy of the molar has nothing to do with occlusion. Since our ultimate aim is to establish normal occlusal relationship, the first consideration is to determine how such a relationship may be brought about by treatment. The occlusion may be established theoretically between the maxillary and mandibular teeth, regardless of the fact that the whole maxillary arch and, in consequence, the first permanent molars may not be in the proper relation to the cranium as a whole. The diagnosis of such a condition is another matter. So far as occlusion is concerned the first molars may be regarded as reliable points of reference. If we chose to consider the first molars always in proper relation to the cranium after occlusion has been established, then we may limit the sphere of usefulness of our diagnostic method, but the establishment of normal occlusion is necessary. This is where Simon believes that his system differs so radically from that of Angle, for he claims to be able to determine the exact position of the maxillary arch to the cranium. We must recognize that there is a difference in the point of view, but there is no clashing of opinions. Simon's method opens up a new phase of the subject, but the establishment of occlusion still remains a necessity and Angle's method may be regarded as sufficiently convenient for average conditions.

The reason we are in search of a more thorough diagnostic system is due to the fact that there are cases which cannot be classed as average and difficulty is experienced in applying Angle's conception to them. The treatment of such cases involves problems which are primarily due to a misconception of conditions. If we carefully examine the teeth which make up the masticatory apparatus of several individuals we will note that in the great majority of instances there is no variation in the sizes of identical teeth on the two sides of the dental arches. This indicates to us that under such conditions absolute symmetry of the arches is demanded and normal occlusion can only be established if the first permanent molars, which are our points of reference, are symmetrically placed. Angle admits that the symmetrical position of the molars is the rule, rather than the exception, but he fails to indicate how such asymmetry can be determined or corrected. This is the reason why in so many cases the Angle system is not adequate and the establishment of normal occlusion seems impossible. On the other hand there may be variation in the sizes of similar teeth on the two sides of the dental arches and in such cases it becomes necessary to determine the degree of desirable asymmetry with respect to the median line. By means of the Angle system we are not able to determine the asymmetrical arrangement of the molars except in cases in which the asymmetry is pronounced.

It is clear then, that while the Angle system is principally correct, a modification of the method is desirable and it must be extended to cover those deviations which, with the system in its present form, may pass unnoticed. Here it is again especially noted that the Simon system is not in conflict with the Angle classification and its applicability will be taken up in detail under the analysis of Simon's method.

Angle defines the "line of occlusion" *as being the line with which in form and position according to type, the teeth must be in harmony if in normal occlusion.** This definition is not sufficiently descriptive. It presupposes a conception on the part of the student and leaves a good deal to individual judgment. The "line of occlusion" is identical with the "arch outline" of later investigators, the difference being that the various proposed arch outlines leave nothing to individual judgment and the arch form is definitely indicated. This deficiency in the Angle system is partially overcome by the work of Hawley, Stanton and others, and while the work of Stanton is presented herein as an individual system, it can only be regarded as an addition to that of Angle. Here again it must be emphasized that Stanton does not place much importance on the change in the relation of the maxillary and mandibular arches, which plays such an important part in the treatment of malocclusion.

Angle has enunciated basic principles which can only be enlarged upon, but never can be dispensed with.

*Angle;—Malocclusion of the teeth 7th Edition page 22.

—To be continued—