Ambiguities of Angle's classification

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Edward H. Angle contributed much to our profession and to our understanding of orthodontic diagnosis and treatment. Other classification systems have been developed to describe "normal" occlusion and malocclusion,[1,2,3] but Angle's System, described in 1899, has survived the test of time. Angle's taxonomy of dental occlusion is still the primary system employed by our specialty, including the American Board of Orthodontics. It has become a vehicle for describing cases among orthodontists as well as other dentists; it is the language accepted by the legal profession; it is the language found in our literature to describe case reports, epidemiological studies and empirical work.

As an orthodontist, Angle was not only an artist and scientist, but also a philosopher who thought broad-mindedly about his classification system. Because plants, animals and the elements had been orderly arranged into discrete classes, Angle believed dental occlusion could also be accurately described and arranged into categories.[4] In retrospect, our understanding of dentofacial development and dental occlusion suggests that ambiguities in Angle's Classification System exist. In biology, the old and widely used two-kingdom system of classifying living things into plants and animals was challenged by such organisms as sea anemones, sponges, protozoa, bread molds, bacteria, and viruses. As the old dichotomous system of classifying living things was too simple for the diversity of nature, Angle's Classification System is often too simplistic and ambiguous as a three-class system of describing the infinite variety of dental occlusions. Even Angle[5] was aware of a permutation in his classification system in which one half of the arch is Class II and the other half is Class III... "There still remains, however, one possible class, viz., where one of the lateral halves of the mandidular arch is in mesial occlusion while the other is in distal occlusion, but cases having these characteristics are so rare that

Abstract

In 1900, Edward H. Angle wrote that all teeth should be considered when classifying cases; in 1907, he emphasized using the maxillary first molars as reference teeth. Arguments are presented to illustrate the confusion in relying solely on Angle's system of classification. The criteria for a discrete versus a continuous variable is discussed.

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Key Words

Angle • Classification

further reference to them seems unnecessary..." (p. 54).

The purpose of this paper is to discuss fallacies of Angle's classification, and to review its history.

Fallacies of Angle's Classification System

As judged by present day knowledge, there are several fallacies in Angle's logic in regards to his philosophy of dental occlusion. For instance, Angle believed that facial harmony and balance were only possible with a full complement of teeth in "normal" occlusion. Thus, Angle's treatment philosophy was opposed to the extraction of permanent teeth.[5] However, cephalometric studies have demonstrated that "normal" occlusion is not necessarily correlated with normal facial balance and vice versa.[6] In addition, Dr. Charles Tweed and others have demonstrated some advantages of extracting premolars in certain cases to enhance treatment results and increase stability.

Angle[5] also believed that the anterior-posterior (i.e., sagittal) position of the maxillary permanent first molars is relatively immutable even though individual variability exists. He also believed that the eruption pattern of the maxillary permanent first molars causes them to assume a normal position. This notion was also considered true for the maxillary permanent canines. However, cephalometric studies have demonstrated that these teeth can assume a range of possible positions compared to the facial skeleton.[7]

With regard to diagnosis and treatment, Angle assumed all malocclusions that look alike are alike, which is not necessarily true. In fact, Tuncay and Biggerstaff[8] believed the opposite is correct; that is, all malocclusions that look alike are not alike.

Historical review of Angle's Classification

Edward Angle published his "Classification of Malocclusion" in 1899 in the periodical, *Dental Cosmos*. He supplemented the information presented in this article in the publication in 1900 of the sixth edition of his book, *Treatment of the Teeth and Fractures of the Maxillae*. However, there are some obvious and pertinent differences in the information presented in these two publications and the information contained in the 1907, seventh edition of his book, *Treatment of Malocclusion of the Teeth*.

The foremost difference between Angle's writings in 1900 and 1907 is the emphasis he placed on the importance of the maxillary permanent first molars. In 1900, Angle considered the maxillary permanent first molars and maxillary permanent canines important teeth from which to judge the mesio-distal interarch relationship of the dental arches, but he believed *all* the teeth were to be taken into consideration when determining the classification of cases. Angle wrote in 1900:

> ...in determining the mesio-distal variations, *all* of the teeth are to be taken into consideration, but the points indicated (i.e., maxillary first molars and canines) have long been favorites with the author in beginning the diagnosis of cases, for the reason that the first molars and cuspids are far more reliable as points from which to judge.[9]

In his 1907 book, Angle emphasized using the maxillary first molars as reference teeth for determining the classification, almost to the exclusion of all other teeth. A year prior to his 1907 book, Angle published his classic article in *Dental Items of Interest* entitled, "The Upper First Molars as a Basis of Diagnosis in Orthodontics."[10] In this article, as well as in his 1907 book, Angle espoused the virtues of the maxillary first molars. He believed these teeth were the key to occlusion because they:

1. Are the largest teeth.
2. Are the firmest in their attachment.
3. Have a key location in the arches.
4. Help determine the dental and skeletal vertical proportions due to the lengths of their crowns.
5. Occupy normal position in the arches far more often than any other teeth because they are the first permanent teeth and are less restrained in taking their position.
6. More or less control the positions of other permanent teeth anterior and posterior to them.
7. Have the most consistent timing of eruption of all the permanent teeth.
8. Determine the interarch relationship of all other teeth upon their eruption and "locking" with the mandibular first molars.

The changes in Angle's thinking and writings between 1900 and 1907 have created a dilemma: Should the orthodontist use only the permanent first molars to determine the classification of an occlusion? Or, should the canines be included? If so, which teeth, the molars or canines, should be given priority when determining the classification of an occlusion? Or, should the orthodontist use *all* the teeth to assign a case to one of Angle's Classifications?

In light of the preceding discussion, it is evident that many dental occlusions would be difficult, if not impossible, to classify according to the guidelines set by Angle. Several of these types of occlusions will be addressed. As pre-

viously mentioned, the situation arising where one side of a dentition is in a Class II relation, while the other side is in a Class III relation, is beyond the parameters of Angle's Classification. There are other instances where Angle's Classification criteria do not apply. How about the perplexing situation created in attempting to classify a dentition where the mandibular second premolars are impacted, or blocked out of the arch lingually; there has been space loss in the mandible due to the mesial migration of the mandibular first molars; the first molars are in a Class I relationship solely due to the mesial movement of the mandibular first molars as they have "reacted" to the impacted second premolars; and the premolars, canines, and incisors are in a Class II relationship. How would this case be classified? Class I, Class II? A similar dilemma could arise when the first molars are in a Class I relationship and the rest of the dentition is in a Class II relation. However, the only reason for the Class II molars is due to the mesial migration of the maxillary first molars because the maxillary second premolars, or for that matter first premolars, are ectopic and are blocked out of the "line of occlusion." The maxillary first molars have positioned themselves in the space where the second premolar should be. Should this occlusion be classified as Class I or Class II?

Discrete categories

Angle's method of diagnosing dental occlusions into three categories, i.e., Class I, Class II, and Class III, involves a discrete variable as opposed to a continuous variable. For example, if one is undertaking a research project in which subjects are classified into one of Angle's Classes on the basis of their dental occlusions, then the occlusions can only be Class I, or Class II, or Class III (or a subdivision), which is a discrete variable. There is no continuum, nothing can fall in between (a continuous variable). A researcher would have to operationally define each category, i.e., Class I, II, III, in order that each is mutually exclusive. During our residency in orthodontics, we were taught that if the first molars were not exactly Class I, the mesiobuccal cusp of the upper first molar occluding in the buccal groove of the lower first molar, then the occlusion can only be one of the other categories, Class II or Class III. This thinking is consistent with the criteria for a discrete variable and a nominal scale in which each category (Class I, II, or III) must be exhaustive and mutually exclusive. Hence, each dental occlusion must fall into one, and only one, of the three classes. But Angle implied that a Class II and a Class III must be of a magnitude of one-half the width of one cusp to fit into these categories. Angle wrote in his 1907 book, *Treatment of Malocclusion of the Teeth: Angle's System:*

> *Class II:* When from any cause the lower first molars lock distally to normal with the upper first molars on their eruption to the extent of more than one-half the width of one cusp on each side... (p. 44)
>
> *Class III, Division 1:* 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 the division of this class is slightly more than one-half the width of a single cusp on each side... (p. 52)

Further, Angle in 1907[5] cast some doubt about the specificity of his Class I-type malocclusion,

because he allowed some latitude in applying his criteria for a Class I molar relationship. He wrote:

> It is to be understood that the sense in which we here speak of the upper first permanent molar is its mesial-distal relations, and independently of slight migrations mesially or distally which may have resulted from mutilation, the extent of which migrations, if occurring, can be easily detected and allowances made therefore. (p. 21)

If it takes one-half a cusp width deviation from a normal molar relation to conform to Angle's definition of a Class II or Class III malocclusion, then what type of an occlusion exists when there is less than a one-half cusp deviation? Does this imply by inference that a molar deviation of less than one-half cusp must be within the parameters of a Class I malocclusion? If this is so, the principle of the mesiobuccal cusp of the maxillary first molar fitting into the buccal groove of the mandibular first molar would not apply in every case.

Conclusion

Because of the apparent lack of reliability in using Angle's Classification as well as confusion concerning the interpretation of Angle's writings, it may be necessary for The American Association of Orthodontists and the American Board of Orthodontics to interpret and define Angle's Classification in a manner that is less subject to error. At the University of Pittsburgh, Department of Orthodontics, Dr. Viken Sassouni taught his students to classify and diagnose dental occlusion at three levels using Angle's concepts, i.e., molars, canines, and incisors. Just as the old dichotomous system of classifying living things into two discrete categories (or kingdoms) has changed, it may be time for us to upgrade a very useful and old system into a more reliable one. Perhaps, the words of our profession will then speak a truer language.

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References

1. Lischer, B.E.: Principles and Methods of Orthodontics. Philadelphia: Lea & Febiger, 1912.
2. Dewey, M.: Classification of malocclusion. Int. J. Orthod., 1:133-147, 1915.
3. Ackerman, J.L., Proffitt, W.R.: The characteristics of malocclusion: A modern approach to classification and diagnosis. Am. J. Orthod., 56:443-454, 1969.
4. Angle, E.H.: Classification of malocclusion. Dental Cosmos, 41:248-264, 1899.
5. Angle, E.H.: Malocclusion of Teeth (7th ed). Philadelphia: The S.S. White Dental Manufacturing Co., 1907.
6. Sassouni, V.: A roentgenographic cephalometric analysis of cephalofacio-dental relationships. Am. J. Orthod., 41:735-764, 1955.
7. Sassouni, V., Forrest, E.J.: Orthodontics in Dental Practice. St. Louis: The C.V. Mosby Co., 1971.
8. Tuncay, O.C., Biggerstaff, R.H.: Orthodontic classifications: Mystique or reality. 70:173-175, 1976.
9. Angle, E.H.: Treatment of Malocclusion of the Teeth and Fractures of the Maxillae: Angle's System (6th ed). Philadelphia: The S.S. White Dental Manufacturing Co., 1900.
10. Angle, E.H.: The upper first molar as a basis of diagnosis in Orthodontics. In Dental Items of Interest. 28:421-426, 1906.