Letters

Anteroposterior dysplasia indicator

We would like to comment on the anteroposterior dysplasia indicator (APDI) used by Robert Rosenblum in his paper "Class II malocclusion: mandibular retrusion or maxillary protrusion" (Angle Orthod 1995;65(1):49-62). This parameter was suggested by Kim and Vietas[1] as an indicator of the molar relationship. It is achieved by tabulating three angles: the facial angle, the A-B plane angle, and the palatal plane angle (to Frankfort horizontal). In the latter paper, it is unclear how the authors arrived at this specific combination of parameters. This seemed to us an intriguing question. A simple geometric investigation shows that APDI is merely the angle formed by the intersection between the palatal plane and the A-B plane. Using this angle rather than measuring three angles and adding them together considerably minimizes the potential for error in measurement. Also, it is much more easily perceived by the orthodontist. Knowing that the APDI is really the angle in between these two planes may also help in understanding the high correlation with the molar relationship.

We would like to point out another issue that seemed problematic to us. In his paper, Rosenblum claims that his sample group had a Class II molar relationship. The upper limit of the APDI was calculated from Kim and Vietas'[1] normal occlusion group's mean minus one standard deviation, rather than using their distocclusion mean of 75.24 degrees. This was more than 2 degrees lower than Rosenblum's upper limit of 77.61 degrees. The statistical meaning behind this is that it is highly probable that Rosenblum's sample group included normal occlusion subjects and may not have comprised Class II malocclusion individuals only. This could have been prevented by selecting a group composed primarily of subjects having a clinical Class II molar relationship and using the cephalometric parameters as secondary criteria.

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References

1. Kim YH, Vietas J. Anteroposterior dysplasia indicator: an adjunct to cephalometric differential diagnosis. Am J Orthod 1978; 73:619-633.

Author's Response

Thanks to Drs. Dinte, Brezniak, and Wasserstein for their interest in my paper. In answer to their second point, there were no Class I subjects in the study. After the initial computer selection of the data base on the APDI and the angle of convexity, about five subjects were removed from the study because they were Class I. All variations of Class II were included in the sample, including end-on and unilateral variations. Two of the 103 subjects were end-on unilateral with Class I. A more detailed explanation of this had been eliminated during revision of the article.

In regard to the cut-off limit used for APDI, one standard deviation was used because I felt it was the statistically valid approach. Class II malocclusions and "Class II skeletal patterns," that is convex facial patterns, represent two subsets of the malocclusion population that are only partially correlated. Coben[1] pointed out that the

Class II malocclusion "does not presuppose a specific craniofacial relationship." He also noted that "Faces exhibiting this malocclusion vary from those with good skeletal balance to those with dysplastic patterns, and profiles vary from retrognathic to prognathic."

Of all the cephalometric indicators evaluated by Kim and Vietas[2], the APDI had the highest correlation coefficient to the displacement of the molar occlusion, but this was still only .643. I also used the angle of convexity as a filter in order to study convex faces based on a skeletal profile measurement.

I was aware that the APDI could be reduced to the AB to palatal plane angle. Kim, Caulfield, Chung, and Chang[3] mention this in a recent paper. In response to this letter, I reviewed the 103-subject database for the incidence of bilateral full Class II malocclusions. Based on the APDI, I sorted the sample into three groups:

A. APDI 77.61 to 85.60 (those that the angle of convexity only selected)
B. APDI 75.24 to 77.60 (those from the Kim Class II limit to the one standard deviation limit on the Class II side of APDI)
C. APDI 55.80 to 75.23 (those greater than one standard deviation to the Class II side)

The number of subjects in each group and the percentage of complete bilateral Class II malocclusions in each group was:

A. 12 subjects - 33.3%
B. 29 subjects - 48.3%
C. 62 subjects - 58.1%

Thus, variations of Class II occur in all three groups.

Kim[4] reported that the mean APDI in a Class II group requiring extraction was 73.7, while that in a nonextraction group was 75.6. The mean in my study as shown in Table IX was 73.79, with a standard deviation of 4.59. Kim et al.[3] also recommended the combination of the ODI and the APDI for diagnostic purposes. They reported a combination factor mean of 148 for a Class II extraction group. The mean of this factor in my study was 149.65 with a standard deviation of 8.41.

In planning this study, I had noted that there are frequent statements in the literature that most Class II skeletal patterns are retrognathic. I have found few, if any, other studies that selected subjects on the basis of the degree of facial convexity or skeletal dysplasia in order to eliminate Class II malocclusions with normal skeletal patterns. There are many studies in the literature on the accuracy of locating cephalometric landmarks, but few of them critically evaluate the logical or clinical relevancy of the indicators used.

The results of the study speak for themselves and are in contradistinction to what would be expected from the letter of Drs. Dinte, Brezniak, and Wasserstein. The popular SNB showed a high incidence of retrognathic mandibles, as many orthodontists would have expected. It should be pointed out that point B is a denture base reference point and not a skeletal chin landmark.

The angle which is more logically and clinically relevant, the facial plane angle, showed approximately one-third as many retrognathic mandibles. The angle NA-FH showed a high incidence of maxillary protrusion in this sample (56.27%) and the Coben ratio B-A:B-N% reported 56.77%.

If we are going to make statements about the source of the skeletal abnormality in Class II subjects, we need subjects with sufficient skeletal or denture base discrepancies from normal skeletal patterns. We also need to use reference standards for the skeletal indicators appropriate to the maturity level of the subjects rather than to their chronological age.

References

1. Coben SE. Growth and Class II treatment. Am J Orthod 1966;52:5-26.
2. Kim YH, Vietas J. Anteroposterior dysplasia indicator: an adjunct to cephalometric differential diagnosis. Am J Orthod 1978;73:619-33.
3. Kim YH, Caulfield Z, Chung WN, Chang YI. Overbite depth indicator, anteroposterior dysplasia indicator, combination factor, and extraction index. The International Journal of the MEAW Technic and Research Foundation, 1994;1:11-32.
4. Kim YH. A comparative cephalometric study of Class II, Division 1 nonextraction and extraction cases. Angle Orthod, 1979;49:77-84.