

## A USEFUL ORTHODONTIC AID FOR THE GENERAL DENTIST

### The Mixed Dentition Analysis

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Aside from the pain, the most common reason for a child being brought to the general dentist is the crowding of mandibular incisors. These teeth typically erupt from a lingual position and Figure 1 is a fairly good example of the condition.

The parent is usually alarmed by this development and begins to wonder if this will be the pattern for all of the permanent teeth.

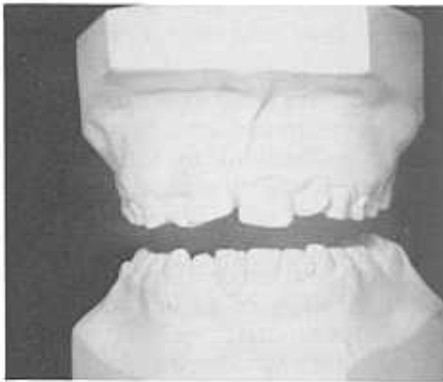


Fig. 1

The mixed dentition analysis, or MDA, is a tool which the dentist may use to discover if the initial crowding is more apparent than real. And he can also form an accurate prognosis.

One fallacy the general dentist should never perpetuate is to tell the parent that there is no way of telling at this young age if the child will eventually have room for all of his permanent teeth.

Another myth the dentist should be careful about planting in the parents' mind is that the jaw will continue to grow and hopefully accommodate the crowded teeth.

The jaws do, indeed, continue to grow, but as Figure 2 shows, the growth does not create more arch length mesial to the six-year molar. Growth, after six to eight years of age, increases the length and the width of the jaws, but only posteriorly from the six-year molar.

The MDA is based upon the high correlation among all of the widths of teeth except the four teeth

developing in the premaxilla. This correlation makes it possible to measure the lower mandibular incisors and to predict, with some reliability, the size of the teeth not yet erupted. This correlation was discovered by Griewe in 1949, at the University of Iowa.<sup>(1)</sup>



Fig. 2

The MDA requires few instruments and a minimum of time; a millimeter gauge, fine dividers, paper, pencil, and models of the patient's mouth (figure 3).

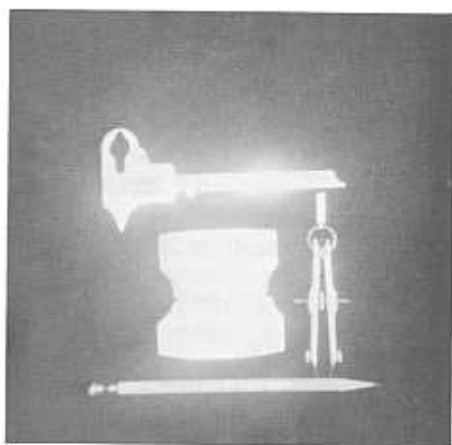


Fig. 3

All four mandibular incisors must be erupted so that their individual widths may be accurately measured with dividers as seen in Figure 4. These widths are placed next to one another on a suitable sheet of paper as illustrated in Figure 5.

A line of arch, which is needed for the alignment of the central and lateral incisors, is marked on the model. This will ordinarily cause the lateral incisors to encroach upon the primary cuspids as shown in Figure 6.

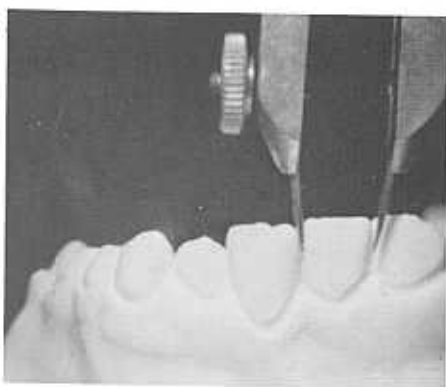


Fig. 4

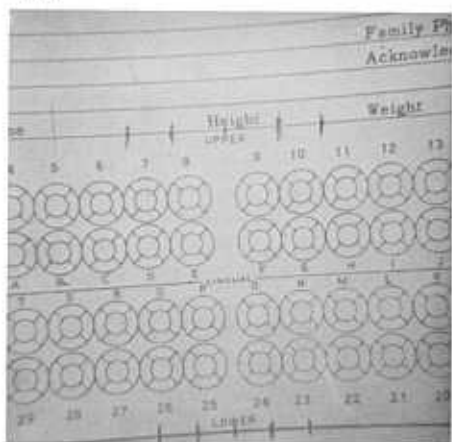


Fig. 5

After the ideal mesio-distal positions of the incisors have been determined, the space available for the posterior teeth is then measured with the dividers from the mesial of the six-year molar to the distal surface of the repositioned lateral incisor as shown in Figure 7. And this length is then recorded, as shown in Figure 8.

The probability charts (2) for computing the size of unerupted cuspids and bicuspids are shown in Figure 9.

The general dentist would be wise to use at least the 85% level of probability in his forecasts. This will eliminate his own anxiety and possibly save him from an embarrassing explanation in later years as to why the teeth are still crowded.



Fig. 6

If the space is judged to be adequate for the yet unerupted posterior teeth the dentist can, in good faith, tell the parent that the crowding will not become worse. And through the influence of the lip, face, and tongue muscles, these

incisors can be expected to unravel within the next two to three years.

Nevertheless, the dentist may want, for one reason or another, to expedite this unraveling. There are various appliances and techniques available for this assistance.

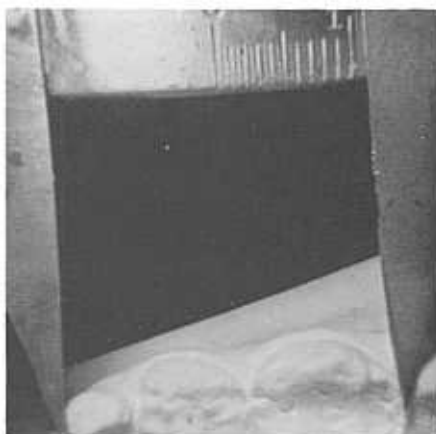


Fig. 7

UPPER		
	33	
	Right	Left
Space left after alignment of 2 and 1	23	24
Predicted size of 3 + 4 + 5	24	24
Space left for molar adjustment	-1 mm	

LOWER		
	25 mm	
	Right	Left
Space left after alignment of 2 and 1	23	22.5
Predicted size of 3 + 4 + 5	23.8	23.8
Space left for molar adjustment	-.8 mm	-1.3 mm

Fig. 8

The dentist may provide some instant space by shaving the mesial sides of the primary cuspids. Or he may wish to provide even more space by removing the primary first molars. Some orthodontists have recommended removing the primary cuspids, but this seems ill advised as it tends to limit the development of the cuspid alveolar eminences, and this eventually robs us of some lateral arch development that is so important for proper cuspid positioning and arch width.

Generally speaking, the general dentist would be wise not to use any appliances at this point, because they are probably unnecessary. But if he is anxious to assist the unraveling, he might wish to use a lip bumper (figure 10) which frees the incisors from the restraining influence of the lips and allows the tongue to mold the incisors into a symmetrical arch.

We need to say something about those cases which reveal obvious tootharch discrepancies and display an 85% chance or greater of being permanently crowded.

Many of these discrepancy cases will be due to the premature loss of primary second molars and concomitant mesial drifting of the six-year molar. The MDA can tell the dentist how much space he must have for the unerupted teeth, and he can then determine how far distally he must move the six-year molar to regain the lost space. There are many removable and fixed appliances that can be used for space regaining, and their choice is probably not too important.<sup>(3)</sup> But the dentist should understand how difficult it is to distally move the six-year molars. He should not

count on being able to reposition them more than one or two millimeters without the aid of sophisticated orthodontic appliances and, generally speaking, these are not part of the general dentists' armamentarium.

The MDA is also useful in helping the general dentist decide the advisability of space maintainers. If a patient is already badly crowded, and it is obvious that bicuspid must eventually be removed and orthodontic treatment instituted, the dentist should forego any temptation to place space maintainers. It is wasteful and unnecessary. About the only thing the unnecessary spacer does is aggravate an already crowded condition.

If the MDA reveals a high probability of crowding in the permanent arch, the general dentist will be wise to seek an orthodontic evaluation. A thorough orthodontic examination should be completed before recommending the removal of any permanent teeth. Ordinarily cephalometric records, complete photographs, Bolton Analysis, etc., are not part of the general dentist's armamentarium, but they must be considered before deciding upon the removal of permanent teeth.

It is no longer a simple matter of deciding if permanent teeth must be removed, but also which teeth must be removed. In the past, first bicuspid were removed also exclusively. But newer and more effective treatment concepts are being used today that may signify the need to remove second bicuspid, a combination of first and second bicuspid, or even the elimination of molars.

*(Continued next page)*

The MDA is a useful tool for the general dentist and orthodontist, but both must realize that its use is limited to forecasts. There are other, more sophisticated, diagnostic tools that must be implemented before the removal of permanent teeth is consummated.

Proper understanding and effective use of the MDA can do much to reassure the parent of the dentist's knowledge and competence. But equally important, it can

provide an important bridge of communication between dentist and orthodontist that can assure the patient of an accurate diagnosis and effective treatment plan.

- (1) Moyers, Robert E., 1963. Handbook of Orthodontics, Year Book Medical Publishers, Inc., pp. 188-196.
- (2) Ibid., pp. 194-195
- (3) Norton, Louis A. & Proffit, William R., 1968. Molar uprighting as an adjunct to fixed prosthesis. J. Am. Dental Assoc. 76:312-315

PROBABILITY CHART FOR PREDICTING THE SUM OF THE WIDTHS OF  $\frac{3}{4}$ S FROM  $\frac{21}{12}$

$\frac{21}{12}$	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0
95%	21.6	21.8	22.1	22.4	22.7	22.9	23.2	23.5	23.8	24.0	24.3	24.6
85%	21.0	21.3	21.5	21.8	22.1	22.4	22.6	22.9	23.2	23.5	23.7	24.0
75%	20.6	20.9	21.2	21.5	21.8	22.0	22.3	22.6	22.9	23.1	23.4	23.7
65%	20.4	20.6	20.9	21.2	21.5	21.8	22.0	22.3	22.6	22.8	23.1	23.4
50%	20.0	20.3	20.6	20.8	21.1	21.4	21.7	21.9	22.2	22.5	22.8	23.0
35%	19.6	19.9	20.2	20.5	20.8	21.0	21.3	21.6	21.9	22.1	22.4	22.7
25%	19.4	19.7	19.9	20.2	20.5	20.8	21.0	21.3	21.6	21.9	22.1	22.4
15%	19.0	19.3	19.6	19.9	20.2	20.4	20.7	21.0	21.3	21.5	21.8	22.1
5%	18.5	18.8	19.0	19.3	19.6	19.9	20.1	20.4	20.7	21.0	21.2	21.5

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$\frac{21}{12}$	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0
95%	21.1	21.4	21.7	22.0	22.3	22.6	22.9	23.2	23.5	23.8	24.1	24.4
85%	20.5	20.8	21.1	21.4	21.7	22.0	22.3	22.6	22.9	23.2	23.5	23.8
75%	20.1	20.4	20.7	21.0	21.3	21.6	21.9	22.2	22.5	22.8	23.1	23.4
65%	19.8	20.1	20.4	20.7	21.0	21.3	21.6	21.9	22.2	22.5	22.8	23.1
50%	19.4	19.7	20.0	20.3	20.6	20.9	21.2	21.5	21.8	22.1	22.4	22.7
35%	19.0	19.3	19.6	19.9	20.2	20.5	20.8	21.1	21.4	21.7	22.0	22.3
25%	18.7	19.0	19.3	19.6	19.9	20.2	20.5	20.8	21.1	21.4	21.7	22.0
15%	18.4	18.7	19.0	19.3	19.6	19.8	20.1	20.4	20.7	21.0	21.3	21.6
5%	17.7	18.0	18.3	18.6	18.9	19.2	19.5	19.8	20.1	20.4	20.7	21.0

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Fig. 9a. — Probability Charts for computing the size of unerupted cuspids and bicuspids. Fig. 9a is for the upper arch; Fig. 9b is for the lower arch. Measure and obtain the sum of the widths of the permanent mandibular incisors and find that value in the top horizontal column. Reading downward in that column, obtain the value for the expected widths of the cuspid and premolars corresponding to the level of probability you wish to use. Ordinarily, the 75% level of probability is used. The chart may also be used to assess the progress of space regaining procedures. Note the mandibular incisors are used for the prediction of both the mandibular and maxillary cuspid and premolar widths.