THE ORTHOGRAM

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I would like to thank all of you for the many nice comments on the first edition of Orthogram. It received a very good response, so I would like to continue on with the series. The next topic I have chosen is one of the most common problems seen in the dental office.

MIXED DENTITION CROWDING

Usually the first orthodontic problem a parent will notice is crowding of the lower incisors as they erupt. This is brought to the dentist's attention as soon as possible, so I would like to review some of the options available now for treatment of this problem.

Serial Extractions

This procedure gained great popularity about twenty five years ago because of the hope that it would reduce the need for extensive orthodontic treatment. Primary teeth are extracted in a serial sequence to provide space for the eruption of permanent teeth. The last step is usually extraction of the first bicuspids. Although some cases work out quite well, the majority still need full banded orthodontics to correct tipped teeth and many instances of excessively flattened profiles have been noted due to lingual tipping of the incisors. This procedure also results in excessive deepening of the overbite in many cases. For this reason, serial extraction should be confined to carefully selected Class I cases that are extremely crowded with a tendency for some fullness of the teeth and lips. Class II and III skeletal problems should not undergo serial extraction as early loss of permanent teeth might accentuate the skeletal problem and reduce later options for treatment. Before beginning a serial extraction procedure, a full orthodontic diagnosis (including cephalometrics) is advisable.

Extraction of Primary Cuspids

Many dentists have used this method for temporary relief of incisor crowding without going through a complete serial extraction procedure. Unfortunately, this can compound the problem in the lower arch and might even commit the patient to the unnecessary bicuspid extractions. The primary cuspid

roots are needed to stimulate development of alveolar bone and their presence fills out the arch as the incisors erupt, causing an enlargement of arch length through growth. Conversely, extraction of primary cuspids causes a shrinkage of alveolar bone and loss of support for the incisors causing them to tip lingually, further shortening the arch length.

The upper incisors are supported by the lower arch so they won't tip this way when the upper primary cuspids are extracted. Therefore, removal of upper primary cuspids is often a good idea if the laterals are blocked. Studies have shown this to reduce the tendency for palatal impaction of the upper cuspids. This is just one example of the many ways upper teeth respond quite differently from lower teeth in orthodontic procedures. This is due to the fact that the mandible has much denser bone, it is movable, and its teeth are enclosed by the upper teeth.

Discing the Mesial Surface of Lower Primary Cuspids

This procedure is recommended to relieve crowded lower incisors in the early mixed dentition because it doesn't cause the problems just mentioned with extraction of the lower primary cuspids. In severe cases, it may not completely correct the crowding, but it will help some until the patient is older and results of growth can be evaluated before deciding on a method of treatment.

Natural Exfoliation of a Lower Primary Cuspid

If this occurs due to eruption of a lateral incisor in cases of extreme crowding, then a decision should be made whether to go ahead with a serial extraction procedure and remove the other primary cuspid so the midlines might correct or to begin some orthodontic procedure to hold or gain arch length to prevent extractions. Again this must be based on a thorough orthodontic diagnosis because this could be a turning point for that case.

Leeway Space from Loss of Lower Primary Second Molars

An average space of 2.26 mm on the upper and 2.54 mm on the lower is available from the replacement of lower primary second molars with second bicuspids. Usually this space is used up by the permanent first molars shifting forward. If a holding arch or space maintainer is placed prior to loss of the lower primary second molars, the space can be used to greater advantage by shifting the cuspids and bicuspids distally, thereby creating more space for the crowded incisors. This procedure can be done most efficiently with fixed appliances just

before loss of the lower primary second molars. This method can be combined with other forms of tooth movement such as lateral expansion, molar distalization, or labial incisor positioning when appropriate to gain even greater amounts of space.

Orthodontic Increase in Arch Length

In past years, it was thought that all orthodontic procedures should be delayed until complete eruption of the permanent teeth. By this time, most growth is completed and the transalveolar ligament has formed, connecting each tooth within the arch by a network of fibrous connective tissue. Expansion of the arch will stretch this ligament which has a tendency to return to its original size and shape. This phenomenon may be one reason why expanded arches have a high relapse tendency and could explain why the orthodontic community in years past has resorted to a high percentage of bicuspid extractions.

In recent years, some clinicians have found expansion in the mixed dentition to be more stable - probably because the transalveolar ligament has not yet formed around all the permanent teeth. This has opened the door to a whole new group of procedures for gaining arch length in the mixed dentition to prevent extractions without sacrificing stability.

Generally, the arch can be expanded in three directions: laterally, anteriorly, and posteriorly. Each patient must be evaluated individually to determine if one or a combination of these expansion procedures would be appropriate. Many factors must be considered such as lower incisor angulation, muscular tension and habits, skeletal pattern, position of unerupted teeth, profile, occlusion and patient cooperation potential. If any of those are not considered, a violation of basis physiological balance could be the result. With this in mind, it is no wonder that there is so much confusion and controversy over methods of treating early crowding.

Once this diagnostic process has determined where the teeth should be placed, there are many methods of accomplishing the actual tooth movement. Choice of appliance will be determined by the amount and type of tooth movement required as well as personal preference of the operator. For example, one common situation is the 9 - 10 year old with narrow arches and crowding. Expansion with a bonded rapid palatal expander and a lower fixed expander is quite effective and stable at this age. This can then be followed up with retainers to improve incisor alignment and myofunctional therapy if a tongue thrust habit is presents.

In slightly older patients with similar problems, fixed appliances on the incisors and first molars can do the same thing with utility archwires and Class II elastics if the arches aren't too constricted. If they are, then quad-helix expansion arches could also be incorporated. The remaining permanent teeth could then be banded as they erupt so the case could be completed a short time after eruption of the permanent teeth with no extactions, an excellent profile, and good stability.

There are many other appliances that can be used to create space during the mixed dentition. Some of the more commonly used ones will be discussed in greater detail in future issues to describe indications, appearance and timing.

In summary, the best early treatment procedure for lower incisor crowding is discing the lower primary cuspids. While removal of maxillary primary cuspids is acceptable, taking out lower primary cuspids often results in even more space loss and commitment to four bicuspid extractions. Therefore, a complete orthodontic work-up with a skeletal evaluation should be done before extractions or space regaining procedures are undertaken. While most space regaining procedures can be put off until 6 -12 months before the primary second molars are lost, some cases with narrow arches due to mouth breathing should be started earlier to take advantage of growth and achieve early habit correction.