

The Lower Second Deciduous Molar

SIDNEY BRANDT, D.D.S.

Millburn, New Jersey

When a deciduous molar has been lost, it is important to the orthodontic profession to learn what happens to the neighboring teeth. The following report by G. Richard Safirstein and myself is a study of the stability of the lower second deciduous molar and the lower permanent first molar in those situations where there has been the removal of both the deciduous cuspid and the deciduous first molar, or the removal of only the first molar.

The stability of the buccal segments involving the second deciduous molar and the permanent first molar has special significance to the general practitioner of dentistry, to the pedodontist and to the orthodontist. The decision to prescribe a space maintainer might be altered if the practitioner were confident that the buccal segments were relatively stable and not likely to slide forward. An orthodontist contemplating serial extraction procedures would be very much influenced in his final decision by his confidence or lack of confidence in the stability of the second deciduous molar and the permanent first molar. Many orthodontists have just assumed that these buccal segments automatically slide forward when there has been a loss of continuous tooth structure.

Please note the term "serial extraction procedures" which is to be differentiated from "serial extraction" in its true accepted sense. Most orthodontists will think of serial extraction as controlled removal of deciduous teeth, followed by removal of perma-

nent dental units, followed eventually by minimal orthodontic management to include minor tooth movements with appliance therapy as needed for finishing the case; it might also mean the complete avoidance of appliance therapy.

In our office "serial extraction procedures" has a different meaning. We frequently examine patients in the mixed dentition stage who exhibit varying degrees of crowding. These patients may present Class I or Class II malocclusions. A case analysis is completed for these youngsters using the following aids: a) study models, b) cephalometric radiographs and c) intraoral radiographic survey.

In those cases exhibiting an underdevelopment of supporting basal bone deemed insufficient to accommodate a full dentition, serial extraction procedures are recommended. It is carefully explained to the parents that there will be removal of deciduous teeth, followed by close observation, and eventually active orthodontic treatment that will include judicious removal of permanent dental units. There is no suggestion of minimal orthodontic management.

When it has been determined to institute these procedures, there is a definite methodology as to the selection of the deciduous teeth for extraction. Lloyd² suggested that the decision as to which deciduous teeth be removed be based upon the relative eruptive positions of the permanent cuspids and first bicuspid. These cases will treat much better when the first bicuspid erupt before the cuspids. Therefore, where x-ray examination re-

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veals the permanent cuspids and first bicuspid are about on an even level, only the deciduous first molars are removed in the hope that the first bicuspid will erupt before the cuspids. Where the bicuspid are well ahead of the cuspids, the four deciduous cuspids and four deciduous first molars are ordered removed. It is also frequently decided to remove the upper deciduous cuspids along with the four deciduous first molars, the reason for this being that the mandibular cuspids usually erupt prior to the maxillary canines. The child is examined every six months. When the bicuspid are beginning to erupt, active treatment is initiated and appliances are cemented into position. A full tour of treatment procedure is anticipated particularly where the malocclusion is of the Class II variety.

We selected the first fifty cases from our records. By chance there were twenty-five Class I and twenty-five Class II cases. All had an underdevelopment of the supporting basal bone.

As has been mentioned, when serial extraction procedures are initiated, models are constructed, a cephalometric tracing completed and a full radiographic survey obtained from the patient's dentist. This diagnostic material is examined and evaluated. Based upon the findings, removal of deciduous teeth is recommended. Eventually, when active orthodontic treatment is begun, a new cephalometric tracing is completed and new study models are constructed. The aim of our project was to compare the original tracing with the second and analyze what occurred to the lower buccal segments during this interval. The technique utilized was to trace the mandible with the central incisor, second deciduous molar and permanent first molar in the original tracing. The mandibular plane was then extended on the inferior border

of the mandible. Perpendiculars were then dropped to the mandibular plane tangent to the following; a) pogonion, b) mesial edge of the second deciduous molar, and c) mesial edge of the first permanent molar. The distance from pogonion to the mesial of the second deciduous molar and from pogonion to the mesial of the permanent first molar was measured in millimeters. A similar drawing was completed from the cephalometric tracing taken when active treatment was started. An evaluation was then made as to whether there had been forward displacement of the lower buccal segments. This technique is similar to Wylie's method of measuring dental changes within the mandibular arch.

In the course of this investigation a healthy respect was gained for those men in our specialty who trace cephalometric films with the security and confidence that they know exactly what they are doing. It is very hard to be sure of anatomical landmarks on headfilms. At least we found it that way. There are many places where errors can be committed in such simple tracing as we have undertaken.

We fully realize the numerous possibilities of tracing errors. It can really get down to where there can be differences based upon the thickness of the lead pencils used. Furthermore, there is the possible increment of growth by apposition at pogonion. These errors and growth factors cannot always be accurately determined. However, unless all these are compounded into any one tracing, they will not cause any discrepancies of magnitude or importance. For example, if there has been appositional growth at pogonion over a twelve month period, it would hardly influence the measurements by more than a millimeter or so. Likewise, where there are errors in tracings, these are also likely

to involve total discrepancies of a millimeter or less. It is quite plain therefore, in spite of inevitable inaccuracies, the basic computations and measurements will be within an accurate range. Twenty-five of the test cases were traced by Dr. Safirstein and myself. This immediately confirmed that variations are apt to occur when two people trace the same x-ray film. In actual calculations, however, the variations were minimal within a millimeter or so.

The fifty cases were measured and computed under the following categories: a) minus—where the buccal segments migrated mesially, b) unchanged—self-explanatory, and c) plus, indicating there had been an increase in the distance from pogonion to the mesial of the molars.

The following is the breakdown of the changes that had occurred in the fifty cases: 18 were unchanged, 12 plus and 20 minus. The average for the total sample was a minus of 0.3 mm.

In those cases that exhibited a decrease in the distance there was an average of minus 1.4 millimeters. Applying the same formula to those "plus" cases revealed a 1.4 millimeter average increase.

There does not appear to be any correlation in the amount of slippage and the time lapse between the original and final tracings. For example, one set of tracings thirty-nine months apart showed a loss of 1 millimeter and another set of tracings forty months apart measured a gain of 1.5 millimeters. Several sets of tracings taken approximately twelve months apart showed as much as 2.5 millimeters loss.

Class I and Class II cases reacted practically identically in direction and amount of change, and in change per time interval. It may be important to indicate that the largest plus was 2.5

millimeters and the greatest minus was also 2.5 millimeters.

It appears to us that the lower second deciduous molar is always upright. Regardless of the length of time the deciduous first molar has been lost, there does not seem to be any change in the axial inclination of the remaining dental units in the buccal segment. Contrast this with the changes in the axial inclination of a first permanent molar where the second deciduous molar immediately mesial has been lost prematurely. We have all seen in these instances the first molar begin to assume a sharp mesioaxial inclination, frequently blocking the eruptive path of the second bicuspid. The clinician will immediately diagnose this as a forward migration of this tooth. This type of forward migration does not become apparent when the second deciduous molar is in position.

The lower incisors tend to upright beautifully over basal bone. The spaces created by the removal of the deciduous teeth diminish constantly by the anterior teeth uprighting and not by the buccal teeth moving forward. Many times an orthodontist examines a patient who has lost the lower deciduous cuspids prematurely. The incisors are upright and in close proximity to the deciduous first molars. The space closure in these cases is due to the lower incisors aligning themselves over basal bone into the stable positions they should eventually occupy. In assuming this alignment they have utilized all the available space. The buccal segments remain stable upright, and do not slide forward. The premature loss of one deciduous lower cuspid also helps align the incisors, but usually with a marked midline disharmony, as the teeth tend to slide toward the space created by the lost tooth. In these instances it is wise to remove the similar tooth on the other side to help

obtain symmetry.

Crowding of the anterior segments is under better control. If the incisor teeth can complete their root formation in positions of better advantage, it is our opinion that there will be less of a tendency for recrowding and re-rotating. It is a far better service to relieve a progressive crowding than to sit by and allow a crowding to culminate into more severe malpositions.

There has been fear expressed that Class I cases have been transposed into Class II malocclusions by the early removal of deciduous teeth. This has not occurred in any of the cases in our office, beyond the fifty cases being described. Class I malocclusions have remained that way, and so have the Class II malocclusions.

From time to time several undesirable things occur. One of the most common complications is the impacting of the lower first bicuspid. The following factors, in varying combinations, cause this to happen: a) uprighing of the lower incisors, b) eruption of the cuspids long before the first bicuspid, and c) prolonged retention of the second deciduous molar. It should be noted that where fairly early normal exfoliation of the second deciduous molar occurs, these complications resolve themselves quite readily.

It is also quite apparent that selective extraction of deciduous teeth does not always control the relative rate of eruption of the succeeding permanent teeth. Fanning⁵ substantiates our developing suspicions that the control over eruption is not as secure as originally thought. In other words, removal of a deciduous first molar does not always hasten the eruption of the underlying first bicuspid. However, we have also found that in dealing with deciduous teeth that have had any type of pathology, the removal of such teeth does appear to hasten the erup-

tion of the permanent successors.

In the dentist-orthodontist relationship the recommendations for space maintainers can become an issue where a sharp difference of opinion can be precipitated. In our office it is very seldom that space maintainers are recommended for the loss of deciduous cuspids or deciduous first molars. The dentist treating the child may disagree, and the parents may feel uncomfortable being placed in this sort of dilemma.

There is also the administrative problem that is frequently encountered. In a crowded, mixed dentition malocclusion, the removal of deciduous teeth results in a rapidly improved alignment of the incisors. The parents are usually quite delighted over these developments. Since the teeth appear to be straighter, the recall notices are disregarded. Eventually the full dentition erupts and recrowding occurs. By the time the patient is brought in for treatment the benefits of serial extraction procedures have been lost. The original planning and timing have been bypassed.

In weighing the advantages versus disadvantages accrued in doing serial extraction procedures, it is our opinion that the advantages are in the majority. Some of these advantages are:

a) The incisors can complete their root formation in positions of relatively good alignment.

b) Molar relationships are constant and do not change when deciduous teeth are removed.

c) The buccal segments are stable and do not migrate mesially.

d) When active orthodontic treatment is initiated, any appliance mechanism can be utilized.

e) Serial extraction procedures do not necessarily reduce treatment time. They offer the tremendous advantage

of placing the patient under orthodontic management early. If the eruptive processes are favorable, and they are in a great many instances, the patient can be completed with active orthodontic treatment at an earlier age than if the dentition had been allowed to erupt normally. The social pressures upon the children being what they are, an earlier age conclusion to appliance therapy is a welcome additional service appreciated by both patients and parents.

f) Confidence in the buccal segment stability obviates the necessity for space maintainers to replace prematurely lost deciduous canines and first molars. It is of course wise and prudent to have such teeth removed symmetrically, otherwise midline disharmonies may develop that will complicate eventual treatment procedures.

I should like to call your attention to several other reasons why it is advantageous to remove deciduous teeth where there is a lack of room for the permanent dentition. According to Dewel⁴

- a) no new bone of consequence in the anterior portion of the mandible is laid down by apposition after the age of six;
- b) internal expansion by interstitial growth in this region is impossible; and
- c) arch length between the first per-

manent molars tends to decrease rather than increase on the interchange of teeth between the mixed and permanent dentitions.

It is for these reasons that we have faith in serial extraction procedures. We also have developed much faith in the second deciduous molar. To the best of our knowledge we know of no other tooth, deciduous or permanent, that appears to have the ability to maintain itself as does the second deciduous molar. Unbuttressed by a first deciduous molar, our amazing tooth appears to be able to resist the various anterior components of forces that cause other teeth to succumb quite readily.

176 Millburn Ave.

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