Extraction Effects On The Dental Profile In Borderline Cases*

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INTRODUCTION

If one is inclined toward mental anxiety, as most young orthodontists are, the complexities of the borderline case provide enough ammunition to trigger an attack of neurasthenia gravis. And probably the best definition of a borderline case is one in which you wonder all through treatment whether you should have extracted or not; and, if you have removed teeth, whether or not you have removed the right ones. This study was of the cases in which bicuspids were extracted.

In treating an extraction case there is always the problem of the effect that the proposed treatment plan will have on the final positioning of the anterior teeth. This, in turn, influences the soft tissue profile to varying degrees.

A good profile balance with an accompanying arch length discrepancy present at the start of treatment has commonly been termed a borderline case, and they are the problem cases. There are different approaches to the solution of this enigma and each one is dependent on many factors that become infinite in variety from one patient to another. The removal of different bicuspid combinations or the utilization of certain treatment techniques may be used; or a union of both may be used to achieve the final answer to the problem.

The objective of this project was to determine the relative effect of removal of different bicuspid combinations for these patients.

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MATERIAL

Before and after headfilms were traced of borderline cases selected from the files of treated cases of ten orthodontists of known clinical ability. Of the cases sent, 37 were selected for their similarity in facial pattern and placed in different categories depending on the extractions used. The age ranged from 11 to 16 years and the sample was composed of 11 boys and 26 girls. The patients were those for whom treatment was started in the permanent dentition period, varying from early to late adolescence. All patients were treated with the edgewise appliance.

Probably the most frequently used extraction pattern in these borderline cases was the removal of four first bicuspids. The next was four second bicuspid extraction and the third choice was the removal of upper first and lower second bicuspids. These were the categories measured for differences in final positioning of anterior teeth. The total bite-opening effect or change in the Y axis was also studied in all the categories. If cervical or occipital headgear was used it was noted for each patient.

METHOD

Measurements were composed of two angular and three linear recordings. To make the linear measurements relative to one another, the net change was recorded as a proportion, in addition to millimeters. For the statistical analysis, it seemed that the percentage of change would be more meaningful when comparing anatomical structures that

varied in size from one patient to another.

The measurements employed were as follows:

Angular

1) SN to a point located on the labial surface of the upper incisor at the height of contour of that surface. (This is usually located one-third of the distance from the cervical line to the incisal edge. It was usually the most anterior point of the upper incisor.)
2) Changes in the Y axis as related to the nasion-basion line.

Linear

1) PTM-$\underline{1}$. A perpendicular was dropped from the Frankfort plane through the posterior border of the pterygomaxillary fissure. The linear measurement was taken from this perpendicular to the point on the labial surface of $\underline{1}$ as used before; the change was recorded over a line parallel to the Frankfort plane.
2) Pog-$\overline{1}$. The mandibles were superimposed on the symphysis, registered on the posterior outline. A perpendicular was projected from the mandibular plane through pogonion. The linear change was recorded from this perpendicular to a point on the labial surface of $\overline{1}$ that corresponded with that on $\underline{1}$. The change was recorded over a line parallel to the mandibular plane.
3) Posterior of symphysis to $\overline{1}$. A perpendicular was projected from the mandibular plane through the superimposed posterior outlines of the symphysis. The linear change was measured from this perpendicular to the same point on $\overline{1}$ and over a line parallel to the mandibular plane.

The Frankfort planes were determined by registering the final head film over the original on SN and tracing the second Frankfort plane directly over the first. The measurement from the posterior border of the symphysis was used in addition to pogonion because of growth changes of pogonion during treatment. The posterior outlines remained very stable in the before and after films.

After the measurements were recorded, an analysis of variance was used, corrected for an uneven distribution of cases in the different categories of the sample. For small samples, the small "t" ratio was used. The level of significance for this ratio was used in the comparison of the categories. The .05 level indicates the odds against chance are 20 to 1; at the .01 level, about 99 to 1, and about a thousand to one at the .001 level. It must be remembered that this sample was necessarily a very small one because of the difficulty in finding similar borderline cases.

Discussion

In comparing the three categories, the only change that was striking in separating the means of all three groups was that of the relationship of the lower incisor to the posterior border of the symphysis. In the four first bicuspid extractions, the lower incisor showed the greatest net change for posterior movement. The next, in order of movement, was the upper first bicuspid and lower second bicuspid extractions. And the least posterior movement of all occurred in the four second bicuspid extraction group. This was significant at the .05 level. All of the other measurements showed no significant difference between groups.

Concerning the position of the upper incisors as related to nasion, there was no differentiation between four first or four second bicuspid removals without

the use of headgear. But the use of headgear in a four second bicuspid case will cause about the same change in the upper incisors as the removal of four first bicuspids without the use of headgear. If headgear is used with a four first bicuspid extraction, there is a significantly greater amount of posterior movement of the upper incisors (at .05 level).

In relating the upper incisors to the pterygomaxillary fissure there is a significant difference (at .01 level) between second and first bicuspid removals.

The lower incisor to pogonion readings indicate the removal of four second bicuspids had a decidedly lesser effect on their posterior positioning if no headgear was used. This was significant at the .001 level. Again, the wearing of headgear with four second bicuspids will cause a significant amount of posterior movement of the lower incisors—enough movement, in fact, to make it similar to a four first bicuspid extraction case without headgear. This was at the .01 level, similar to the finding with the upper incisors.

Relating the lower incisors to the posterior border of the symphysis, there is a great difference between the amount of posterior movement of the lower incisors in second bicuspid extraction cases where no headgear is used. This is significant at the .001 level.

In the change in the Y axis, there was no significant difference between the categories.

Conclusions

Bearing in mind that this is a small sample:

1. The removal of four second bicuspids tends to cause a lesser amount of posterior movement of the lower incisors.
2. The use of headgear in a four second bicuspid extraction case tends to cause about the same change in the upper and lower incisors as a four first bicuspid extraction case treated without headgear.
3. When the upper incisors are related to the pterygomaxillary fissure, there is a trend toward lesser posterior positioning of the incisors when four second bicuspids are extracted. However, in relating them to nasion, this trend is not evident unless headgear is used with four first bicuspid extractions.

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