Studies on the So-called Reverse Occlusion

by

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Part I Frequency of Occurrence of the So-called Reverse Occlusion and its Family Relationship

Literature dealing with the protrusion of lower jaw is rather plentiful and also researches in the light of hereditary are by no means scanty. IWAGAKI states in his report that the occurrence of lower protrusion is quite frequent among the Japanese amounting as much as 6%. In his attempt to throw further light on the subject, the author has adopted a four-fold classification as follows and the occurrences of lower protrusions on the part of orthodontic patients treated in the Orthodontic Clinic of Nihon University School of Dentistry have been Examined in terms of this classification so as to compute respective percentages.

1) A class where reverse occlusion is clearly traceable in the family.
2) A class in which slight trace of reverse occlusion is found among the near relatives upon close examination.
3) A class in which the occurrence of reverse occlusion takes place independent of others.
4) A class in which the facial features indicate lower protrusion but the occlusion is in a normal state.

As an additional inquiry, 8760 college students were subjected to an examination for the purpose of selecting from among them those with the so-called reverse protrusion. As a result, it revealed that of 8750 samples 426 were found to be suffering from reverse protrusion (4.8% ± 0.72%).

With reference to the family members of reverse occlusion patients examined in the Orthodontic Clinic, of 1362 (243 families) we found 468 cases of reverse occlusion (34.3% ± 1.27%). The tabulation below gives the relationship the juvenile protrusions with their families (Table 1).

When the above figures are examined in terms of WEINBERG’s method of incidence, we will have findings as follows (Table 2).

According to WEINBERG, the rate of expectancy in the case of both parents being normal is 1/4 (25%) but in the present study it is slightly different as 11.2% is indicated. Theoretically when both parents possess lower protrusion, the rate of expectancy is 100% but in practice the figure seems to be 40% and, for the same reason, when either of parents has lower protrusion the rate is 50% but in actual observation this seems to be 20%. What these findings mean is that the actual rate of occurrence is 1/2 of what has been theoretically determined. Based on these it is to be inferred

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Part II  Some Observations on Orthodontic Treatment of the So-called Reverse Occlusion and Determination of Ease and Difficulty

The Department of Orthodontics, Nihon University School of Dentistry, has been using the classificatory method according to which ease or difficulty in the treatment of the reverse occlusion is to be determined (the method was formulated through joint efforts of Drs. IWAGAKI and ARITA). The following is the classification used in determining ease or difficulty of a reverse occlusion treatment.

The author has actually tried the applicability of these determining factors with due considerations of family, general symptom and cephalometric analysis.

Fig. 1 is a photograph of a reverse occlusion case which is considered to be easy in terms of these factors and Fig. 2 is that of a case difficult of treatment.

With a sampling of 35 cases of the reverse occlusion, the author tried to look into possible relationship between these determining factors and readings of cephalometric analysis. As a result, of them 13 cases were considered to be difficult of orthodontic treatment while the remaining 22 cases were easy of treatment. Fig. 3 gives cephalometric analysis readings of the easy cases (13 samples).

For the same purpose, cephalometric analysis readings of the difficult cases (22 samples) are given by Fig. 4.

Efforts were then made to contrast these two sets of figures against the mean rate
<table>
<thead>
<tr>
<th>Easy reverse occlusions</th>
<th>Difficult reverse occlusions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anterior teeth</strong></td>
<td></td>
</tr>
<tr>
<td>a. Cover over the anterior teeth is deep</td>
<td>a. Cover over the anterior teeth is not deep enough</td>
</tr>
<tr>
<td>b. Upper anterior teeth are near the vertical axle</td>
<td>b. Upper anterior teeth are versed toward front</td>
</tr>
<tr>
<td>c. Lower anterior teeth are declined toward front with sufficient space</td>
<td>c. Lower anterior teeth are declined toward back</td>
</tr>
<tr>
<td><strong>Molars</strong></td>
<td></td>
</tr>
<tr>
<td>d. Occlusion in the molars is near normalcy</td>
<td>d. Occlusion is mesial or open to outside</td>
</tr>
<tr>
<td>e. Much anomalies in the alignment of upper teeth</td>
<td>e. Few anomalies in the alignment of teeth</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
</tr>
<tr>
<td>f. Face and jaws are near normalcy</td>
<td>f. General facial features are concave with obtuse jaw angle</td>
</tr>
<tr>
<td>g. The floor of sockets is normal</td>
<td>g. The floor of lower sockets is large</td>
</tr>
<tr>
<td>h. The reverse movement of lower jaw is possible</td>
<td>h. The reverse movement of lower jaw is hardly possible</td>
</tr>
</tbody>
</table>

Fig. 1

Fig. 2
### Table 3
Comparison of Easy and Difficult Figures with the Japanese Mean

<table>
<thead>
<tr>
<th>Items</th>
<th>Difficult cases M.</th>
<th>Easy cases M.</th>
<th>Japanese M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facial angle</td>
<td>86.2</td>
<td>87.5</td>
<td>85.1</td>
</tr>
<tr>
<td>Convexity</td>
<td>2.0</td>
<td>2.0</td>
<td>8.5</td>
</tr>
<tr>
<td>A-B plane</td>
<td>+4.0</td>
<td>0</td>
<td>-5.9</td>
</tr>
<tr>
<td>Mandibular plane</td>
<td>37.2</td>
<td>30.4</td>
<td>28.5</td>
</tr>
<tr>
<td>Y-axis</td>
<td>59.0</td>
<td>61.8</td>
<td>65.9</td>
</tr>
<tr>
<td>Occlusal plane</td>
<td>+14.8</td>
<td>+14.1</td>
<td>+11.6</td>
</tr>
<tr>
<td>Interincisal</td>
<td>133.9</td>
<td>127.6</td>
<td>120.8</td>
</tr>
<tr>
<td>L-1 to Occlusal</td>
<td>+14.5</td>
<td>+19.5</td>
<td>+23.8</td>
</tr>
<tr>
<td>L-1 to Mandibular</td>
<td>85.5</td>
<td>89.7</td>
<td>95.3</td>
</tr>
<tr>
<td>U-1 to A-P plane</td>
<td>+5.9 mm</td>
<td>+5.8 mm</td>
<td>+6.6 mm</td>
</tr>
</tbody>
</table>
As is evident from the comparative table above, the mean of cephalometric readings for the easy cases falls within the standard deviation of the normal readings, whereas in regard to those cases difficult of treatment part or parts of A-B plane, mandibular plane, Y-axis, interincisal, L-1 to occlusal or L-1 to mandibular readings are inclined either toward (+) or toward (−) to a pronounced degree. As a result of these inquiries, it has been established that the patient whose so-called reverse occlusion is easy of orthodontic treatment possesses the mandibular and facial planes not much different from those of a normal person. On the other hand, a patient with difficult reverse occlusion is found to have smaller protrusion of upper socket floor, a larger angle of upper and lower socket floors at facial plane and also a larger angle at F. H. plane and mandibular plane. Therefore, we are able to generalize that patients who suffer from so-called reverse occlusion possess cephalometric findings indicative of deficiency or excess in growth.

**General Considerations and Conclusion**

The author has been of the opinion that causative factor of the so-called reverse occlusion is not single but is manifold in nature. Therefore, it was felt that it could be classified accordingly in manifold categories and different categories would mean either
ease or difficulty in the administration of orthodontic treatment. The author has carried out a series of these studies along this line and, at the same time, directed his efforts in looking into the justification of a table of ease and difficulty adopted by Department of Orthodontics, Nihon University School of Dentistry, with which he is associated. Therefore, the following three points were given main attention:

a. Relationship of the so-called reverse occlusion and family with reference to its frequency.

b. Whether it would be possible to distinguish independent reverse occlusions from those ascribable to family.

c. Examination of a table of ease and difficulty in the treatment of reverse occlusion (IWAGAKI & ARITA).

The clinical observations on in-coming patients and cephalometric analysis have produced the following findings.

1) The ordinary rate of frequency in the occurrence of reverse occlusion is at 7.5%±0.89%. This is in line with a previous research of IWAGAKI who gave it as 6.0%±0.3%. In terms of family relationship, the rate of occurrence frequency is as high as 34.3%±1.27%. This lends support to a conclusion that the reverse occlusion is intimately connected with families.
2) Results of examination into family relationship of reverse occlusion patients are more or less in accord with those published by IWAGAKI. But it was fortunate for the author to have had an opportunity of coming across five families where both parents suffered from reverse occlusion. If this reverse occlusion would appear as a single recessive type, then their child should hereditarily have 100% occurrence but actually the author has found it to be merely 40%. This finding inclines the author to the belief that reverse occlusion possesses complicated hereditary mechanism.

3) It is established that the cases of reverse occlusion which are easy of treatment are those ascribable to families and, on the other hand, those of single independent occurrence are always difficult of treatment. For this reason, it is inferred that such postgenital factors as irregularities of bone development and insufficiency of internal secretions may go into the cause of reverse occlusion.

4) In terms of cephalometric analysis readings, the cases of reverse occlusion which are easy of orthodontic treatment fall within standard deviation of those of a normal person. That is, they can be said to have always possess normal skeletal pattern. Conversely, those of difficult of treatment show abnormalcy in the development of jaws.

5) These findings above indicate that the IWAGAKI and ARITA table can be usefully employed for clinical purposes.

References

[16] BRODIE, A. G.: Some Recent Observations on the Growth of the Mandible, A. O., 10:
63-77 (1940)


