CASE REPORT

Nonsurgical treatment of open bite in nongrowing patients

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Successful treatment of the adult patient with an open bite dental or skeletal pattern often presents a difficult challenge. While the causes of open bite may be multifactorial in nature, there are specific diagnostic criteria that may allow for an orthodontic treatment modality incorporating extraction therapy with retraction of incisors. Two case presentations illustrate treatment of adult patients with open bites due to proclined incisors. The diagnostic criteria and mechanics for appropriate and successful treatment are discussed. Although the selection of extraction therapy for correction of anterior open bite has a narrow range of application in the overall scheme of open bite treatment, this treatment method has certain areas of application in which success may be anticipated.


Open bite dental and skeletal pattern often represents one of the more difficult malocclusions to treat to a successful and stable result. This statement is even more true in the adult patient because they do not have the potential for growth modification that is available in adolescent patients. Since this redirection of growth and dentoalveolar eruption is not a treatment option available in the adult population, orthognathic surgery is often required for correction of open bite in nongrowing persons.

Like most orthodontic problems, the cause of open bite is often multifactorial. Etiologic factors most often cited in the literature include "open bite skeletal pattern," vertical maxillary excess, abnormalities in dental eruption, and tongue posture problems.1-10 As Isaacs11 and Richardson12 described in 1970, anterior open bite might also be a result of increased axial inclination of maxillary and mandibular incisors. The treatment of any particular open bite problem naturally would be dependent on the particular problem list evolved with the assessment of each individual patient. The purpose of this article is to present treatment of the adult patient with open bite due to proclined incisors with the diagnostic criteria and mechanics for appropriate and successful treatment.

The effect of mesiodistal movements of the molar teeth on the mandibular plane has been well documented. Premolar extraction and orthodontic space closure has been cited as a possible option in the treatment of open bites by two basic mecha-
nisms: (1) Mesial movement of the molar teeth. This movement can result in reduction of the mandibular plane angle with a resultant closure in anterior open bite.\textsuperscript{15-20} (2) Retraction of incisors resulting in uprighting and relative extrusion as the crown is retracted below the center of rotation (Fig. 1).\textsuperscript{11,12}

The mesial movement of the lower molars often requires Class II elastic traction, and many patients with open bite cannot afford the extrusive effects of Class II mechanics. The resultant increase in facial height with downward and backward rotation of the mandible and the overall downward and backward rotation of the occlusal plane often results in an unfavorable anterior esthetic relationship (Fig. 2). Although retraction of the maxillary incisors or mesial movement of the molars may offer the potential to close an open bite, the patient selection criteria is narrow for functional and esthetic treatment success. Two case presentations help to illustrate and summarize appropriate case selection.

**CASE 1**

This 23-year-old black woman (Fig. 3) was referred for correction of her anterior open bite. Her problem list was summarized as follows:

1. 3 mm anterior open bite (Fig. 4);
2. Severely proclined and procumbent incisors (Fig. 3);
3. Mandibular plane within normal limits (36\degree);
4. 0 functional chin projection NB-PG = –2 mm);
5. 2 mm reverse curve of Spee in the mandibular arch; and

6. Profile exhibits full lips secondary to bidental protrusion (Fig. 6).

Recognition of the vertical relationship of the maxillary incisors to the upper lip was very important in this case. At rest, the patient showed only 1 mm of incisor, whereas on smile only 80% of the incisor shows with no gingival display (Fig. 3). This is an important clinical notation since retraction of incisors with premolar extraction allows reduction of protrusion and the vertical changes that tend to occur anteriorly with retraction and uprighting of incisors can be esthetically tolerated. Because of the reverse curve of Spee in the lower arch, extrusion of the lower incisors may be afforded. Therefore we elected to proceed with extraction of all four first premolars and comprehensive orthodontic treatment. Once aligned and leveled, we progressed to upper and lower closing loops that were activated for 4 months. Finishing space closure was performed with elastic chain on round arch wires, which not only completed space closure, but also finished incisor uprighting and bite closure. It is important to note that no exaggerated curve of Spee was placed in the lower arch and that bite closure occurred primarily with incisor uprighting. Total treatment time was 27 months. Profile fullness was reduced (Fig. 7) and bite closure achieved (Fig. 8). Anterior smile relations were not adversely affected.
(Fig. 9). Cephalometric superimposition of pretreatment and posttreatment radiographs (Fig. 10) illustrate the vertical changes that occur with incisor uprighting with retraction.

**CASE 2**

This 26-year-old woman presented with a milder open bite than did our first example. The profile (Fig. 11) was also quite different from the first patient, with more facial convexity and virtually no dental protrusion and facial fullness. An anterior open bite was evident, with mild bilateral Class II buccal relations (Figs. 12 and 13). The cephalometric analysis (Fig. 14) reflected a Class II mandibular deficiency with proclined maxillary and mandibular incisors. No other dental or skeletal measurements were associated with open bite dental or skeletal patterns. The effect of treatment on the profile was of great concern, since this patient exhibited an obtuse nasolabial angle due to nasal projection and a slightly retrusive maxilla. Differential treatment options include: (1) posterior maxillary impaction through orthognathic surgery, (2) anterior extrusion with elastics (with questionable stability), and (3) extraction of first premolars with retraction and uprighting and subsequent bite closure. Taking into consideration the fact that the surgical treatment option would require first premolar extraction to achieve proper incisor angulation, a treatment plan with extraction of first premolars and retraction of incisors was initiated, with surgery remaining as an option. We were concerned that the retraction of maxillary
incisors would result in undesirable profile flattening, and the patient was counseled that finalization of the treatment plan may not only include orthognathic surgery, but might also incorporate rhinoplasty and genioplasty to idealize the profile.

After extraction of the four first premolars and initial leveling and alignment (4 months), retraction of the maxillary and mandibular incisors was achieved with closing loop mechanics (7 months). As in the prior case, once space closure was almost complete, round arch wires were placed with power chain to complete space closure and finish incisor retraction. No curve of Spee was placed in the lower arch. Total treatment time was 23 months. The finished occlusal results were character-
ized by good buccal occlusion (Fig. 15) and upright maxillary incisors. The final cephalogram reflected that the maxillary incisors were more upright than normal (Fig. 16), but the esthetics of the anterior dental segment (Fig. 17) were very acceptable as was the smile relationship (Fig. 18). The finished profile (Fig. 19) was only moderately affected by the incisor uprighting, and the concern of excessive profile flattening and its resultant "esthetic disaster" was not realized. Cephalometric superimposition (Fig. 20) reflected the bite closure through dentoalveolar movement and reduction of the mandibular plane angle. Stability of bite closure 5 years after treatment is illustrated in Fig. 21.

CONCLUSION

The selection of extraction therapy for correction of anterior open bite has a fairly narrow range of application in the overall scheme of open bite treatment. This is because the type of open bite that is amenable to this therapy has a limited indication criteria. In general terms, the problem list for this type of therapy may include most of the following:

1. Proclined maxillary or mandibular incisors.
2. Procumbent maxillary or mandibular incisors.
3. Little or no gingival display on smile.
4. The skeletal pattern should not be particularly dolichocephalic because of potential deleterious effects of any posterior extrusion.
5. The anterior incisor relationship to the lip is
Fig. 12. Anterior open bite was present with flared maxillary incisors.

Fig. 13. Pretreatment buccal occlusion shows mild Class II relationship.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
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<tbody>
<tr>
<td>SNA</td>
<td>80.4°</td>
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<tr>
<td>SNB</td>
<td>72.8°</td>
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<tr>
<td>ANB</td>
<td>7.6°</td>
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<tr>
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<tr>
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<tr>
<td>L1-NB</td>
<td>11.4mm</td>
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<tr>
<td>NB-Pg</td>
<td>1.8mm</td>
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</tbody>
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Fig. 14. Pretreatment cephalometric measurements indicate Class II mandibular deficiency with proclined maxillary and mandibular incisors.
Fig. 15. Good posttreatment buccal occlusion was obtained.

SNA 78.6 °  
SNB 73.2 °  
ANB 5.4 °  
SNMP 41.4 °  
U1-NA 10.3 °  
L1-NB 27.1 °  
L1-NB 6.7mm  
NB-Pg 2.9mm  

Fig. 16. Posttreatment cephalometric measurements reflect mildly upright maxillary incisors.

Fig. 17. Posttreatment occlusion reveals that complete bite closure was achieved.
of great importance. The smile line should not exhibit excessive gingival display, since incisor retraction and uprighting tends to result in an inferior positioning of the maxillary incisor. The amount of incisor showing at rest should not exceed 2 to 3 mm.

As described in previous literature, the effect of extraction mechanics can effect the mandibular plane and vertical relationships of the anterior face. It would be misleading to describe "extraction and retraction" as a foolproof method of treating open bite. Like most treatment entities, this treatment method has certain areas of application in which success can be anticipated.

REFERENCES
2. Isaacson JR, Isaacson RJ, Speidel TM, Worms FW. Extreme variation in vertical facial growth and associated


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