Brodie bite with an extracted mandibular first molar in a young adult: A case report

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Total buccal crossbites are rare, but, when they occur, they can be extremely difficult to correct, even with surgery and orthodontics. In most patients with in-locking crossbites, the maxillary teeth erupt past their mandibular antagonists, creating severe occlusal difficulties. This article presents an adult patient with scissors-bite or partial telescoping bite bilaterally in the posterior region and an extracted mandibular first molar on the right side. She was treated with expansion of the mandibular arch, and the subsequent open bite was closed with the help of masticatory muscle exercises and high-pull headgear. The second and third molars were uprighted and moved mesially to close the extraction spaces. (Am J Orthod Dentofacial Orthop 2010;137:694-700)

Total buccal crossbite problems—ie, in-locking, Brodie bite,1 buccal nonocclusion, or telescoping bite—are rare, but, when they occur, they can be extremely difficult to correct, even with surgery and orthodontic treatment. In most patients with in-locking crossbites, the maxillary teeth erupt past their mandibular antagonists, creating severe occlusal difficulties and all but eliminating lateral excursions. Interestingly, a tendency toward maxillary buccal crossbite is found in Australian aborigines, who otherwise have ideal dentitions and perfect occlusions. Barrett2 called this “X” occlusion. Although it might initially be a transverse discrepancy with fault in the maxilla or the mandible, or in both jaws, it becomes a problem because the unopposed teeth in each arch supraerupt, creating a situation in which the elongated posterior teeth need to be intruded by several millimeters and repositioned laterally.

This rare situation of total buccal crossbite or total in-locking is due to a combination of excessive maxillary width and mandibular deficiency. The mandibular alveolar process might be narrow, but the width of the mandibular base is usually normal. Many clinicians have reported the potential effects on the health of the temporomandibular joints. Although the crossbite itself might not cause pathosis, compromised mastication could eventually lead to temporomandibular dysfunction.3 The extreme vertical overlap on the affected side makes it impossible to place orthodontic attachments on the facial surfaces of the mandibular teeth.

Loss of 1 tooth can have significant effects on the stability of both arches. With loss of a mandibular first molar, the mandibular second and third molars tip mesially, the mandibular second premolars move distally, and the opposing maxillary first molar is supraerupted. Mesial tipping of the mandibular second molar results in redundant edematous gingivae accumulating at the mesial surface, creating a defect that cannot be cleaned with routine home-care procedures. Mesial tipping places the distal cusps of the second molar into occlusal prominence, creating excursive deflective occlusal contacts that generate horizontal forces on the ipsilateral molars.

CASE REPORT

A 17-year-old girl came for treatment at the Department of Orthodontics and Dentofacial Orthopedics, King George’s University of Dental Sciences (now, CSM Medical University), Lucknow, Uttar Pradesh, India. Her chief complaint was inability to chew with her back teeth. The intraoral examination showed that her mandibular posterior teeth telescoped partially inside the maxillary teeth. She had a bilateral scissors-bite in the posterior region. Her mandibular right first molar...
had been extracted 4 years earlier because of a poor endodontic prognosis, resulting in mesial tipping and drifting of the second molar. This malocclusion developed partially because of lingual tipping of the mandibular buccal segments and partially because of loss of the first molar (Figs 1 and 2). The maxillary right and left posterior teeth were extruded, and the labial surface of the first molar was worn, with the underlying dentin exposed. She had a Class I molar relationship on the left side and a Class II relationship on right side, because of mesial migration of the mandibular right second molar. The dental midline was deviated 1.5 mm toward the right side. Other than the Brodie bite and the mesial tipping and drifting of the mandibular second molar, almost everything else about her occlusion was within acceptable limits. Cephalometric
analysis (Table) indicated that she was an average grower with a skeletal Class I pattern. The soft-tissue profile was convex with good frontal symmetry and facial proportions. The panoramic radiograph (Fig 3) showed complete permanent dentition, except for the extracted mandibular right first molar, and the severe tipping and mesial drifting of the second molar into the extraction space.

Treatment options were limited for this patient. She refused to consider surgery, but, because the problem was caused mainly by buccolingual tipping of the dentition rather than an underlying skeletal problem, a non-surgical approach was feasible. Therefore, the treatment plan called for dental correction with standard edgewise appliances, 0.022×0.028 in. The mandibular arch would be expanded, the maxillary arch constricted, and the mandibular molars uprighted. High-pull headgear with a force of 500 g per side would be used throughout the expansion period when cross elastics were used to aid in minimizing molar extrusion and to promote intrusion. Third molar extraction (except the mandibular right) would provide space for alignment.

## TREATMENT PROGRESS

A maxillary removable plate (Fig 4) was delivered to open the bite in the posterior region so that the mandibular posterior teeth could be banded. After 3 months of initial alignment and leveling, a 0.019×0.025-in stainless steel archwire was placed in the mandibular arch, and a 0.040-in stainless steel jockey arch4 (Fig 5) expanded up to 1 cm was placed into the headgear tubes of the last banded molars. The jockey archwire was also tied to the stainless steel archwire at various regions to maintain the vertical level and stability of the jockey arch. Along with the jockey archwire, cross elastics (3/16-in, 4 oz, TP Orthodontics, LaPorte, Ind) or “through the bite elastics” were worn.1 Transverse expansion of the mandibular arch was continued along with cross elastics for 2.5 months, until the buccal segments began to upright to oppose the maxillary arch. High-pull headgear with a force of 500 g per side worn a minimum of 12 to 14 hours per day was used during the expansion period with the cross elastics. However, bite opening in the anterior region was inevitable, as vertical control of the mandibular molars could not be done while simultaneously uprighting them. As a consequence, 9 mm of bite opening was recorded at the incisor region (Fig 6).

### Table. Cephalometric analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pretreatment</th>
<th>Normal</th>
<th>Posttreatment</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNA (°)</td>
<td>82</td>
<td>82 ± 3</td>
<td>82</td>
<td>0</td>
</tr>
<tr>
<td>SNB (°)</td>
<td>79</td>
<td>79 ± 3</td>
<td>79</td>
<td>0</td>
</tr>
<tr>
<td>ANB (°)</td>
<td>3</td>
<td>3 ± 1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Wits appraisal (mm)</td>
<td>−1</td>
<td>0</td>
<td>−2.5</td>
<td>−1.5</td>
</tr>
<tr>
<td>Maxillary incisor to maxillary plane angle (°)</td>
<td>118</td>
<td>108 ± 5</td>
<td>118</td>
<td>0</td>
</tr>
<tr>
<td>Mandibular incisor to mandibular plane angle (°)</td>
<td>95</td>
<td>92 ± 5</td>
<td>97</td>
<td>2</td>
</tr>
<tr>
<td>Interincisal angle (°)</td>
<td>124</td>
<td>133 ± 10</td>
<td>123</td>
<td>−1</td>
</tr>
<tr>
<td>Maxillomandibular plane angle (°)</td>
<td>24</td>
<td>27 ± 5</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>Upper anterior face height (mm)</td>
<td>56</td>
<td>56</td>
<td>56</td>
<td>0</td>
</tr>
<tr>
<td>Lower anterior face height (mm)</td>
<td>66</td>
<td>66</td>
<td>66</td>
<td>0</td>
</tr>
<tr>
<td>Face height ratio (%)</td>
<td>54</td>
<td>55</td>
<td>54</td>
<td>0</td>
</tr>
<tr>
<td>Mandibular incisor to APo line (mm)</td>
<td>3</td>
<td>0-2</td>
<td>3.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Lower lip to Ricketts E-plane (mm)</td>
<td>3</td>
<td>−2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Upper lip to E-line (mm)</td>
<td>0</td>
<td>−2-3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
To control the open-bite problem, we used a combination of masticatory muscle exercises and high-pull headgear. Appointments were scheduled every 3 weeks to make certain that the patient was wearing the headgear and doing the exercises. She cooperated with both; at each visit, the open bite was reduced by 2 mm. When sufficient uprighting of the right second molar was achieved, we decided to close the extraction space with loop mechanics. A new 0.019 × 0.025-in stainless steel stabilizing archwire was fabricated that bypassed the first molars and was placed into the tube of the third molar on the right side. A tissue guard was placed in the bypassed region to prevent gingival trauma. A vertical tube, 0.018 × 0.025 in, was soldered to the stainless steel wire between the lateral incisor and canine region (Fig 7). A 0.017 × 0.025-in TMA (Ormco/“A” Company, Orange, Calif) T-loop was fabricated with all preactivation bends, placed in the soldered vertical tube, ligated into the second molar bracket (Fig 7), and activated 3.5 mm by cinching back. The T-loop was reactivated as needed, and the mechanics were continued until the roots of the second molar were parallel to those of the second premolar (Fig 8).

Nine months into treatment, the overbite was corrected to pretreatment levels. To move the mandibular right third molar mesially, the same archwire was modified and placed on the second molar, with the third molar set free. A new T-loop was fabricated and placed in the auxiliary tube of the third molar on 1 side and the vertical tube on the other side. This was also augmented with Class II elastics (1/4-in, 3.3 oz, TP Orthodontics).

Near the end of treatment, a unilateral Forsus fixed functional appliance (3M Unitek, Monrovia, Calif) was used on the right side for midline correction and to establish a Class I molar and canine relationship. Active treatment time was 18 months. A maxillary Hawley retainer with a wraparound labial bow and a mandibular bonded lingual retainer from canine to canine were provided. A mandibular bonded labial retainer was also placed in the buccal segment.

**TREATMENT RESULTS**

In general, the patient’s treatment outcome was excellent, and her cooperation with the extraoral appliances, clenching exercises, and oral hygiene was good. Posttreatment records (Figs 9 and 10) showed a well-aligned and interdigitated dentition with the occlusion finished in a Class I molar and canine relationship. The bilateral scissors-bite and anterior open bite were corrected, and the resulting profile was satisfactory. The final panoramic and intraoral periapical radiographs show acceptable root parallelism. The patient was satisfied with her teeth and profile and reported no discomfort near the temporomandibular joints.

Cephalometric analysis (Table) showed no skeletal changes in the maxilla or the mandible, as expected in an adult. Nearly all cephalometric measurements were maintained at the pretreatment levels except that the mandibular incisors proclined slightly. Superimposition of pretreatment and posttreatment cephalograms demonstrated intrusion of the maxillary molars and a slight extrusion of the mandibular molars. The maxillary molar was intruded approximately 2 mm. Superimposition also showed mesial movement of the mandibular right molars and slight proclination of mandibular incisors. Overall, the superimposition showed that facial height was the same as before treatment (Fig 11).

**DISCUSSION**

When correcting a telescoping bite, vertical space is needed for easy tooth movement. Temporary and instant raising of the bite during fixed orthodontic treatment is commonly obtained with removable occlusal plates. However, complete patient cooperation is needed. Various treatment procedures have been developed to correct scissors-bite and establish proper molar interdigitation. The critical procedures for scissors-bite correction are intruding and palatal or buccal tipping of the involved teeth when they are both extruded and buccally or lingually tilted. With a surgical-orthodontic approach, the buccolingual tipping and vertical repositioning could

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**Fig 4.** Maxillary removable plate (different views).
have been handled in 1 step, but we had to rely on a combination of high-pull headgear and masticatory muscle exercises. The treatment progressed well, although the supraeruption of the posterior teeth as a result of uprighting led to the inevitable opening of the bite in the anterior region.

In a prospective study of early open-bite treatment, English demonstrated that light masticatory exercises combined with high-pull headgear produced significant reductions in the ANB and gonial angles, and reduced mandibular autorotation by 2.2°. We used the same modality, in which the patient was asked to clench on a soft bite wafer (GAC International, Bohemia, NY) for 1 minute, 5 times per day. Each 1-minute session included 5 seconds of isometric clenching (80% of maximum), followed by 5 seconds of rest. English and Olfert recommended this regimen for growing patients; adult patients can also use it but with greater intensity and longer duration, at least 5 minutes per hour for 6 hours minimum. Chewing sugarless gum as much as possible was also advised. The patient showed excellent cooperation with the high-pull headgear and followed the instructions for the masticatory muscle exercises; thus, the positive overbite was reestablished to the pretreatment level. Open-bite closure was accomplished solely by intrusion of the posterior teeth; mechanics to extrude the anterior teeth were not used.

The third molars were extracted, except on the mandibular right side. Extraction space closure was favored over uprighting followed by prostheses to achieve better prognosis and long-lasting functional results. Moreover, restorations would most likely need to be replaced several times during the patient’s lifetime.

Considerable time was spent in bodily mesialization of the mandibular right second and third molars. Some difficulty in mesialization was encountered initially with sliding mechanics; therefore, we switched to sectional mechanics, using a T-loop to generate the necessary moments for root movement. The entire mandibular arch and the labial crown torque in the mandibular anterior teeth were used to reinforce anchorage while maintaining the integrity of the arch. The patient had excellent oral health throughout treatment. Plaque-harboring pseudopockets associated with tipped and drifted molars were completely eliminated, and the bone defect just mesial to the severely tipped mandibular right second molar was resolved.

Labial bonded retainers were used in the buccal segments to retain the results. Clenching exercises were...
continued. Good Class I molar and canine relationships were established to ensure long-term stability. The end result of the treatment was good, and the goals were achieved.

CONCLUSIONS

Tooth migration after extraction of the first permanent molar results in periodontal deformities and “collapse” of the occlusion. Deviations from normal tooth alignment bring changes in gingival and bony architecture. Irregular soft-tissue architecture prevents complete plaque removal and complicates oral hygiene, leading to progressive disease in the form of inflammation, loss of attachment, and caries. It becomes apparent that the proximal and occlusal contacts are important in maintaining tooth alignment and arch integrity. Treatment can improve masticatory function, esthetics, occlusion, and periodontal condition.

Masticatory exercise is an important adjunctive treatment in correcting an open-bite malocclusion.
Although surgery or miniscrews mean that virtually any malocclusion is correctable, proper understanding and application of the fundamental principles of biomechanics can still make a tremendous difference. If the patient is reasonably motivated, adult orthodontic therapy can provide complete rehabilitation in both function and appearance with a satisfactory long-term prognosis.

REFERENCES