

Nonsurgical treatment of Brodie bite assisted by 3-dimensional planning and assessment

Guangying Song, Huizhong Chen, and Tianmin Xu
Beijing, China

This case report describes the nonsurgical treatment of an adolescent patient with a severe transverse discrepancy presented as a Brodie bite and retrognathic mandible. Distraction osteogenesis has been often used for similar cases in the literature. However, in this patient, a fixed appliance with 1 maxillary extraction combined with a functional appliance was used to resolve the transverse discrepancy with natural growth. After the orthodontic treatment, the impinging teeth and Brodie bite were corrected with a favorable occlusion and profile. Retention at the 3-year follow-up showed improved occlusal interdigitation and good stability. (*Am J Orthod Dentofacial Orthop* 2018;154:421-32)

A bilateral buccal posterior crossbite, also called a Brodie bite, is a severe transverse discrepancy, when all buccal cusps of the mandibular molars are telescoped within the lingual cusps of the maxillary molars. The reported morbidity due to a Brodie bite is approximately 1.0% to 1.5%.¹ The associated unilateral or bilateral posterior crossbite can be corrected by distraction osteogenesis, depending on the severity of the skeletal problem.²⁻⁵ In some cases, nonsurgical treatments such as maxillary contraction⁶ and mandibular expansion⁷ have been used to correct the discrepancy. Furthermore, many adults with a scissors-bite have been treated with miniscrew anchorage.^{8,9} Since the etiology of the Brodie bite varies with each patient, the main problem may result from maxillary hypergenesis, mandibular hypogenesis, or both, and could be accompanied by tooth compensation. Therefore, the diagnosis and treatment planning need more consideration, especially for teenagers who still have growth potential. In this report, we describe an adolescent patient with a Brodie bite and a Class II skeletal problem who was treated nonsurgically with a functional appliance and monomaxillary extraction.

DIAGNOSIS AND ETIOLOGY

The patient was a 12.4-year-old Chinese boy. His chief complaints were crooked teeth and difficulty in chewing. He was told by his mother to push his maxillary incisors inward with his fingers because both his mother and grandmother had protruded incisors (*Fig 1*). The lateral view of his facial photographs showed a convex facial profile and a retrognathic mandible. The frontal view of the patient's face showed no evident asymmetry and a diminished inferior third of the face. There were no temporomandibular joint symptoms.

The intraoral examination and dental casts showed an Angle Class II Division 2 malocclusion, with mild crowding in both arches. The maxillary and mandibular dental midlines were shifted 0.5 mm to the right of the facial midline. The mandibular dental arch showed atresia with retroinclined maxillary incisors. In addition, a bilateral scissors-bite was noted in the posterior region on both sides, called a Brodie bite, with the mandible telescoped completely inside the maxilla, resulting in the total absence of occlusal contacts in centric occlusion. The patient had a 100% overbite, with the mandibular anterior teeth biting on the palatal gingiva. Both arches were symmetrical (*Fig 2*). The maxillary intermolar width was much larger than the normal range, whereas the mandibular intermolar width was within normal limits; the intercanine width in both arches was a little larger than the normal range (*Table 1*).¹⁰ Furthermore, generalized mild gingivitis associated with fair oral hygiene was noted, with probing depths within normal limits.

From the Department of Orthodontics, Peking University School and Hospital of Stomatology, Beijing, China.

All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest, and none were reported.

Address correspondence to: Tianmin Xu, No. 22 Zhongguancun S Ave, Haidian District, Beijing 100081, China; e-mail, tmxuortho@163.com.

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Fig 1. Pretreatment facial and intraoral photographs.

The panoramic radiograph showed a complete permanent dentition, with erupting second molars, impacted third molars, and 2 supernumerary teeth inverted above the maxillary incisors. Cone-beam computed tomography (CBCT) images showed that the supernumerary teeth were highly impacted on the palatal side. The torque of the maxillary molars exhibited a buccal inclination, and the mandibular posterior teeth tipped lingually. The maxillary palatal width was greater than the normal value, and the mandibular lingual width was almost normal (Table II¹¹). The basal arch width shown by the WALA ridge was measured and had the same tendency as the arch width (Table III¹²). The cephalometric analysis (Table IV) showed a moderate skeletal Class II discrepancy with a mandibular deficiency (SNA angle, 82.58°; SNB angle, 74.41°; ANB angle, 8.17°) and a hypodivergent skeletal pattern (SN-GoGn angle, 27.92°). The maxillary incisors were retroinclined (U1-SN angle, 82.63°). On the basis of these findings, the patient was diagnosed with a Class II malocclusion

and a Class II skeletal pattern with a low mandibular plane angle (Fig 3).

The lateral cervical vertebrae on the cephalometric radiograph showed concavity at the lower border of the second cervical vertebrae, whereas the bodies of both the third and fourth cervical vertebrae were still trapezoidal, indicating that the peak in mandibular growth would occur within approximately 1 year after this stage. The etiology of this malocclusion was unclear. The tooth germ positions and erupted directions of the maxillary incisors might have been influenced by the inverted, impacted supernumerary teeth. Furthermore, the severe transverse discrepancy may have involved neurologic and muscular mechanisms, leading to certain oral habits that were not possible to detect.¹³

TREATMENT OBJECTIVES

The treatment objectives were to reduce the arch width of the maxillary dentition and upright the mandibular posterior teeth to resolve the Brodie bite

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