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Closure of multiple maxillary diastemata in a patient with deep overbite and accentuated curve of Spee - Case report

**KEYWORDS**

Diastema;
Bolton ratio;
Curve of Spee;
Overjet and overbite

Etiologies of maxillary diastema include high frenal attachment, small tooth-size in relative to jaw-size, pathological tooth migration, and deep overbite with steep incisal guidance. Patients seek for treatment are mainly due to esthetics and phonetic problems.¹

This 26-year-old female patient was under orthodontic treatment for one year elsewhere before she visited to our hospital. She complained of multiple maxillary diastemata that became wider than pre-treatment and wished to close these spaces at the maxillary anterior region to improve her protrusion. Extraorally, she had bimaxillary dentoalveolar protrusion with procumbent lips, acute nasolabial angle and gummy smile with prominent spacings between maxillary incisors. Lower dental midline was deviated towards the left, but without prominent facial asymmetry (Fig. 1A, B, C and D). Intraorally, she had full mouth fixed appliance, and both arches were in round stainless-steel wires for space closure with power chain (Fig. 1 E). Bilateral molar relations were end-on Class II and incisors showed 6 mm large overjet and 6 mm deep overbite with accentuated curve of Spee, causing upper palatal gum impingement (Fig. 1F and I). Left maxillary first molar and right mandibular lateral incisor were mesially rotated due to bonding error, and there were improper interproximal reductions from the left lower second premolar to the right lower first premolar (Fig. 1G and H). Treatment goal was to

correct deep overbite, reduce large overjet, and close multiple maxillary diastemata. Two treatment options were offered: one with non-extraction treatment and the other with four first bicuspid extraction for better improvement of her facial profile. Patient opted non-extraction treatment for a shorter treatment duration.

Treatment began by removal of her fixed appliance to allow the severely swollen gingiva to subside. One month later, full mouth fixed appliance was bonded, and wires were changed progressively from 0.014" Nitinol to 0.016" × 0.022" stainless-steel wire. Upper mild compensating curve and lower reverse curve of Spee were placed throughout the progress of wire changing to open the deep overbite. Meanwhile Nitinol open coil springs were placed between contacts where teeth were inappropriately sliced, to create space for composite resin build-up. Bilateral Class II elastics from the maxillary retraction hooks to the mandibular second molars were worn for a month and the right side Class I molar relationship was attained. We then shifted to anterior midline and the left side Class II elastics for the next six months (Fig. 1J, K, L and M). When Class I occlusion was achieved, upper and lower fixed lingual retainers were bonded before fixed appliance was removed (Fig. 1N, O, P and Q).² Total treatment time was 18 months. The one-year recall revealed stable occlusion without any re-opening of diastemata and the overjet and overbite were well maintained (Fig. 1R, S, T, U and V).

Closure of diastema by orthodontic treatment may be simple, but attempting to close space without correction of deep overbite may result in occlusal trauma or treatment failure.^{1,3} The lower anterior teeth must be intruded before the upper anterior teeth retraction (Fig. 1W). Restoration of lower deficit tooth structures to bring anterior Bolton ratio from 75% to 77.6% (norm 77.2%) is important to the stability of overjet and overbite.^{4,5}

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Fig. 1 Clinical extraoral and intraoral photographs and radiographs of our case. (A, B and C) Initial extraoral photographs. (D) Initial lateral cephalometric radiograph with tracing and analysis showed Class II molar relation and protruded incisors and lips. (E) Initial intraoral frontal view with brackets in place from previous treatment. (F) Initial intraoral frontal view with deep curve of Spee. (G, H and I) The upper, lower, and left buccal view photographs before receiving our treatment. (J, K, L and M) Intraoral frontal, upper, lower, and left buccal view photographs 10 months of treatment. (N, O and P) Final extraoral photographs with pleasant smile. (Q) Final lateral cephalometric radiograph with tracing and analysis showed Class I molar relation, normal overjet/overbite, and harmonious lateral profile. (R, S, T, U and V) Follow-up intraoral frontal, upper, lower, and left buccal view photographs showed stable overjet and overbite one year after treatment. (W) Superimposition of initial and final cephalometric tracings illustrated 4-mm intrusion of lower incisors and 4 mm retraction of upper incisors. The everted lower lip has been retracted closer to the E-line.

Declaration of Competing Interest

The authors declare no conflicts of interest relevant to this article.

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