CASE REPORT

Maximizing Facial Esthetics in a Brachyfacial Class II Deep-Bite Case

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Combined surgical-orthodontic treatment of dentofacial deformities presents various challenges in both diagnosis and mechanotherapy.[1] A skeletal Class II with deep bite is a prime example. In a patient with a short anterior face, most of the orthodontic treatment should be postponed until after surgery.[1,2] Presurgical leveling of the mandibular occlusal plane would not only fail to take advantage of the surgical increase in lower facial height, but could make it more difficult to accomplish because of the heavy occlusal forces often associated with deep bites. A stable tripod occlusion, or contact between the incisors and molars, will provide the stability needed for proper postsurgical healing and leveling during the transitory lateral open bite that usually appears immediately after surgical correction.[3]

This article delineates the postsurgical mechanics that should be used for predictable leveling of the lower occlusal plane and stabilization of the occlusion in a brachyfacial Class II patient with deep bite.

Diagnosis

A 14-year-old female in the permanent dentition presented with the chief complaint of her "overbite and overlapping front teeth." Clinical examination revealed a brachyfacial pattern with no interlabial gap at rest, a convex profile due to a retrognathic mandible, an acute nasolabial angle, and a deep mentolabial fold (Fig. 1).

The patient had a skeletal Class II deep-bite pattern with 9mm of overjet, 80% overbite, and an excessive lower curve of Spee resulting from supraeruption of the mandibular incisors. Pretreatment casts confirmed a deep overbite and accentuated lower curve of Spee. The patient had a full-cusp Class II malocclusion on the right side and an end-on Class II malocclusion on the left.

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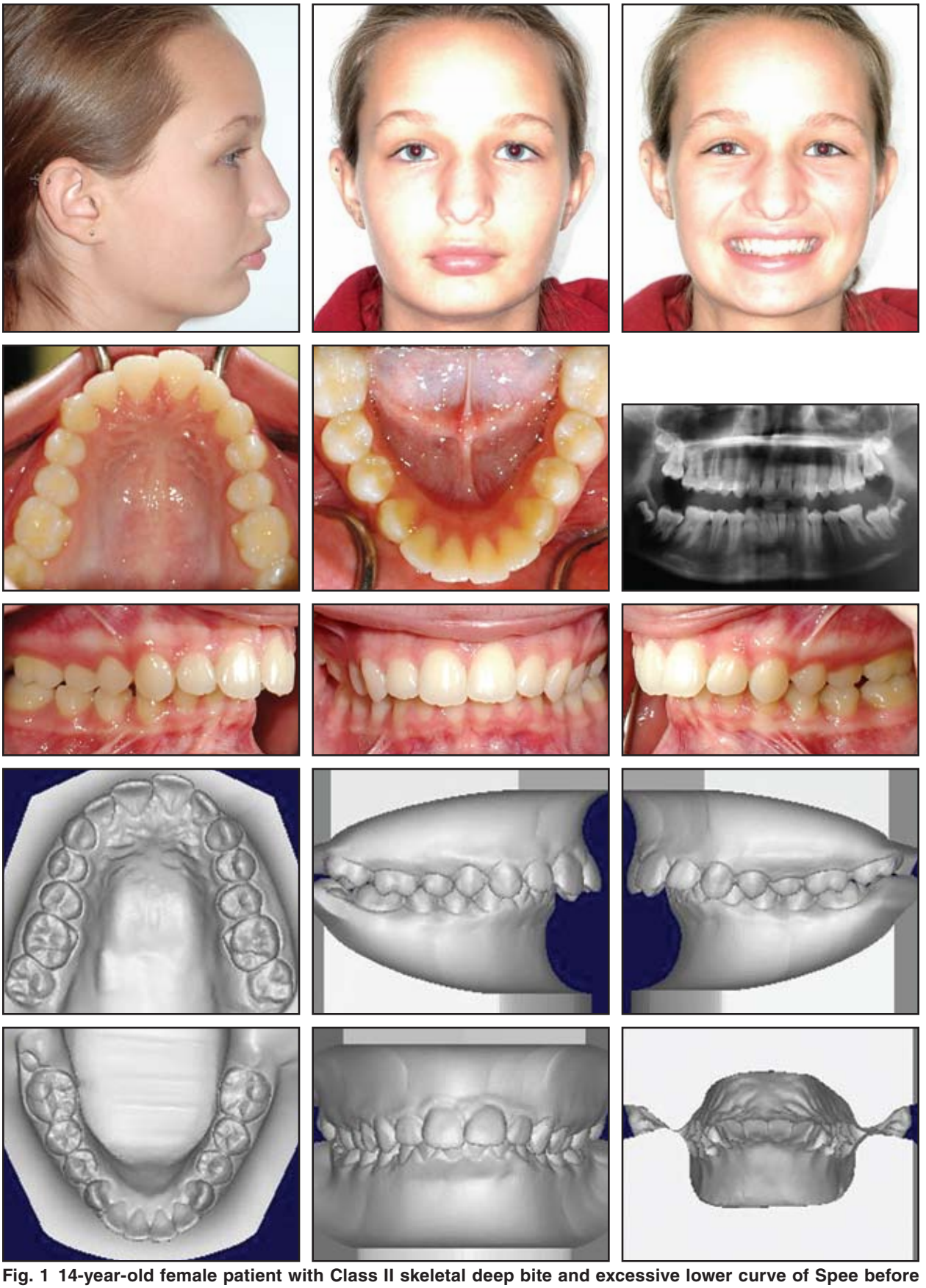

Fig. 1 14-year-old female patient with Class II skeletal deep bite and excessive lower curve of Spee before treatment (panoramic radiograph taken six months before initial consultation; continued on next page).

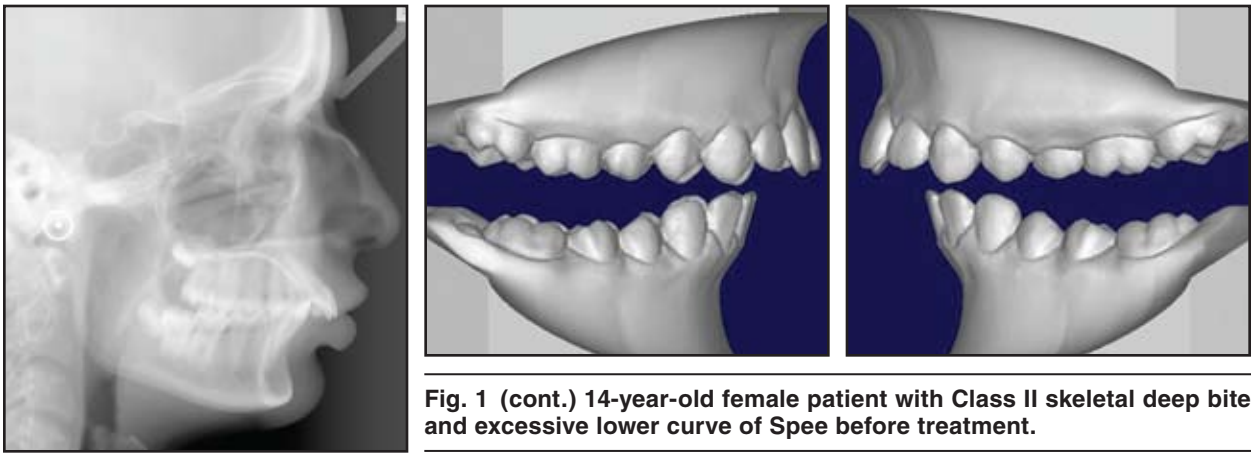

Fig. 1 (cont.) 14-year-old female patient with Class II skeletal deep bite and excessive lower curve of Spee before treatment.

TABLE 1
CEPHALOMETRIC DATA

	Norm	Pre-treatment	Post-Treatment	Difference
SN	75.0mm	66.0mm	66.0mm	0.0mm
SNA	82°	80°	80°	0°
SNB	80°	74°	77°	3°
ANB	2°	6°	3°	–3°
Wits	–1.0mm	10.0mm	2.0mm	–8.0mm
SGn/SN	67°	66°	67°	1°
Ar-Go-Me	123°	117°	128°	11°
SN-MPA	32°	25°	33°	8°
UFH:LFH	45:55	50:50	45:55	5%
FMA	25°	15°	25°	10°
FMIA	65°	55°	55°	0°
IMPA	90°	110°	100°	–10°
1-NA	4.0mm	7.5mm	5.5mm	2.0mm
1-NA	22°	39°	33°	–6°
1-NB	4.0mm	4.5mm	6.0mm	1.5mm
1-NB	25°	30°	28°	–2°
Soft-tissue convexity	132°	127°	130°	3°

Radiographic examination indicated that the mandibular second molars were erupting and all third molars were developing normally. The lateral cephalogram showed a skeletal Class II discrepancy with mandibular retrognathism, skeletal deep bite, reduced lower anterior facial height, proclined upper and lower incisors, an excessive lower curve of Spee, and protrusive maxillary central incisors contributing to eversion of the lower lip (Table 1).

Treatment Planning

Our esthetic treatment objectives were to reduce the patient's facial convexity while increasing her lower anterior facial height. The occlusal goals were to achieve a Class I occlusion, level the lower curve of Spee through postsurgical eruption of the buccal segments, and obtain a normal overbite and overjet.

We presented three treatment options to the patient: nonsurgical camouflage extraction treatment, mandibular surgical advancement with no extractions, or mandibular surgical advancement with lower premolar extractions. The patient and her mother chose the surgical treatment without extractions.

The primary purpose of orthodontic treatment was to attain a Class I canine and molar relationship while maximizing the esthetic impact of the surgical movements. The mandibular advancement surgery planned was a bilateral sagittal split osteotomy (BSSO), which is generally considered stable and predictable.[4] The third molars were to be extracted at the same time.

Treatment Progress

Both arches were fully banded and bonded with .022" preadjusted appliances. A continuous maxillary archwire was inserted, but the mandibular arch received segmented wires to maintain the steps between the incisal and posterior occlusal planes. Once mandibular alignment was completed, a continuous archwire was bent with steps between the lateral incisors and canines to preserve the separate incisal and posterior occlusal planes. Archwire sizes were gradually increased until .021" × .025"

Fig. 2 After 13 months of treatment, .021" × .025" stainless steel surgical wires in place. Note steps between lower canines and lateral incisors, maintaining exaggerated lower curve of Spee, and substantial bilateral posterior open bite.

Fig. 3 Surgical wires with lugs and stainless steel ligatures after one month of bracket expression.

stainless steel surgical wires were placed in both arches, maintaining the exaggerated lower curve of Spee (Fig. 2).

Next, surgical lugs were crimped and tack-welded onto the surgical wires, which were then tied into the brackets with stainless steel ligatures. The wires were allowed to express the bracket prescription for a month before impressions were taken for the surgical stent (Fig. 3).

The presurgical setup was then constructed, and a stable tripod occlusion was verified on the casts (Fig. 4). A full-coverage maxillary surgical stent was fabricated from cold-cure acrylic, extending from first molar to first molar. A presurgical tracing was superimposed over the pretreatment tracing for surgical planning (Fig. 5).

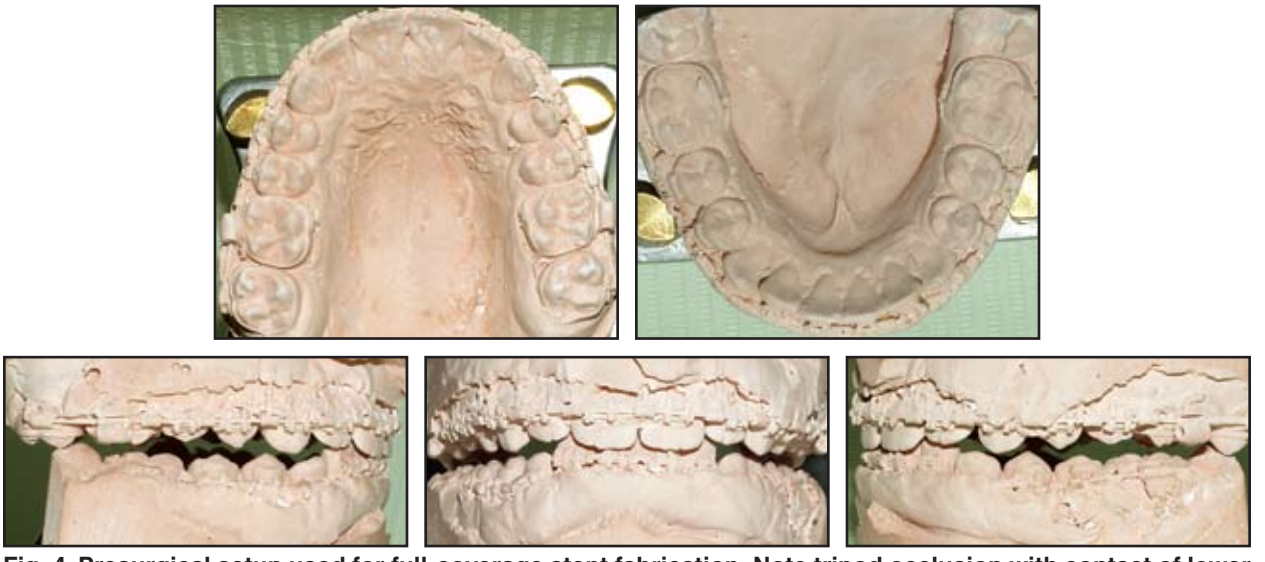

Fig. 4 Presurgical setup used for full-coverage stent fabrication. Note tripod occlusion with contact of lower second molars and incisors.

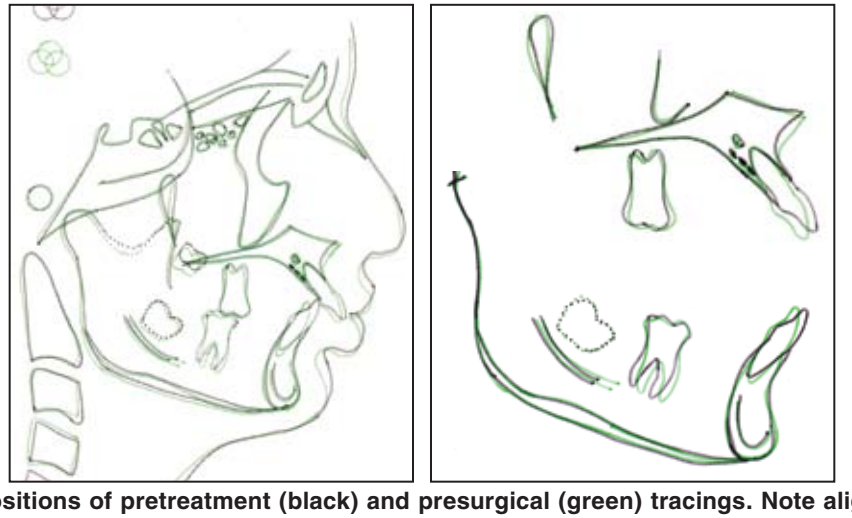

Fig. 5 Superimpositions of pretreatment (black) and presurgical (green) tracings. Note alignment of upper incisors, slight uprighting of lower incisors, and vertical maintenance of lower molars.

Fig. 6 Upper .019" × .025" stainless steel continuous archwire and lower .019" × .025" beta titanium segments with .019" × .025" beta titanium intrusion arch used to generate extrusive force and bite-closing moment on posterior segments. Note white elastomeric ligatures and Kobayashi hooks used for attachment of bilateral Class II box elastics. White ligatures provided visual guide for patient, indicating proper elastic pattern to maximize bite-closing mechanics. Green arrows show desired effects on mandibular arch; yellow arrows indicate undesired effects.

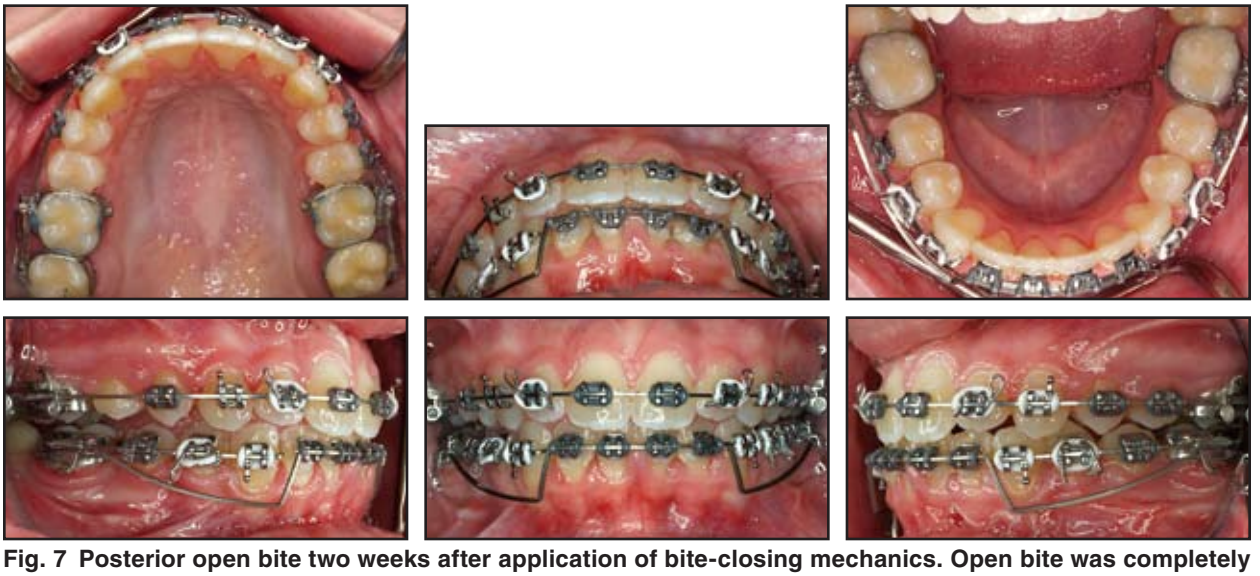

Fig. 7 Posterior open bite two weeks after application of bite-closing mechanics. Open bite was completely closed in three weeks.

The BSSO was performed without complication, and the correction was maintained with rigid internal fixation. Four weeks after surgery, the splint was removed, and a bilateral posterior open bite of 6-8mm was observed. The splint was then trimmed to leave only the labial portion from canine to canine and the palatal portion from lateral incisor to lateral incisor, removing the area of the splint that might have occluded with the lower canines so as not to impede postsurgical leveling. Even though a tripod occlusion had been established, the splint was left in the mouth to enhance the occlusal stability and patient comfort. The surgical wires were removed, and an .019" × .025" stainless steel continuous archwire was placed in the maxillary arch. Mandibular .019" × .025" beta titanium segmental wires were inserted, with an .019" × .025" beta titanium intrusion arch overlay to deliver an extrusive force and bite-closing moment to the posterior segments. This was supplemented by bilateral box elastics with Class II force vectors (Figs. 6,7).

After 10 months of postsurgical detailing and finishing, which consisted mostly of correcting the 3rd-order inclinations of the lower second molars, the appliances were debonded (Fig. 8). Maxillary and mandibular wraparound retainers were delivered, and final records were taken.

Discussion

In any brachyfacial Class II patient with a deep bite, a three-dimensional analysis of the malocclusion is required for proper diagnosis and treatment planning. From a functional perspective, the achievement of a Class I canine-guided occlusion should be a priority in the sagittal direction. From an esthetic standpoint, the patient may also benefit from anterior repositioning of soft-tissue pogonion. The segmental-archwire technique provides an efficient mechanism for postsurgical leveling of the curve of Spee, maximizing the esthetic impact of surgery on lower facial height (Fig. 8C).

One area of concern may be occlusal stability immediately after surgery. The maxillary anterior surgical splint can stabilize a tripod occlusion while allowing the orthodontist to close the posterior open bite and level the curve of Spee (Figs. 6,7). Another concern is the transverse dimension; the clinician must recognize the potential for transverse discrepancy and modify treatment accordingly. Our patient did not need expansion because the original malocclusion involved excessive posterior overjet.

In the case shown here, the presurgical superimposition (Fig. 5) showed a 2mm retraction of the maxillary incisors when the most prominent incisor in the initial tracing was compared with that of the progress tracing. The postsurgical superimposition (Fig. 8B) showed a vertical change in the lower molars from the bite-closing mechanics. The final superimpositions (Fig. 8C) demonstrated both vertical and sagittal skeletal changes, which translated into an increased lower facial height and reduced facial convexity. Dentally, the molars were extruded and the incisors uprighted. There was also a 1.5mm forward movement of the lower incisor to NB (Table 1), albeit with minor retraction of the lower incisors, due to the rotational component of the surgical mandibular advancement.

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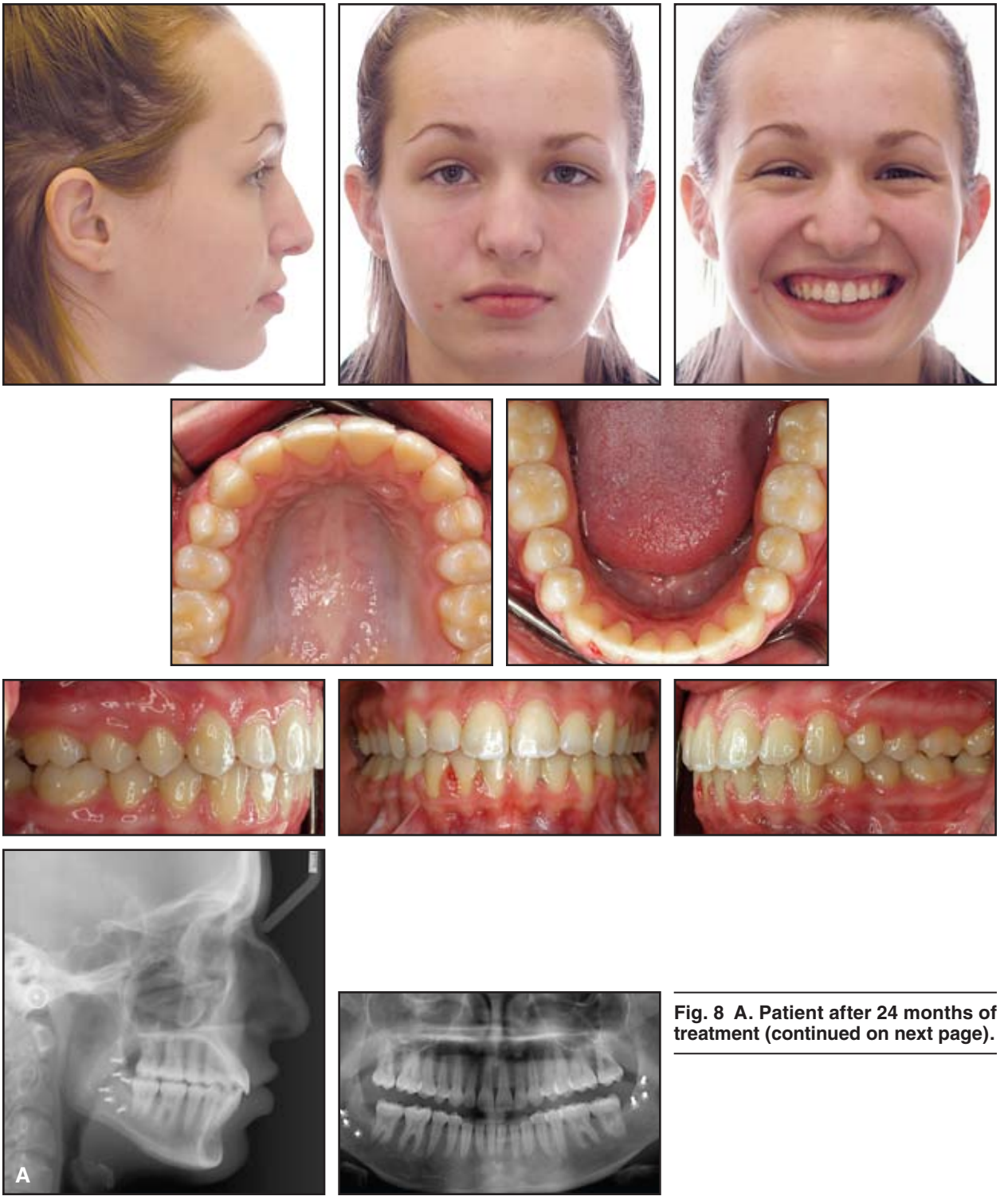

Fig. 8 A. Patient after 24 months of treatment (continued on next page).

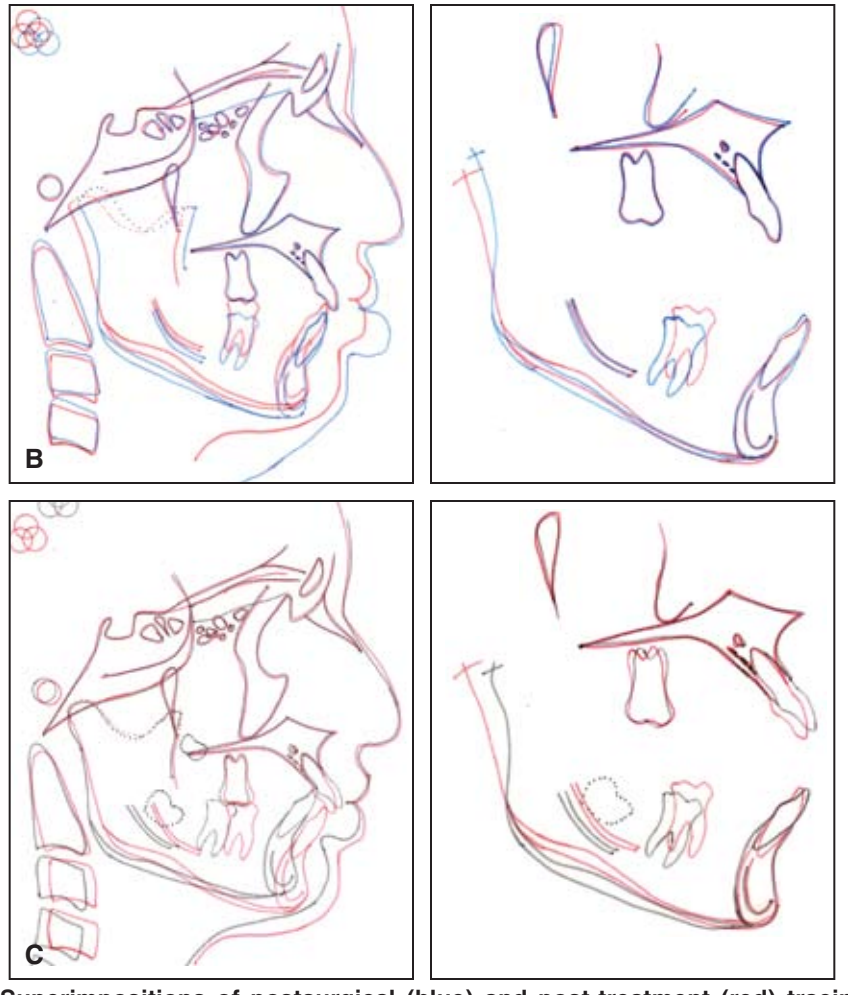

Fig. 8 (cont.) B. Superimpositions of postsurgical (blue) and post-treatment (red) tracings. Postsurgical lateral cephalogram was taken with full-coverage splint in place, resulting in excessive open bite and increased ramal height from Ar-Go. C. Superimpositions of pretreatment (black) and post-treatment (red) tracings.