Reverse Twin Block Appliance for Early Dental Class III Correction

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The Reverse Twin Block (RTB) is a toothborne, removable functional appliance that can rapidly correct developing Class III incisor relationships and anterior displacements. This variation of the traditional Twin Block appliance[1] produces sagittal correction through proclination of the maxillary incisors and retroclination of the mandibular incisors. Transverse arch coordination can be accomplished simultaneously with upper arch expansion when necessary. The appliance is easily fabricated and is well tolerated by young patients.

Appliance Fabrication

1. Take upper and lower alginate impressions, as well as a bite registration in maximum mandibular retrusion. Aim for 2mm interincisal clearance and at least 5mm clearance in the buccal segments to allow sufficient height for the blocks.
2. Place .028" stainless steel Adams clasps on the first permanent molars and .032" stainless steel interproximal ball clasps between the deciduous molars (Fig. 1). If the first deciduous molars are to be clasped, we recommend using .024" stainless steel wire.
3. Fabricate the upper and lower baseplates and biteplanes from cold-cure acrylic (polymethylmethacrylate). The biteplanes should be at least 5mm in height and inclined at 70° to the occlusal plane, configured in reverse of the conventional Twin Block. Place the upper block anteriorly so that the lower block will occlude behind it.
4. To enhance correction of the incisor relationship, a recurved .024" stainless steel spring or a similar spring can be placed palatal to the upper incisors. A midline expansion screw can also be incorporated in the upper component; the parents should be instructed to turn the screw twice a week to produce .4-.5mm of weekly upper arch expansion. Alternatively, the upper baseplate can be split into three sections for maxillary expansion and proclination of the upper incisors.

Distal movement of the maxillary molars is prevented by the intersection of the upper and lower acrylic biteplanes. The mandibular arch provides anchorage for advancement of the maxillary dentition, and a lower labial bow (.028" stainless steel) is used to control the position of the lower anterior segment.

The patient should wear the appliance full-time, except during meals, oral hygiene, and contact sports or swimming. Visits are scheduled at four-to-six-week intervals to monitor treatment progress, compliance, and appliance retention and to reactivate the components as required.

Once positive overjet and overbite are achieved, the patient is instructed to wear the appliance only at night for three months to allow daytime settling of the buccal occlusion while the sagittal and transverse changes are retained.

Case 1

A 9-year-old female in the mixed dentition presented with a Class III incisor relationship on a mild skeletal Class III pattern with average FMPA and lower facial height, complicated by an absent maxillary right lateral incisor (Fig. 2). The lower anterior segment was well aligned and slightly retroclined, whereas the upper anterior segment was mildly crowded and normally inclined. A reverse overjet of 2mm was noted. The maxillary left central and lateral incisors were in crossbite, and anterior displacement was detected on closure. A unilateral posterior crossbite was also present on the left side.

The treatment plan involved elimination of the anterior displacement, correction of the poste-

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rior crossbite, and establishment of a positive overjet and overbite.

An RTB was fitted and prescribed for full-time wear (Fig. 3). Compliance was excellent, with no appliance breakage. Total treatment time was eight months (Fig. 4).

Case 2

This 9-year-old male displayed a Class III incisor relationship on a mild skeletal Class III base with average FMPA and lower facial height (Fig. 5). The lower anterior segment was well aligned and slightly proclined; the upper anterior segment was moderately crowded and normally inclined. A reverse overjet of 1mm was measured in centric occlusion. An anterior crossbite involving the maxillary central and lateral incisors was present, with anterior displacement on closure.

This patient was also treated with an RTB appliance (Fig. 6), with treatment successfully completed in eight months (Fig. 7).

Case 3

A 10-year-old male presented with a complaint about his "back-to-front" bite. He had a Class III incisor relationship on a mild skeletal Class III base, with average FMPA and lower facial height (Fig. 8). The lower anterior segment was spaced and slightly retroclined, while the upper anterior segment was mildly crowded and normally inclined. The patient had a reverse overjet of 2mm and an anterior crossbite involving the maxillary central and lateral incisors, with anterior displacement detected on closure.

The treatment plan was similar to that of Case 2 (Fig. 9). Positive overjet and overbite were achieved in nine months of treatment (Fig. 10).

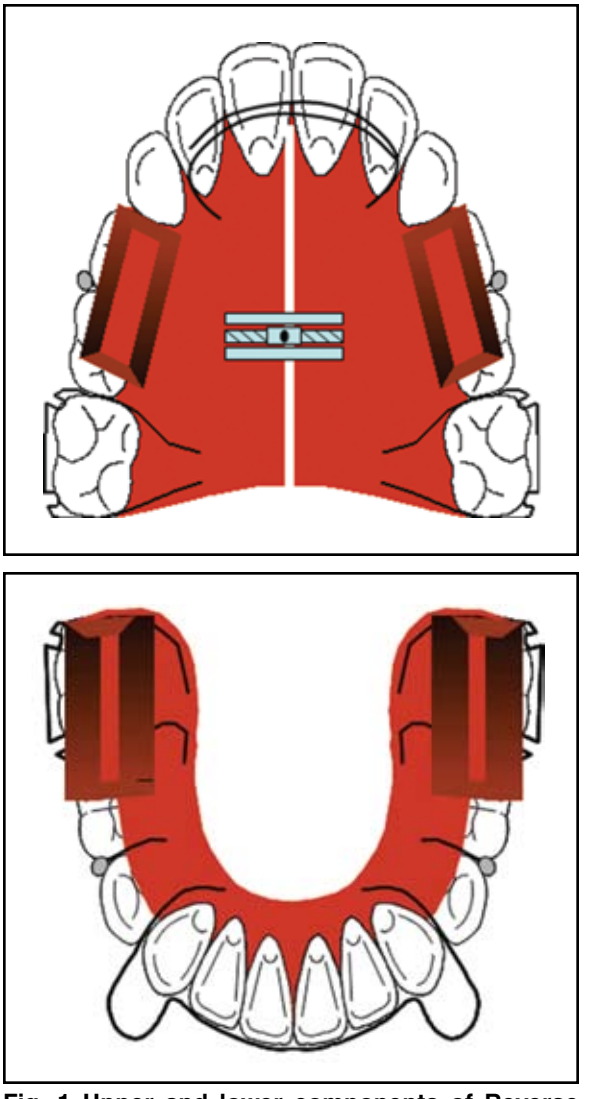

Fig. 1 Upper and lower components of Reverse Twin Block (RTB) appliance. Upper component diagram illustrates typical use of midline expansion screw for transverse correction and recurved stainless steel spring for proclination of maxillary incisors.

Discussion

A Class III growth pattern is usually established early[2] and typically deteriorates with age.[3] Early correction of a developing Class III malocclusion conveys both cosmetic and dental-health benefits.[4] Untreated anterior displacements have been associated with rapid periodontal destruction, accelerated occlusal wear, and TMD.[5] Typical correction methods include removable appliances, fixed appliances,[6] removable functional appliances,[7-9] and chin cups and protraction headgear, alone or in combination.[10-15]

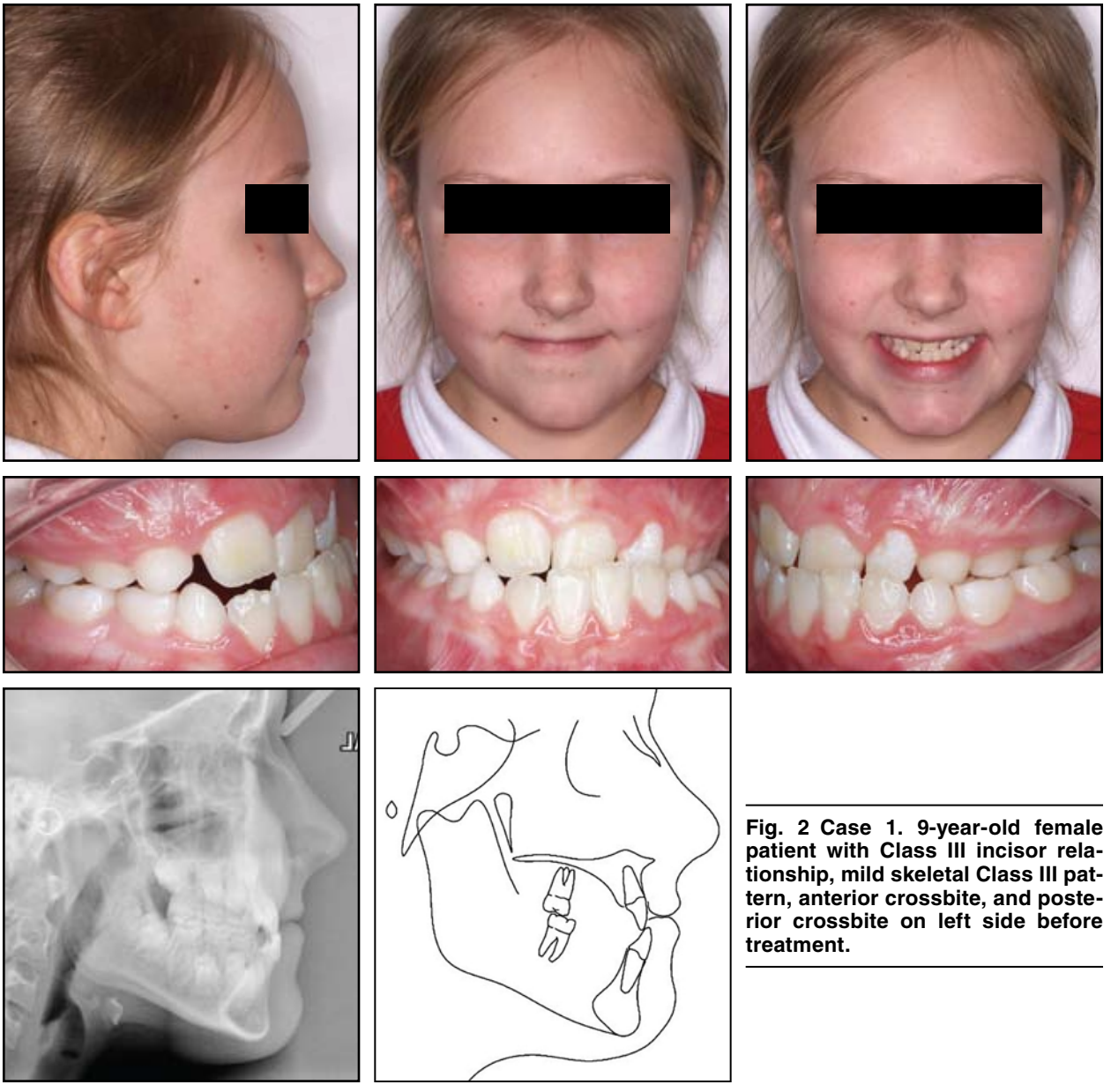

Fig. 2 Case 1. 9-year-old female patient with Class III incisor relationship, mild skeletal Class III pattern, anterior crossbite, and posterior crossbite on left side before treatment.

Fig. 3 Case 1. Placement of RTB appliance.

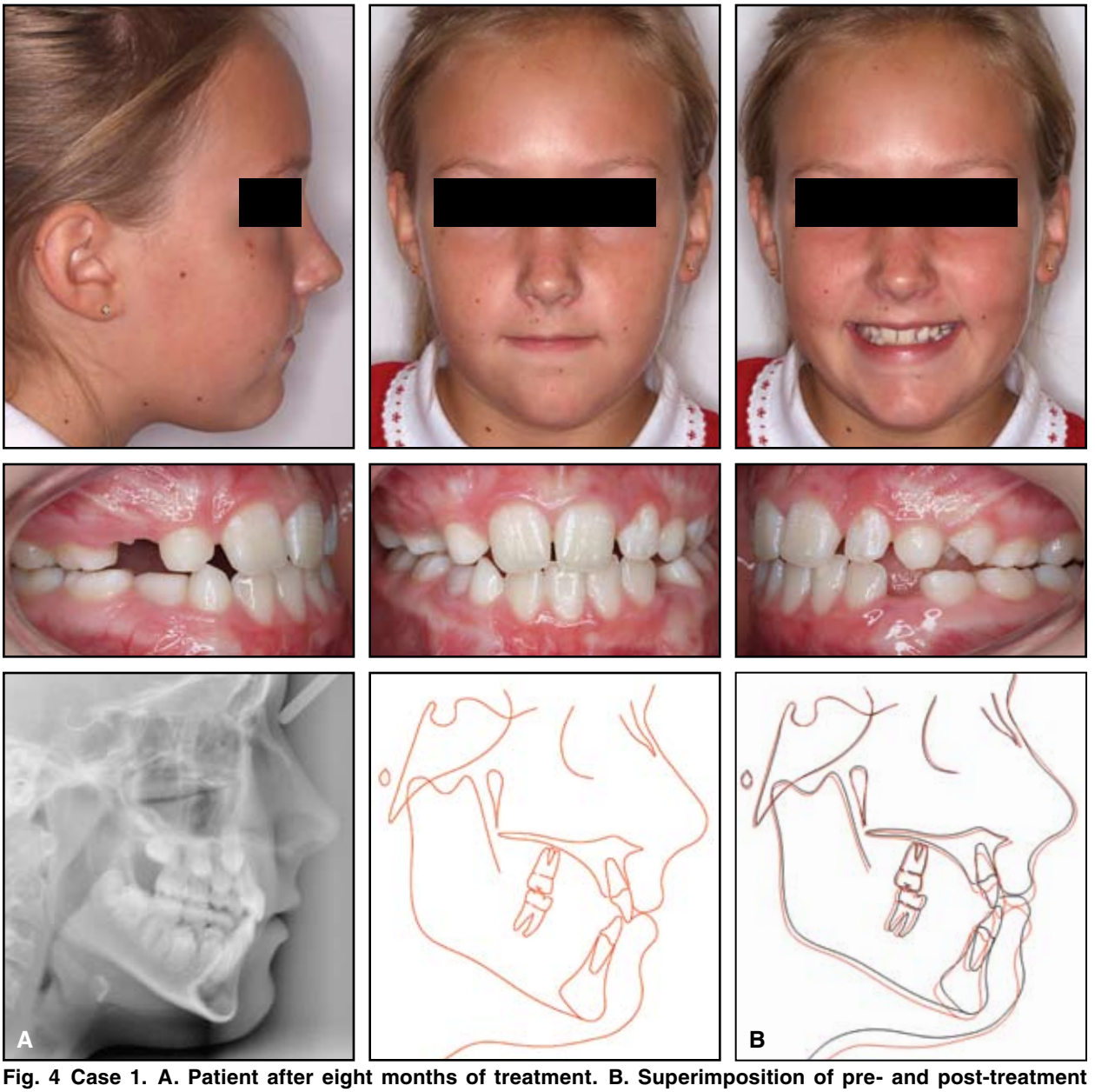

Fig. 4 Case 1. A. Patient after eight months of treatment. B. Superimposition of pre- and post-treatment cephalometric tracings.

The crucial design element of the RTB is the intersecting inclined occlusal platforms, which introduce a Class III traction effect on the maxillary and mandibular dentition. Associated dentoalveolar effects—proclination of the maxillary incisors, mesial tipping of the maxillary dentition, and distal tipping of the mandibular teeth—result in establishment of a positive overjet and overbite. This outcome is clearly shown in the cephalometric superimpositions of all three cases presented here. Other effects, including temporary restriction of mandibular growth and correction of the trans-

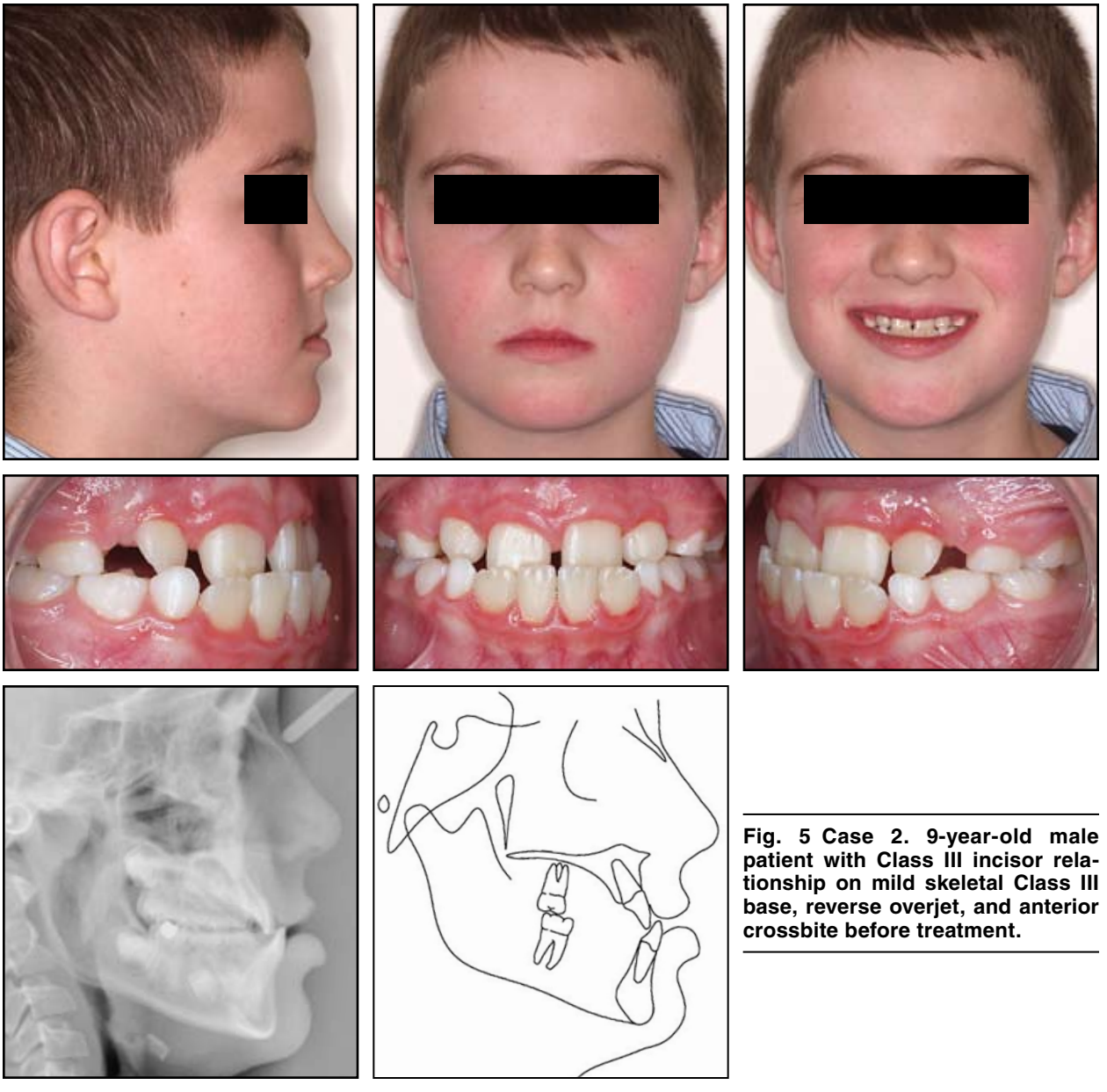

Fig. 5 Case 2. 9-year-old male patient with Class III incisor relationship on mild skeletal Class III base, reverse overjet, and anterior crossbite before treatment.

Fig. 6 Case 2. Placement of RTB appliance.

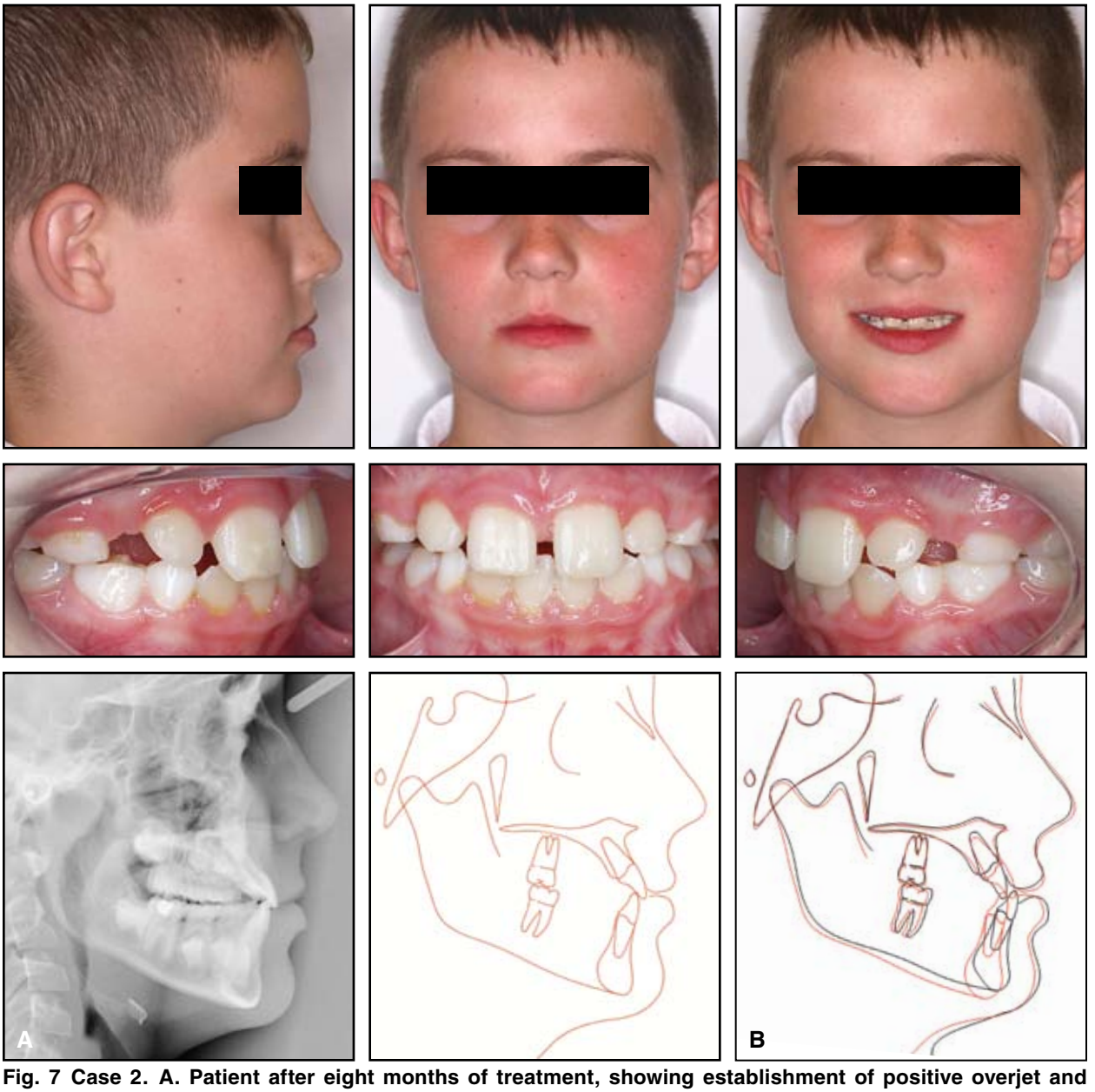

Fig. 7 Case 2. A. Patient after eight months of treatment, showing establishment of positive overjet and overbite. B. Superimposition of pretreatment and post-RTB cephalometric tracings.

verse plane, may be produced both by active components, such as three-way screws or cantilever springs, and by postural effects. The maximally retruded bite exerts a Class III effect on the dentition and may thus place a distalizing force on the mandibular condyles.

Upper lip pads and facemasks can be incorporated into the upper component of the RTB to enhance the potential orthopedic effect.[9] A study of growing Class III patients by Kidner and colleagues reported the primary effects of the RTB to be dentoalveolar, however, involving proclination

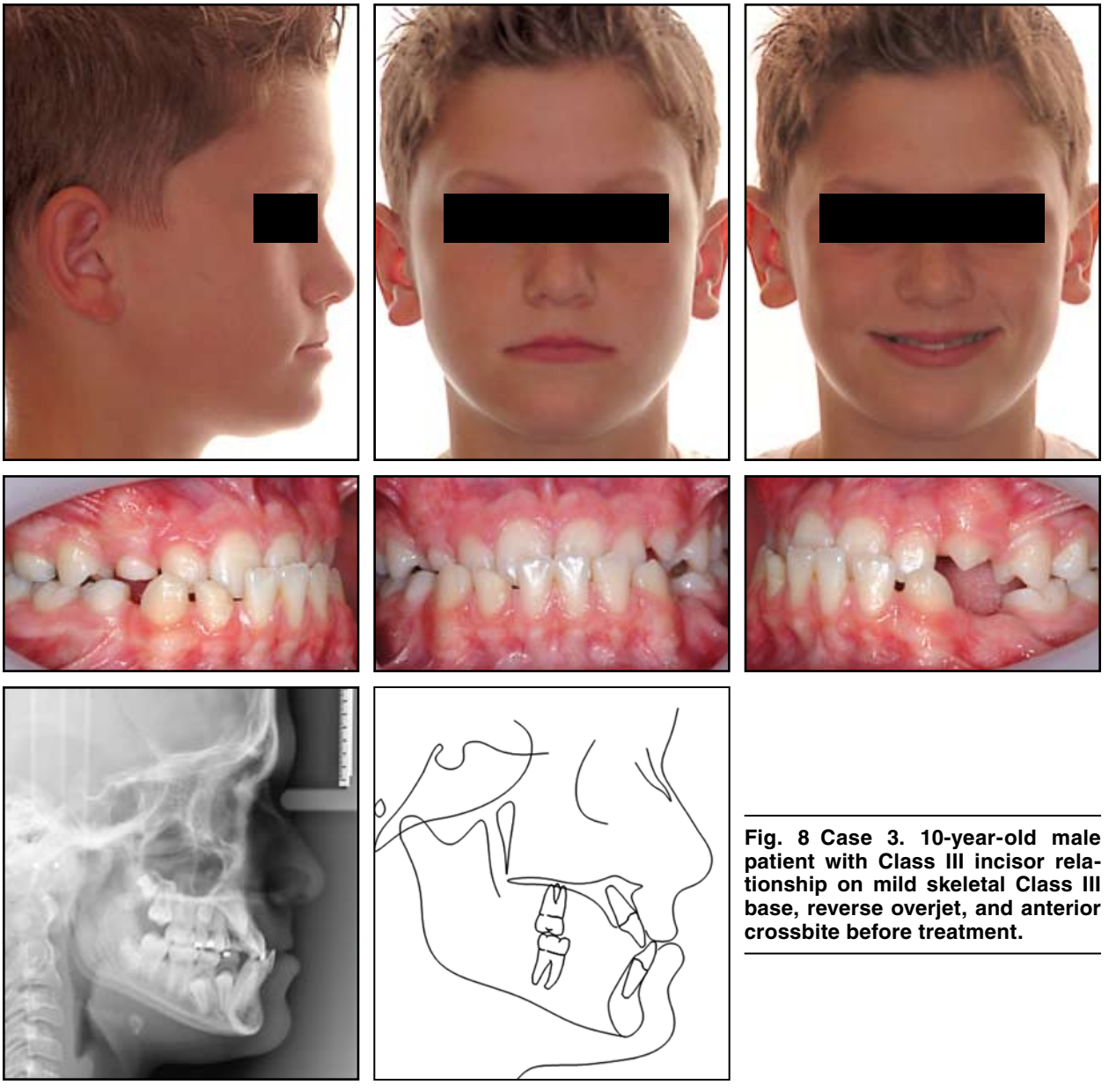

Fig. 8 Case 3. 10-year-old male patient with Class III incisor relationship on mild skeletal Class III base, reverse overjet, and anterior crossbite before treatment.

Fig. 9 Case 3. Placement of RTB appliance.

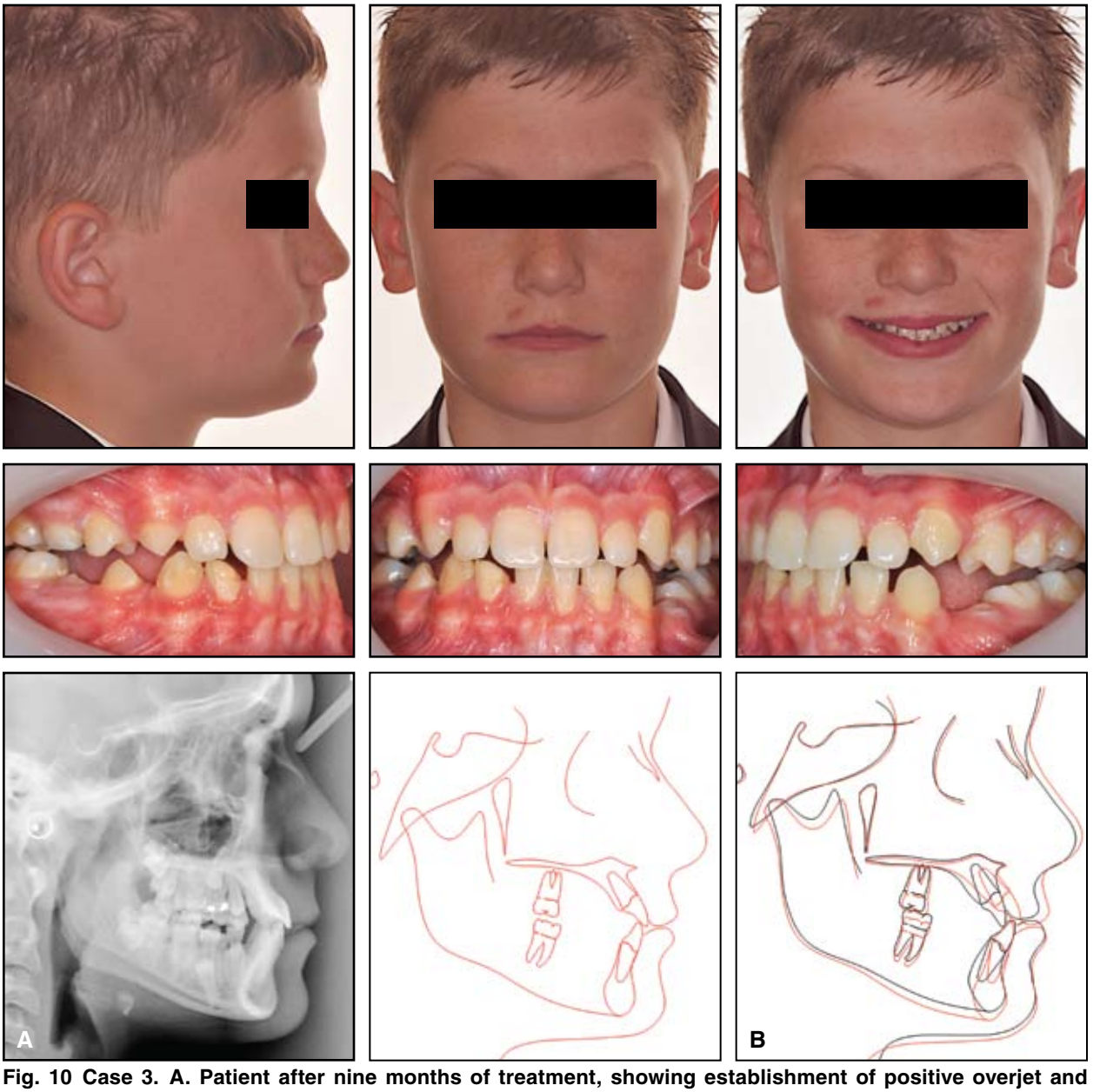

Fig. 10 Case 3. A. Patient after nine months of treatment, showing establishment of positive overjet and overbite. B. Superimposition of pretreatment and post-RTB cephalometric tracings.

of the maxillary incisors (mean: 5.1°) and retroclination of the mandibular incisors (mean: 4.5°).[16] Also reported were downward and backward mandibular rotation with a concomitant increase in lower facial height (mean: 1.75mm) and a reduction in mandibular prognathism (mean: −1.3°). The average reported treatment time for these patients was 6.6 months—significantly shorter than the 3.1 years reported by Loh and Kerr with the use of a Function Regulator III appliance.[8]

The patients shown here were all treated within a similar time frame, before the pubertal growth spurt. These cases will require further treatment with fixed appliances to align the arches and to finish and detail the occlusion. Unfavorable future growth, leading to reestablishment of a Class III malocclusion, is therefore possible. Since long-term follow-up was not reported by Kidner and colleagues,[16] further research is needed in this area.

Factors governing use of the RTB include the patient's age and the skeletal and occlusal relationships. The ideal patient is between 8 and 10 years old and in the mixed dentition. Skeletal indicators include a mild Class III skeletal pattern (mild mandibular prognathism with a normal or mildly retrognathic maxilla), with an average or below-average maxillary-mandibular plane angle and lower facial height. Dental indicators include reverse overjet with multiple teeth in crossbite, excessive overbite, minimal incisor compensation, anterior mandibular displacement on closure, and edge-to-edge incisor relationships in retruded contact position. The RTB can be used in both uncrowded and crowded cases, with or without rotated teeth.

Conclusion

The RTB is a simple, durable, versatile, self-retaining, and well-tolerated appliance that can rapidly correct developing Class III malocclusions involving multiple teeth in crossbite. The primary effects are dental, combined with minimal orthopedic changes. Long-term stability of the correction is unpredictable, however, and may depend on favorable growth.

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