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CDABO CASE REPORT

Orthosurgical correction of a Class II open bite, with previous first premolar extractions without follow-up orthodontic treatment

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HISTORY AND GENERAL CLINICAL PICTURE

This 18-year, 10-month-old white young man presented to the Baylor College of Dentistry orthodontic department with a chief concern of "I need braces to bite better." The history of the malocclusion was epigenetic. The patient's mother was mandibular retrusive with a narrow maxilla. His father and siblings were not examined. The patient had four first premolars previously extracted in the mixed dentition without follow-up orthodontics. There was a history of trauma to the upper left central incisor during amelogenesis that led to hypomaturation and subsequent discoloration of the facial enamel. No other significant medical or dental findings were contributory to his malocclusion.

CLINICAL EXAMINATION

Extraoral: The patient presented with a long, tapering ovoid facial form, with the nose deviated significantly to his left (Fig. 1). The patient had incompetent lips and mentalis strain. The upper and lower dental midlines were coincident with the facial midline. The patient exhibited a convex profile with a long, lower facial height and a contour deficient chin. The nasolabial angle was obtuse.

Intraoral: The patient presented with a Class II, Division 1 open bite (Fig. 2). Four first premolars had been previously extracted without follow-up orthodontic treatment. All third molars were missing. There was an 8 mm overjet and 0 mm overbite. The arch length deficiency in the maxilla and mandible were 3 and 4 mm, respectively. Minimal attached gingiva was noted on the lower right canine. The occlusion was poor because of the constricted maxilla, Class II relationship, excessive overjet, and open bite.

Functional assessment: The patient had good range of motion and reported no limitations or pain in the temporomandibular joints (TMJ). Further, there were no signs or symptoms of TMJ dysfunction. In addition, several wear facets were present in both arches, with the most pronounced being on the lower left first molar.

RADIOGRAPHIC ANALYSIS

Panoramic: Radiographic examination revealed that all first premolars and all third molars were missing (Fig. 3). There was no evidence of periapical disease, and alveolar bone height was within normal limits.

Cephalogram: Cephalometrically, the patient had a skeletal Class II, high angle, open bite problem. Both the maxilla and the mandible appeared deficient sagittally, with the mandible being more retrusive. Dentally, the upper incisors were slightly flared and protrusive. The lower incisors were upright (Table I and Fig. 4).

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Fig. 1. Pretreatment facial photographs.

Fig. 2. Pretreatment intraoral photographs.

TREATMENT PLAN

The patient was referred for surgical evaluation and informed of the need for orthognathic surgery. He accepted the preliminary plan of orthognathic surgery. Because previous extractions had already been performed, the orthodontic plan was to provide comprehensive orthodontic treatment without further extractions. Arch length deficiency of 4 mm in the lower arch would be managed

Fig. 3. Pretreatment panoramic radiograph.

Table I. Cephalometric summary

Area of study	Measurement	Standard	Measurements (A)	Measurements (B)
Cranial base				
	SN-FH	7	7	7
	S-N (mm)	80	79	79
Maxilla to cranial base:				
	SNA (°)	82	76	77
	Maxillary depth	90	85	87
Mandible to cranial base				
	SNB (°)	79	70	73.5
	Mandibular depth	88	78	83
Maxillomandibular relations				
	ANB (°)	3	6	3.5
	A-B/OP (mm)	−1	7.5	2
Vertical relations:				
	ANS-Me (mm)	76	90	83
	SN-GoGn	34	48	43
	FMA	28	39	33
	Y-axis	63	70	60
Maxillary and mandibular incisor position:				
	U1/NA (mm)	4	8	5
	U1/SN (°)	103	108	99
	U1/L1 (°)	127	151	139
	L1/NB (mm)	4	8	9
	FIMA	65	56	60
	IMPA (°)	90	85	87
Soft tissue				
	Ls (Pn-Pg) MM	−2	−2	−5
	Li (Pn-Pg) mm	0	2	−2.5
Other				
	L1-APO (mm)	1	6	6

through interproximal enamel reduction. The upper arch length deficiency of 3 mm would be corrected by transverse surgical expansion. Preadjusted 0.018 × 0.025 appliances were to be used to level and to align. The upper arch would be treated sectionally 2 × 2 and 3 × 7 because of the different occlusal planes to limit orthodontic extrusion of the upper incisors and to prevent orthodontic expansion posteriorly.

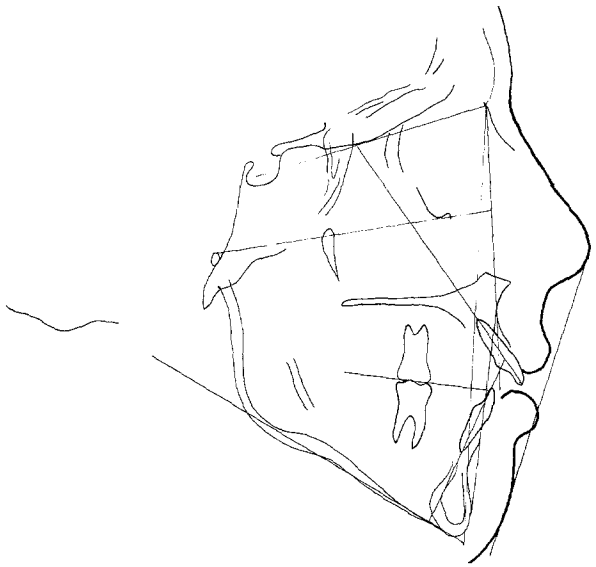
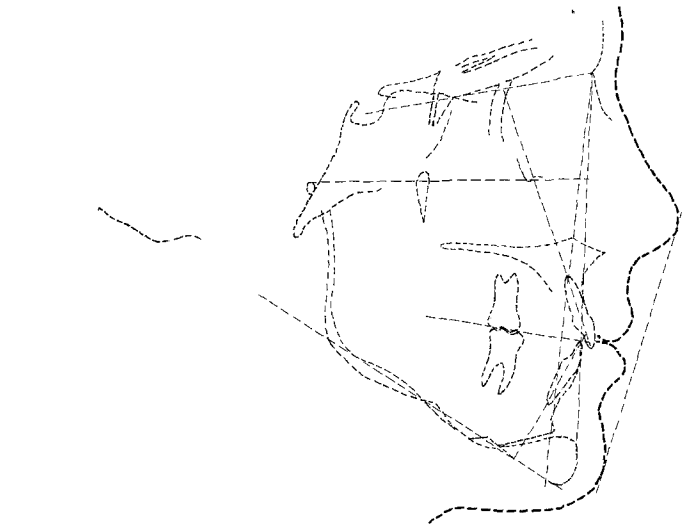


Fig. 4. Pretreatment cephalometric tracing.

A three-piece LeFort I osteotomy was planned to correct the A-P, transverse and vertical discrepancies of the upper jaw, in addition to the arch length inadequacy. A mandibular advancement and genioplasty were planned to provide balance and facial harmony and a functional Class I occlusion. Postsurgically, the mandibular arch would be treated with continuous mechanics, and intermaxillary elastics would be used as necessary to finish.

SPECIFIC OBJECTIVES

Maxilla: Three-piece maxillary osteotomy to expand, impact, and advance the segments establishing arch form and width.



A

B

Fig. 5. A, Posttreatment cephalometric tracing. **B**, Posttreatment panoramic radiograph.

Mandible: Autorotation, bilateral sagittal split ramus osteotomy, and genioplasty.

Maxillary dentition: Maintain arch form presurgically, sectional mechanics: lateral incisor to lateral incisor and cuspid through second molar.

Mandibular dentition: Pretreatment, free gingival graft lower right canine, continuous mechanics, interproximal reduction. Attempt to maintain lower incisor position and general arch form.

Occlusion: Create mutually protected occlusion with anterior guidance. Canine rise without balancing interfernces.

Facial esthetics: Decrease lower facial height. Obtain orthognathic profile with good chin projection.

TREATMENT PROGRESS

Full banded and bonded upper and lower appliances were placed. Initial alignment was with round wires. A coil spring was used to gain space for lower right incisor. Rectangular wires continued leveling and alignment. Finally, 17 × 25 stainless steel arch wires were placed before surgery with soldered brass hooks. Postsurgical intermaxillary elastics were used as necessary during finishing.

REULTS ACHIEVED (See Figs. 5 and 6)

Maxilla: Impacted posteriorly 2.5 mm, advanced 3 mm.

Mandible: Advanced mandible 6 mm with bilateral sagittal split ramus osteotomy and sliding genioplasty for chin. Slight autorotation of the mandible, due to the maxilla being impacted posteriorly.

Maxillary dentition: Upper incisors uprighted surgically 10° to SN and NA and decreased linearly 3 mm to NA. Upper molars appear to have moved anteriorly. This was due to the decreased arch length associated with the significant arch width increase. Transverse arch width in the maxilla was increased 5

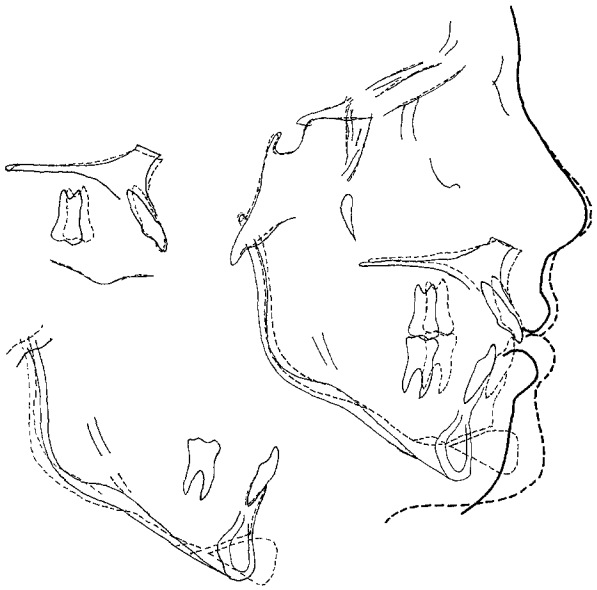


Fig. 6. Pretreatment and posttreatment cephalometric superimposition.

Fig. 7. Posttreatment intraoral photographs.

Fig. 8. Posttreatment facial photographs.

mm at the canines and molars. Root parallelism was acceptable, with the exception of the maxillary lateral incisors, where increased distal root angulation was achieved. Composite restoration was planned for the maxillary left central incisor.

Mandibular dentition: Lower molar and incisor position was maintained. Root parallelism was acceptable. Wear facet on lower left molar may require restorative attention.

Occlusion: The occlusion was improved significantly (Fig. 7). Class I molar and canine relationship was obtained. The midlines remained coincident. The overbite and overjet were ideal. Centric relation and centric occlusion were coincident, and there was canine rise without balancing interferences.

Facial esthetics: The facial result achieved was a significant improvement (Fig. 8). The profile was orthognathic with slight convexity. The nose, lips and chin had good balance and harmony. The facial height was still slightly excessive, however, acceptable. The nose still deviated to the left, which compromises symmetry; however, the patient did not find this objectionable.

RETENTION

Maxillary removable wrap-around Hawley retainer was worn full time for 6 weeks, then at night only. Lower modified spring retainer was worn full time for 6 weeks, then at night only.

DISCUSSION

The combined orthosurgical treatment of this case led to a significant facial, dental, and functional improvement. Facially, vertical balance and harmony were obtained. The dental relationship achieved was good. Functionally, the occlusion was improved over the pretreatment occlusion and this is perhaps the most important goal achieved, because it was the patient's chief concern.

Long-term stability after orthognathic surgical procedures has been of major concern since the early days of orthognathic surgery. Facial, dental, and functional results achieved are directly related to the postsurgical stability. Rigid internal fixation, which uses plates and screws to fix the surgical segments to each other and to the unoperated areas of the facial skeleton, appears to enhance postsurgical stability. Rigid fixation increases the postsurgical stability in both the mandible[1-6] and maxilla.[7-12] This increase in stability is manifested to a small degree in the maxilla and becomes more dramatic in the mandible. Multiple segment maxillary procedures show various degrees of surgical relapse, which may be partially related to operator technique.[13-15] Advancement genioplasty appear to be extremely stable.[16] Stability of the dental result is directly related to proper diagnosis and treatment planning. Proper decompensation of the dentition and orthodontic mechanotherapy that does not produce unwanted expansion or extrusion is a vitally important concept in surgical cases. Because every effort was made to adhere to these principles in this case, stability should be excellent.[17]

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