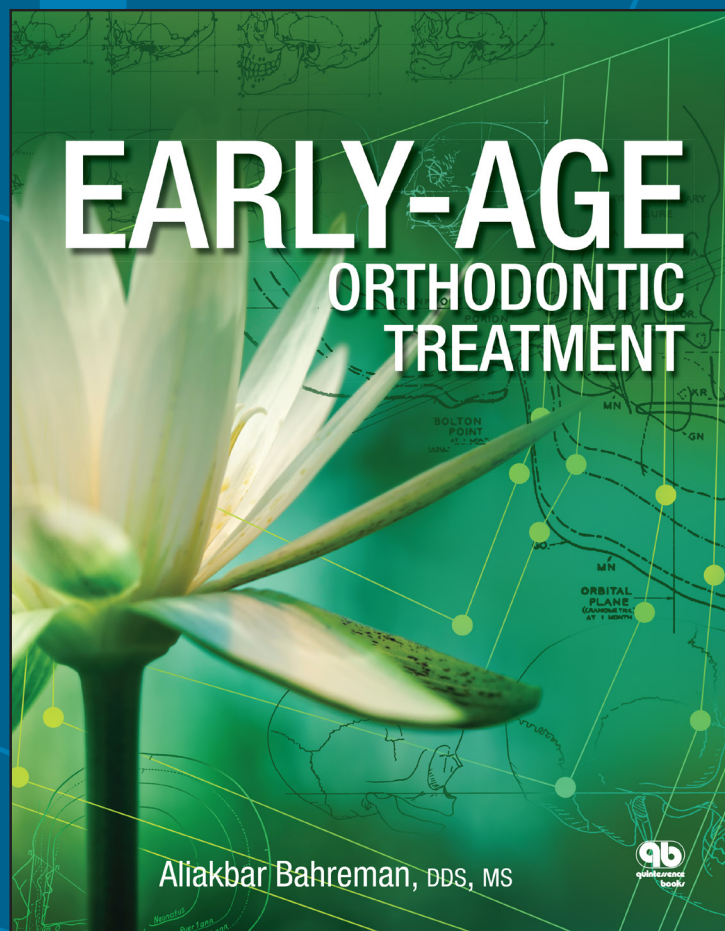


# BONUS CASES



## Chapter 6

An 8-year-old boy with a long-term, chronic thumb-sucking habit developed a callus on his thumb (Figs 1A to 1D). He exhibited a Class II division 1 malocclusion, an 8- to 10-mm open bite, contact only on the primary second and permanent first molars, and an overjet of about 17 mm.

### Treatment:

The patient was a very cooperative and determined boy, and after consultation with his parents, a removable appliance was planned for the first phase of treatment (Fig 1E). The patient's level of compliance was excellent, and the habit was stopped after 2 months. The use of the appliance was continued for 12 months: He wore it 24 hours a day for 6 months and at night only for 6 months.

The habit was completely discontinued, and the open bite and overjet were reduced significantly, but the patient stopped treatment and returned 2 years later. Figures 1F and 1G show the patient's occlusion during the permanent dentition. He had a Class II division 1 occlusion, 9-mm overjet, 2- to 3-mm open bite, acceptable mandibular dentition, and severe maxillary anterior crowding with the canines out of the arch.

In accordance with the parents' wishes and the patient's age, the second phase of treatment was limited to the maxillary arch and extraction of two first premolars. Figures 1H and 1I show the results of phase 2 treatment.



**Fig 1** Treatment of an 8-year-old boy with a severe, long-term thumb-sucking habit. He has a Class II division 1 malocclusion, an 8- to 10-mm open bite, and a 17-mm overjet. Only the primary second and permanent first molars make contact. (A to C) Pretreatment occlusion. (D) Calluses developed as a result of the sucking habit. (E) Removable habit breaker. (F and G) Occlusion of the permanent dentition 30 months after habit control. (H and I) Posttreatment occlusion after phase 2 therapy.

## Chapter 7

An 18-year-old man presented with oligodontia. He was missing 10 teeth, including third molars, and five remaining submerged primary molars had arrested the growth of the alveolar process. The extreme spacing and tipping of all dentition, including distal tipping of the anterior teeth, had resulted in a bizarre occlusion (Fig 1A to 1F). Orthodontic problems included an anterior deep bite, severe open bite affecting the buccal segments (no bite), interdental spacing, mesial tipping of all molars, and distal tipping of all remaining permanent teeth. The patient's major complaint was a chewing problem; because of financial problems he did not consider esthetics to be an issue.

This is a clear example of the necessity for general practitioners to understand the importance of early detection of and intervention in ankylosed primary molars as well as hypodontia. Timely extraction of the ankylosed teeth and proper space maintenance, instead of placement of amalgam restorations, would have restored the integrity of the occlusion of this patient earlier and more easily.

### Treatment:

After extraction of all primary ankylosed molars, the treatment plan for this young man included orthodontic treatment first and then prosthodontic restoration. The comprehensive orthodontic approach included leveling, correction of rotation, uprighting, space closure, anterior retraction, torque control, and overbite reduction.

The prosthetic approach was limited to fixed partial dentures because implants were not common at that time. Considering the patient's age and skeletal maturation, it was recommended to restore the occlusion toward some bite opening. Figures 1G to 1J show the final occlusion after prosthodontic restoration.



**Fig 1** Treatment of an 18-year-old man with oligodontia. He is missing 10 teeth, including third molars. Some submerged primary molars remain. (A to D) Pretreatment occlusion. (E) Pretreatment panoramic radiograph. (F) Pretreatment cephalometric radiograph. (G to J) Posttreatment occlusion, after prosthetic restoration. (K) Posttreatment panoramic radiograph. (L) Posttreatment cephalometric radiograph.

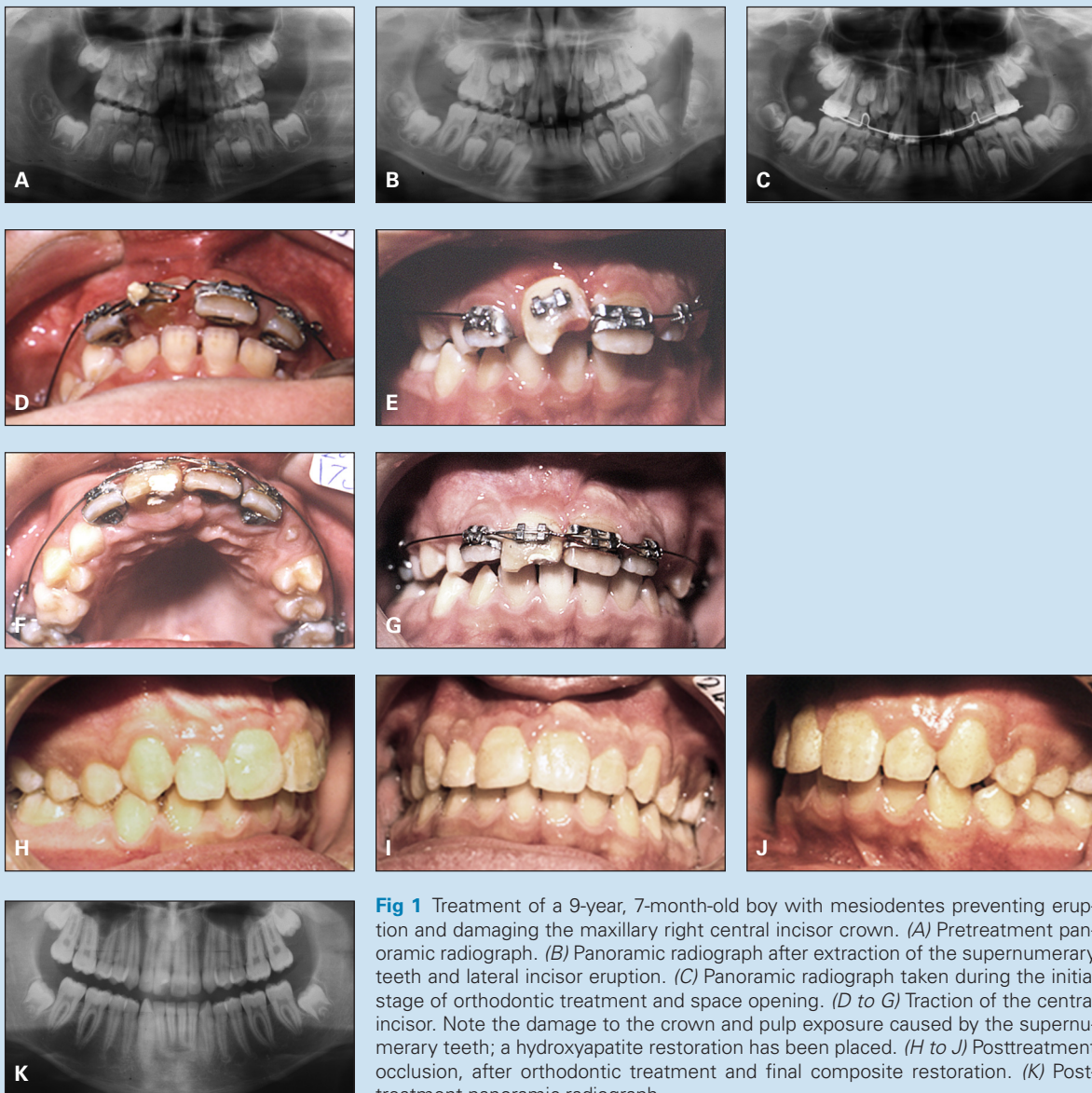
## Chapter 8

A 9-year, 7-month-old boy in the early mixed dentition had a Class I malocclusion and two mesiodentes preventing eruption of the maxillary right central and lateral incisors (Fig 1A). Damage to the central incisor crown and space loss had resulted from the neglected supernumeraries.

Figure 1B, taken after removal of the mesiodentes, clearly demonstrates the space closure in the anterior segment that has resulted from the failure to maintain the necessary space for the unerupted central incisor.

Figure 1C was taken during the initial stage of orthodontic treatment for space opening. The lateral incisor had erupted, but the central incisor was still highly positioned. The central incisor was exposed for traction attachment. The crown damage and pulp exposure were restored first with hydroxyapatite (Figs 1D to 1G) and later, after completion of orthodontic movement, with a composite resin restoration (Figs 1H to 1K).

Undiagnosed or neglected mesiodentes that delay eruption of the central incisors can result in the mesial movement of erupted lateral incisors and space loss even before removal of the mesiodentes. Therefore, an important consideration in management of hyperdontia is maintaining the space between erupted teeth after removal of the supernumerary. Space maintenance for unerupted teeth is especially a factor when unerupted teeth are located deeply, and, even after extraction of the supernumerary tooth, their eruption is delayed and slow.



**Fig 1** Treatment of a 9-year, 7-month-old boy with mesiodentes preventing eruption and damaging the maxillary right central incisor crown. (A) Pretreatment panoramic radiograph. (B) Panoramic radiograph after extraction of the supernumerary teeth and lateral incisor eruption. (C) Panoramic radiograph taken during the initial stage of orthodontic treatment and space opening. (D to G) Traction of the central incisor. Note the damage to the crown and pulp exposure caused by the supernumerary teeth; a hydroxyapatite restoration has been placed. (H to J) Posttreatment occlusion, after orthodontic treatment and final composite restoration. (K) Post-treatment panoramic radiograph.

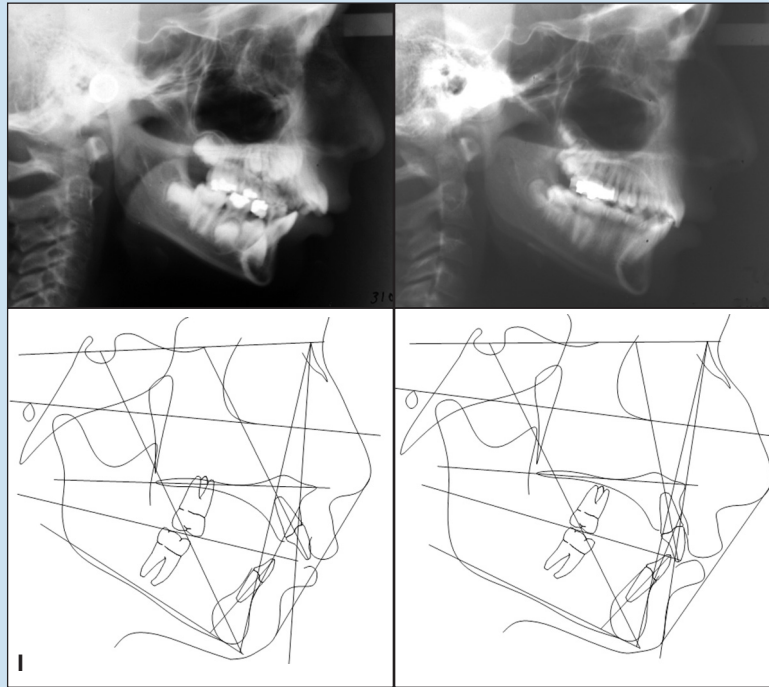
## Chapter 11: Case 1

A 9-year, 3-month-old boy in the middle mixed dentition had a history of previous thumb sucking. He presented with a severe Class II division 1 malocclusion, an 11.3-mm overjet, and a 2.6-mm open bite. He exhibited severe maxillary and mild mandibular incisor proclination, a convex profile, and a retrognathic chin caused by mandibular clockwise rotation (Figs 1A to 1D).

### Treatment:

Because of his vertical growth tendency and aligned mandibular incisors, the only appliance used in the mandibular dentition was a heavy lower holding arch to preserve leeway space and prevent vertical molar eruption, thereby controlling clockwise mandibular rotation. In the maxillary arch, a combined tongue crib–transpalatal arch appliance was inserted first to control anterior tongue movement and achieve some intrusion of the maxillary molars (for more detail on the tongue crib–transpalatal arch appliance, see chapter 6). Then high-pull headgear was applied to correct the Class II molar relationships and intrude the molars in order to achieve more counterclockwise rotation of the mandible. Treatment provided significant results in correcting all dentoskeletal aberrations and improving the profile (Figs 1E to 1J). Treatment resulted in a Class I dentition; a significant change in the A-B discrepancy from 9.1 to 4.3 degrees; correction of the overjet, from 11.3 to 2.1 mm; and a change in incisor overlap from a -2.6 to 1.4 mm. In addition, significant changes in the retruded chin were achieved by mandibular growth and counterclockwise rotation of the mandible; these changes were confirmed by cephalometric improvement in the facial angle, lower facial height, and profile convexity.





Landmark	Norm	Pretreatment	Posttreatment
Facial angle (FH-NPo) (°)	87.0	82.6	85.9
SNB (°)	78.0	74.6	77.2
SNA (°)	82.0	83.7	81.5
Maxillary depth (FH-NA) (°)	90.0	91.3	89.6
ANB (°)	2.3	9.1	4.3
FMA (MP-FH) (°)	25.9	27.2	19.8
Y-axis (SGn-SN) (°)	59.4	66.9	65.4
Interincisal angle (U1-L1) (°)	135.0	112.0	128.0
U1-FH (°)	116.2	121.8	108.0
IMPA (L1-MP) (°)	95.0	99.1	104.2
Overbite (mm)	2.5	-2.6	1.4
Overjet (mm)	2.5	11.3	2.1



**Fig 1** (cont) (I) Pretreatment (left) and posttreatment (right) cephalometric radiographs and tracings. (J) Changes in cephalometric measurements and superimposition of pretreatment (black) and posttreatment (green) tracings.

## Chapter 11: Case 2

An 11-year, 3-month-old girl in the late mixed dentition presented with a Class II division 1 malocclusion, an 11.6-mm overjet, impinging deep bite, and maxillary and mandibular incisor crowding. The maxillary incisors were crowded and proclined, and the mandibular incisors were retroclined and overerupted, creating a two-step occlusion (Figs 2A to 2D).

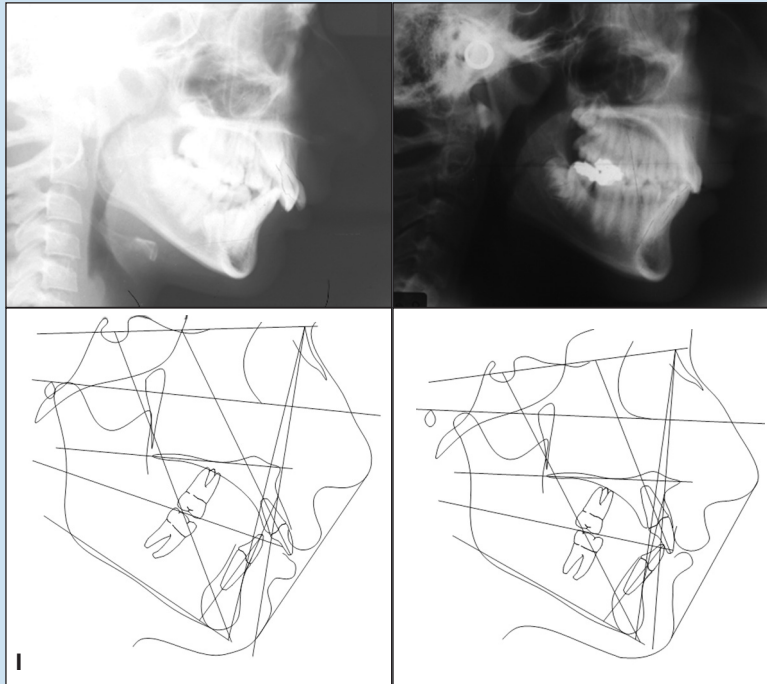
### Treatment:

Because of the patient's severe maxillary incisor crowding, the HLH approach was modified to include an inclined bite plane and, instead of a labial bow, 2 × 4 bonding, plus cervical headgear and a mandibular lip bumper. The first goal of treatment was to align the maxillary incisors by bonding. The second goal was to distalize and extrude the maxillary molars by the use of cervical headgear in conjunction with an anterior inclined bite plane to disocclude the posterior segments to reduce the overbite. Third, the curve of Spee was reduced by use of the lip bumper to upright the proclined mandibular incisors. After some reduction of overbite was achieved by the previous three steps, 2 × 4 bonding of the mandibular incisors was started. Later, a utility arch was placed to intrude the mandibular incisors for complete leveling of the mandibular arch.

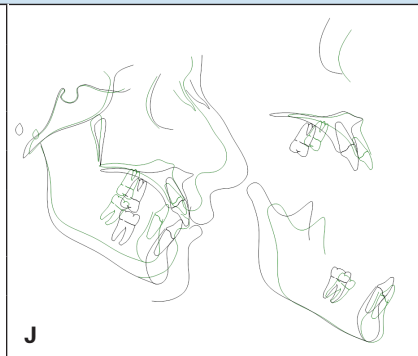
The treatment approach was a one-phase treatment that consisted of the aforementioned steps, which were continued until normal interdigtation was achieved and the crowding, overjet, and overbite were corrected. Active treatment was finished with 2 × 6 bonding followed by placement of a maxillary Hawley retainer and mandibular fixed retainer extending from canine to canine. Figures 2E to 2J show the results of treatment.



**Fig 2** Management of severe overjet, impinging deep bite, and incisor crowding in an 11-year, 3-month-old girl with a Class II division 1 malocclusion. (A to C) Pre-treatment occlusion. (D) Pretreatment soft tissue profile. (E to G) Posttreatment occlusion. (H) Posttreatment soft tissue profile.



Landmark	Norm	Pretreatment	Posttreatment
Facial angle (FH-NPo) (°)	87.0	82.7	85.8
SNB (°)	78.0	74.6	74.6
SNA (°)	82.0	81.1	78.1
Maxillary depth (FH-NA) (°)	90.0	88.5	88.2
ANB (°)	2.3	6.4	3.4
FMA (MP-FH) (°)	25.9	28.0	27.8
Y-axis (SGn-SN) (°)	59.4	70.8	71.3
Interincisal angle (U1-L1) (°)	135.0	117.6	121.8
U1-FH (°)	116.2	121.8	113.2
IMPA (L1-MP) (°)	95.0	92.6	97.2
Overbite (mm)	2.5	3.4	3.1
Overjet (mm)	2.5	11.6	3.5



**Fig 2** (cont) (I) Pretreatment (left) and posttreatment (right) cephalometric radiographs and tracings. (J) Changes in cephalometric measurements and superimposition of pretreatment (black) and posttreatment (green) tracings.



## Chapter 11: Case 3

A 14-year-old girl presented with a neglected pseudo–Class III malocclusion, space deficiency for the maxillary second premolar, and a mandibular shift that was causing temporomandibular dysfunction (Figs 3A to 3D). She exhibited some damage to the incisor structure and minor spacing in the mandibular anterior segment. The patient's chief complaint was temporomandibular joint pain.

### Treatment:

The treatment approach involved use of only one removable appliance in the maxilla and no treatment in the mandible. The appliance was a modified Hawley appliance with a special labial bow with two horizontal loops on the buccal side of the canines to provide good retention in the anterior segment without touching incisors; occlusal coverage; two Z-springs for labial movement of the maxillary incisors out of crossbite; and a jackscrew for distalization of the maxillary left molars (Fig 3E). Figures 3F to 3I show the posttreatment occlusion. The crossbite was corrected, the maxillary second premolar was aligned, and minor mandibular incisor spacing was spontaneously closed.



## Chapter 11: Case 4

A 5-year-old girl in the primary dentition presented with a complete unilateral and anterior crossbite as well as a mandibular functional shift (Figs 4A to 4F).

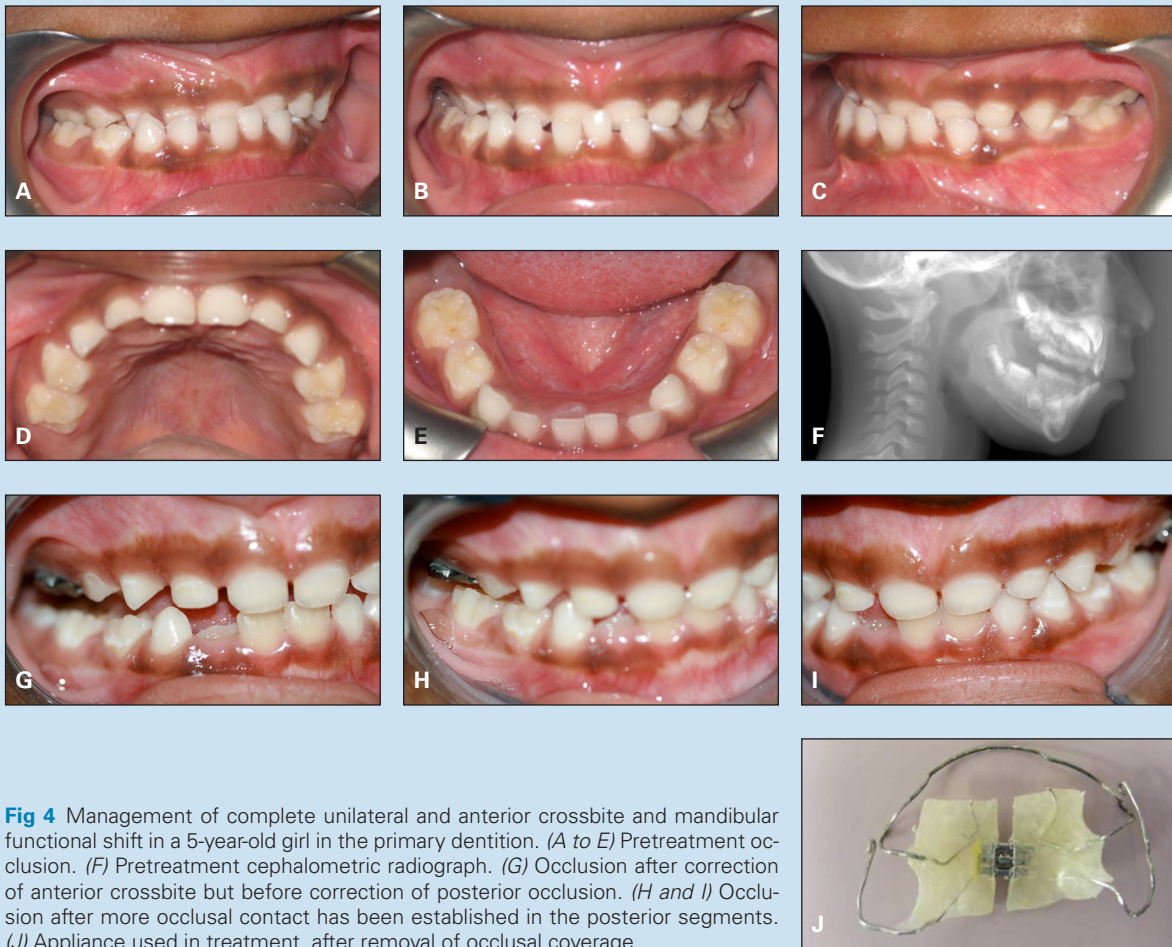
### Treatment:

This patient was treated with a removable Hawley appliance. The maxillary primary second molars were bonded with a buccal tube and C-clasps over the tube for better retention of the appliance. Two Z-springs were constructed to procline the maxillary incisors out of crossbite, while posterior occlusal coverage was used to disocclude the anterior segment.

Figures 4G to 4I show different stages of anterior crossbite correction. The posterior segments exhibited open occlusion before settling. Figure 4J shows the appliance after removal of the occlusal acrylic resin. By 10 months after the end of retention, all mandibular permanent incisors and the maxillary central incisors had erupted (Figs 4K to 4O).

The type of appliance used in this patient must be worn 24 hours a day except during toothbrushing. As mentioned earlier, the first tactic in such cases is to jump the incisors out of crossbite. In some patients, after the maxillary incisors are corrected, open occlusion may result in the posterior segments if the appliance is worn continuously.

In this situation, the occlusal acrylic resin should be left in place and gradually reduced in thickness at each visit. Once the posterior dentition has erupted and settled, the occlusal coverage can be removed or the appliance can be stopped, if required.



**Fig 4** Management of complete unilateral and anterior crossbite and mandibular functional shift in a 5-year-old girl in the primary dentition. (A to E) Pretreatment occlusion. (F) Pretreatment cephalometric radiograph. (G) Occlusion after correction of anterior crossbite but before correction of posterior occlusion. (H and I) Occlusion after more occlusal contact has been established in the posterior segments. (J) Appliance used in treatment, after removal of occlusal coverage.



**Fig 4** (cont) (K to N) Posttreatment occlusion. (O) Posttreatment cephalometric radiograph.