

CLINICAL
SECTION

The Orthoworld Specialist Practitioner Prize Cases 2000

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Abstract

Index words:
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This paper describes the orthodontic management of three diverse malocclusions that were awarded the Orthoworld Specialist Practitioner Prize (2000) and presented at the British Orthodontic Conference in Harrogate 2001.

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Introduction

This paper describes the three cases that presented for the Orthoworld Specialist Practitioner Prize that was awarded at the British Orthodontic Society Conference in 2000.

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Case report 1

The patient presented aged 17 years and 11 months concerned with the appearance of his anterior teeth and palatal discomfort. The patient had previously undergone the extraction of four permanent teeth and surgical exposure of his maxillary canines, but with no provision for orthodontic care had been made.

Clinical examination

Extra-oral features (Figure 1a,b). He presented with a mild Skeletal II pattern and reduced Frankfort-mandibular planes angle. The lips were competent with a high lip line. There was an overall convex facial profile, with a normal nasio-labial angle and slightly pronounced labio-mental fold.

Intra-oral features (Figure 1c–g). The gingival looked healthy and the standard of oral hygiene was reasonably

good. There was evidence of trauma to the palatal mucosa behind the upper incisors.

Functional examination. His centric occlusion and centric relation were coincident, and there were no signs or symptoms of temporomandibular joint dysfunction. There was a steep path of opening in protrusion due to the retroclined upper incisors. The patient showed group function on lateral excursion with non-working side interferences on the maxillary second molars.

Dental casts

Maxillary arch. The upper labial segment was aligned and upright, with the upper right lateral incisor having a reduced mesio-distal width. The left canine was partially erupted in the palate with a gold chain attached, whilst the right canine was unerupted with only a gold chain showing through the palatal mucosa. The buccal segments were aligned with slight spacing, resulting from the absent premolars.

Mandibular arch. The lower labial segment was upright and moderately crowded, with the lower left canine partially erupted and mesio-labially rotated. The buccal segments were relatively well aligned with the lower left second premolar and lower right second molar absent.

Occlusion. Overjet 5 mm, overbite was increased (6 mm) and traumatic to the palate. Buccal segment relationship on the right side was Class II and Class I on the left side.



Fig. 1 (a–g) Case 1: start of treatment photographs.

Bolton analysis revealed a maxillary anterior deficiency, due to the diminutive maxillary right lateral incisor.

Radiographic analysis

The panoramic radiograph (Figure 2) confirmed the absence of: 4|5/7|5

Both maxillary canines were ectopic, with the right canine being less favourably inclined. All third molars



Fig. 2 Panoramic radiograph of case 1.

were present and in favourable positions. An upper standard occlusal radiograph (Figure 3) confirmed the palatal position of the maxillary canines and the absence of any apparent pathology in the surrounding structures.

Pre-treatment cephalometric radiograph (Figure 4). Mild Skeletal II pattern, with a degree of maxillary prognathism and a marked reduction in the maxillary-mandibular planes angle (Table 1). The upper incisors were retroclined and the lower incisors proclined and 3 mm behind the APo line.

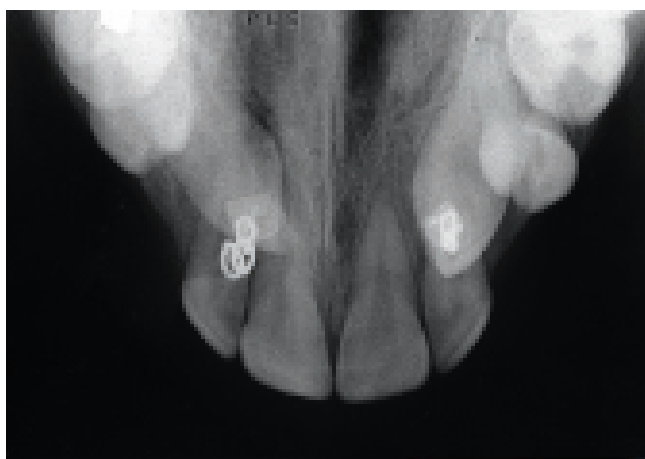


Fig. 3 Upper standard occlusal radiograph of case 1.

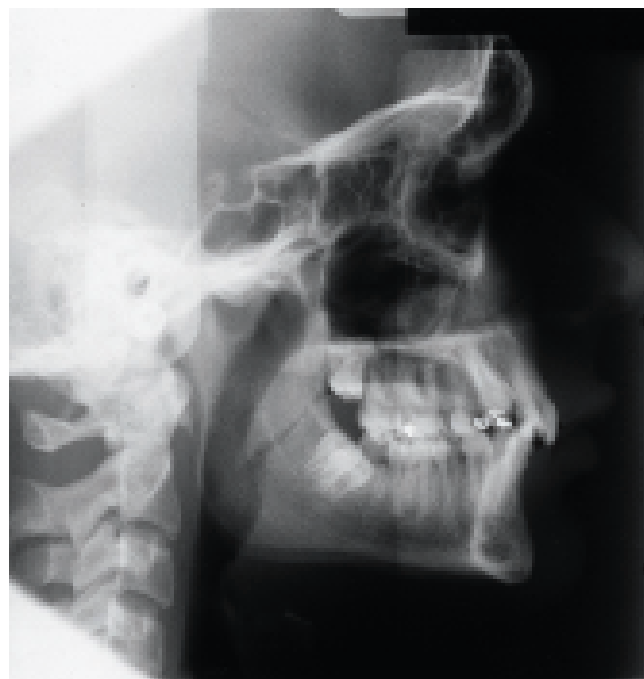


Fig. 4 Lateral cephalogram of case 1.

Table 1 Cephalometric morphological analysis for case 1

	Pre-treatment	Post-treatment	Mean \pm SD
<i>Sagittal skeletal relationships</i>			
Maxillary position S-N-A	84	82	82 \pm 3.5
Mandibular position S-N-Pg	80	82	80 \pm 3.5
Sagittal jaw relation A-N-Pg	4	0	2 \pm 2.5
<i>Vertical skeletal relationships</i>			
Maxillary inclination S-N/ANS-PNS	5	4	8 \pm 3.0
Mandibular inclination S-N/Go-Gn	21	20	33 \pm 2.5
Vertical jaw relation ANS-PNS/Go-Gn	15	15	25 \pm 6.0
<i>Dento-basal relationships</i>			
Maxillary incisor inclination I-ANS-PNS	103	114	110 \pm 6.0
Mandibular incisor inclination I-Go-Gn	102	104	94 \pm 7.0
Mandibular incisor compensation I-A-Po (mm)	-1	+2	2 \pm 2
<i>Dental relationships</i>			
Overjet (mm)	5	3	3.5 \pm 2.5
Overbite (mm)	6	3	2 \pm 2.5
Inter-incisal angle \llcorner I	141	128	132 \pm 6.0

Aetiology

The inherited Class II skeletal pattern, reduced maxillary-mandibular planes angle and high lip line have all contributed to the Class II malocclusion. There has been some unopposed vertical development of the labial segments resulting in the traumatic overbite and the crowding has resulted from dento-alveolar disproportion.

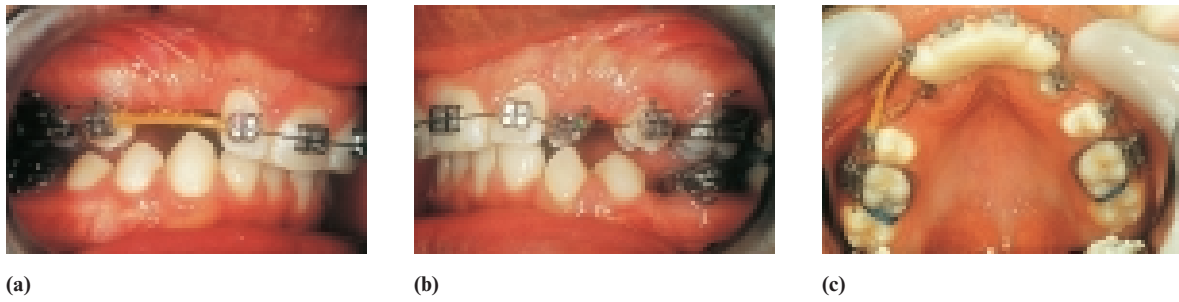


Fig. 5 (a–c) Upper pre-adjusted Edgewise fixed appliance used in conjunction to a temporary anterior bite plane, constructed from glass ionomer cement, to disengage the occlusion.

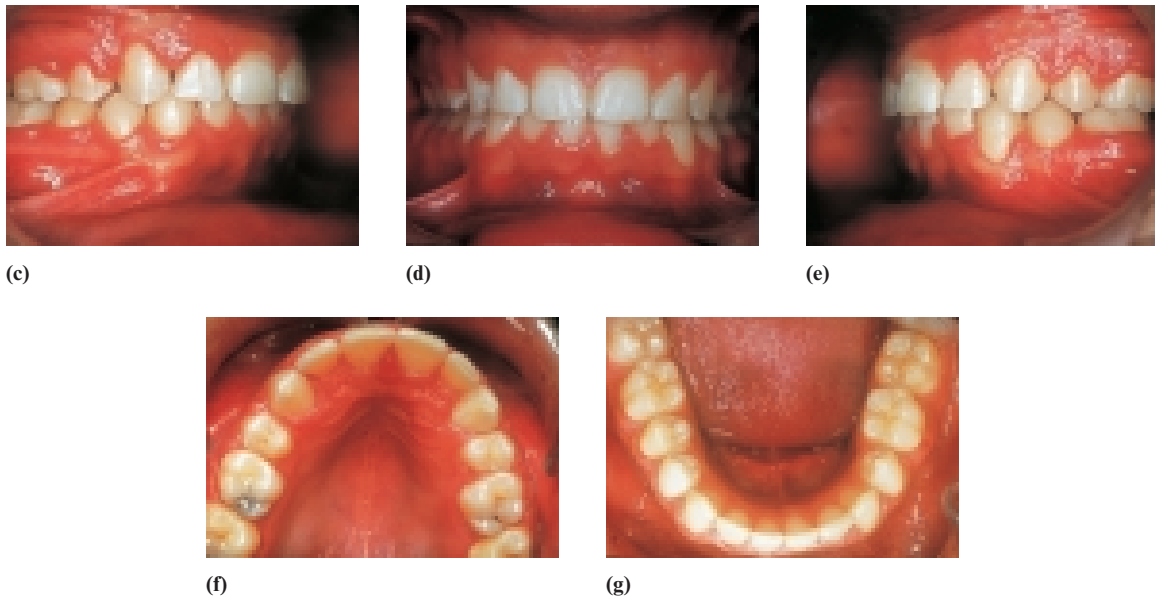
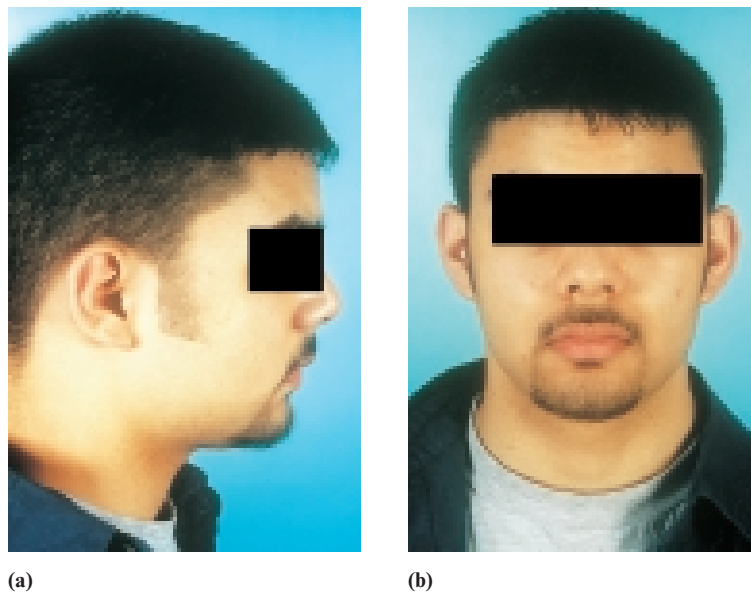


Fig. 6 (a–g) Case 1: end of treatment.

Treatment plan

It was felt that this malocclusion could be satisfactorily treated with the pre-adjusted Edgewise appliance system and the pre-determined asymmetric extraction pattern:

IOTN Dental Health Component score = 5i

IOTN Aesthetic Component score = 7

Pre-treatment PAR score = 26

Aims of treatment

1. Align ectopically positioned canines.
2. Level and align the arches.
3. Achieve a Class I incisor relationship.
4. Re-create space for $\frac{2}{1}$ build-up.
5. Achieve Class I buccal occlusion on the left and Class II right.
6. Maintain the facial profile.
7. Retention.

Progress of the case

Treatment commenced with an upper pre-adjusted Edgewise fixed appliance (Roth prescription) with a 0.022×0.028 -inch slot. An initial 0.014-inch super elastic nickel titanium (NiTi) aligning arch was inserted. A temporary anterior bite plane of glass ionomer cement was utilized to disengage the occlusion (Figure 5a–c). The lower pre-adjusted Edgewise fixed appliance (Roth prescription) was placed 7 months later. Alignment of the ectopic maxillary canines commenced with the application of light elastic traction and continued with a 0.014-inch NiTi piggy-back arch on an 0.018-inch stainless steel base archwire. Overbite reduction, with a reverse curve of Spee was achieved using a 0.019×0.025 -inch stainless steel archwire. Final space closure was completed using intra-arch mechanics and night time inter-maxillary traction. At debond the maxillary right lateral incisor was restored to a more normal morphology, with composite resin and modified Hawley retainers fitted. Total treatment time was 28 months.

Post-treatment evaluation

The management of this case had been somewhat determined by the loss of permanent teeth in both arches. Little change in facial profile has resulted from treatment despite the growth of the nose and chin point (Figure 6a–b). This has been aided by the use of additional torque control in the upper and lower labial

segments, ensuring that they remained forward offering continuing support to the lips. The improvement in dental appearance and the establishment of a mutually protected occlusion was largely the result of alignment of the ectopic canines (Figure 6c–g). The composite resin restoration undertaken on the right lateral incisor not only aided dental aesthetics by establishing arch symmetry, but further eliminated the tooth size discrepancy in the labial segments. The dental cast analysis revealed an increase in both maxillary and mandibular arch length (Figures 8 and 9), with an end of treatment PAR score = 0. Therefore, this treated case is in the 'greatly improved' category of the PAR nomogram.

The Class II malocclusion has been corrected through a combination of skeletal and dentoalveolar changes (Table 1). During treatment very little general or maxillary skeletal growth took place (Figures 7 and 8). The mandible rotated 3 degrees forward during treatment and there was an associated change in the occlusal plane (Figure 9).

Retention and stability

At the completion of his orthodontic treatment the patient was fitted with modified Hawley retainers, with clear labial acrylic on the bows. Following 6 months of full-time wear the patient was instructed to wear his retainers on at night time only for a further 6 months. Long-term, the patient will be instructed to continue wearing the Hawley retainers on an alternate night basis.



Fig. 7 Case 1: pre- and post-treatment cephalometric tracings superimposed along the anterior cranial base.

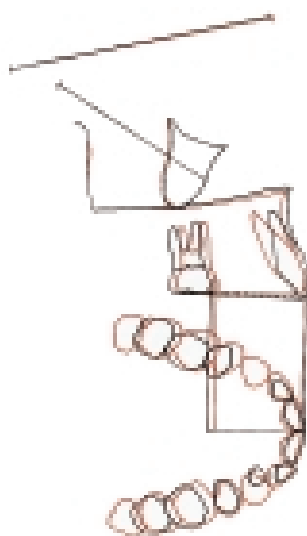


Fig. 8 Case 1: dental arch form and cephalometric superimposition (on stable structures) of maxilla.

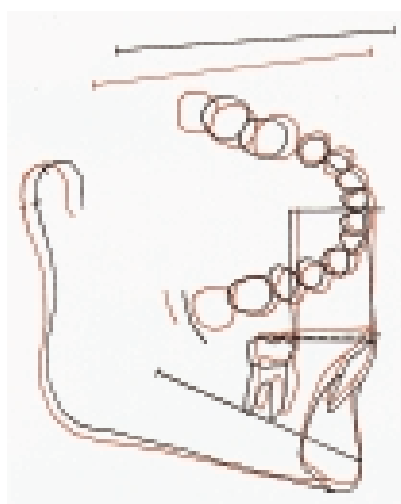


Fig. 9 Case 1: dental arch form and cephalometric superimposition (on stable structures) of mandible.

Case report 2

The patient presented aged 27 years and 6 months concerned with the appearance of her anterior teeth. The patient had previously undergone the loss of $\overline{3|3}$ and $\overline{4|4}$ at age 11 years, but had not received any orthodontic treatment.

Clinical examination

Extra-oral features (Figure 10a,b). The patient presented with a mild Skeletal II pattern and marked chin

prominence. The lower anterior face height proportion and Frankfort-mandibular planes angle were normal. The lips were competent and there was a high lip line. There was also a degree of bi-maxillary retrusion.

Intra-oral features (Figure 10c–g). The gingivae looked healthy and the standard of oral hygiene was reasonably good. The lower right canine had gingival recession on its labial aspect and had subsequently received a free-gingival graft.

Functional examination

The patient's centric occlusion and centric relationships were coincident, and there were no signs or symptoms of temporomandibular joint dysfunction. There was a steep path of opening in protrusion due to the retroclined upper central incisors. The patient could not readily undertake lateral excursion and there were non-working side interferences on the maxillary second molars.

Dental casts

Maxillary arch. The upper labial segment showed mild crowding with the central incisors retroclined and the lateral incisors showing mesio-labial rotations. The upper buccal segments were aligned, with the maxillary canines absent.

Mandibular arch. The lower labial segment was retroclined and moderately crowded, with both canines mesio-labially rotated. The buccal segments were relatively well aligned with the lower first premolars being absent.

Occlusion. Overjet 2 mm, overbite was increased (7 mm) and complete. Buccal segment relationship on the right side was Class II and Class I on the left side.

Radiographic examination

The panoramic radiograph (Figure 11) confirmed the absence of: $\overline{8|3|3|8} / \overline{8|4|4|8}$

The pre-treatment cephalometric radiograph (Figure 12) demonstrated a Skeletal I pattern with bi-maxillary retrusion and a slightly reduced maxillary-mandibular planes angle (Table 2). The upper central and lower incisors were significantly retroclined, with the lower incisors being 1 mm behind the APo line.



Fig. 10 (a–g) Case 2: start of treatment photographs.

Aetiology

The Class II division 2 malocclusion is a result of the mild sagittal skeletal discrepancy, reduced lower facial proportion and high lip line. There has been some unopposed vertical development of the labial segments resulting in the increased overbite. The aetiology behind the localized loss of clinical attachment affecting the lower right canine was unknown. The crowding has resulted from dento-alveolar disproportion, however, which has been exacerbated by the retroclination of the labial segments.

Treatment plan

It was felt that this malocclusion could be satisfactorily treated with no further extractions using an upper removable appliance with headgear support, in conjunction with the pre-adjusted Edgewise appliance system.

IOTN Dental Health Component score = 4d

IOTN Aesthetic Component score = 8

Pre-treatment PAR score = 24

Aims of treatment

1. Minimize the risk of further gingival recession on the 3].
2. Relief of dental crowding and arch alignment.
3. Achieve a Class I incisor and buccal relationship.
4. Reduce the overbite and establish a normal inter-incisal angulation.
5. Establish a mutually protected occlusion.
6. Improve the facial profile.
7. Retention.

Progress of case

Following a free-gingival graft and periodontal therapy there was a 9-month period of observation. An upper removable appliance incorporating an anterior bite-plane, unilateral screw plate, and headgear was fitted in conjunction to a lower pre-adjusted Edgewise fixed appliance (Roth prescription) with a 0.022 × 0.028-inch slot (Figure 13a,b). After a period of 6 months the upper

right buccal segment had been retracted in to a Class I relationship and the pre-adjusted Edgewise fixed appliance placed, continuing with the headgear. Overbite reduction, with a reverse curve of Spee was achieved using a 0.019 × 0.025-inch stainless steel archwire. At



Fig. 11 Panoramic radiograph of case 2.



Fig. 12 Lateral cephalogram of case 2.

Table 2 Cephalometric morphological analysis for case 2

	Pretreatment	Post-treatment	Mean ± SD
<i>Sagittal skeletal relationships</i>			
Maxillary position S–N–A	74	73	82 ± 3.5
Mandibular position S–N–Pg	73	73.5	80 ± 3.5
Sagittal jaw relation A–N–Pg	1	–0.5	2 ± 2.5
<i>Vertical skeletal relationships</i>			
Maxillary inclination S–N/ANS–PNS	10.5	11	8 ± 3.0
Mandibular inclination S–N/Go–Gn	37	37	33 ± 2.5
Vertical jaw relation ANS–PNS/Go–Gn	26	27	25 ± 6.0
<i>Dento-basal relationships</i>			
Maxillary incisor inclination I–ANS–PNS	91	112	110 ± 6.0
Mandibular incisor inclination I–Go–Gn	81	96	94 ± 7.0
Mandibular incisor compensation I–A–Po (mm)	–1	+2	2 ± 2
<i>Dental relationships</i>			
Overjet (mm)	2	2	3.5 ± 2.5
Overbite (mm)	7	1	2 ± 2.5
Inter-incisal angle I I	160	126	132 ± 6.0

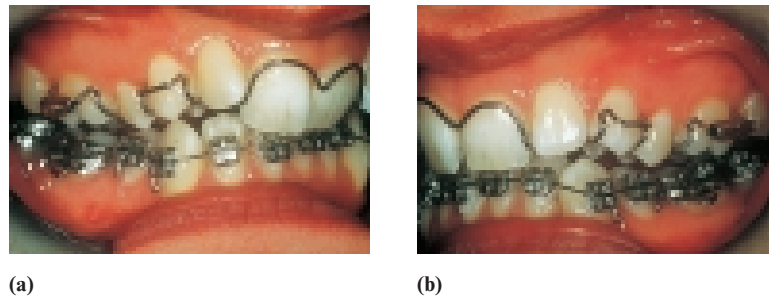


Fig. 13 (a,b) Upper removable appliance used in conjunction to a lower pre-adjusted Edgewise fixed appliance.

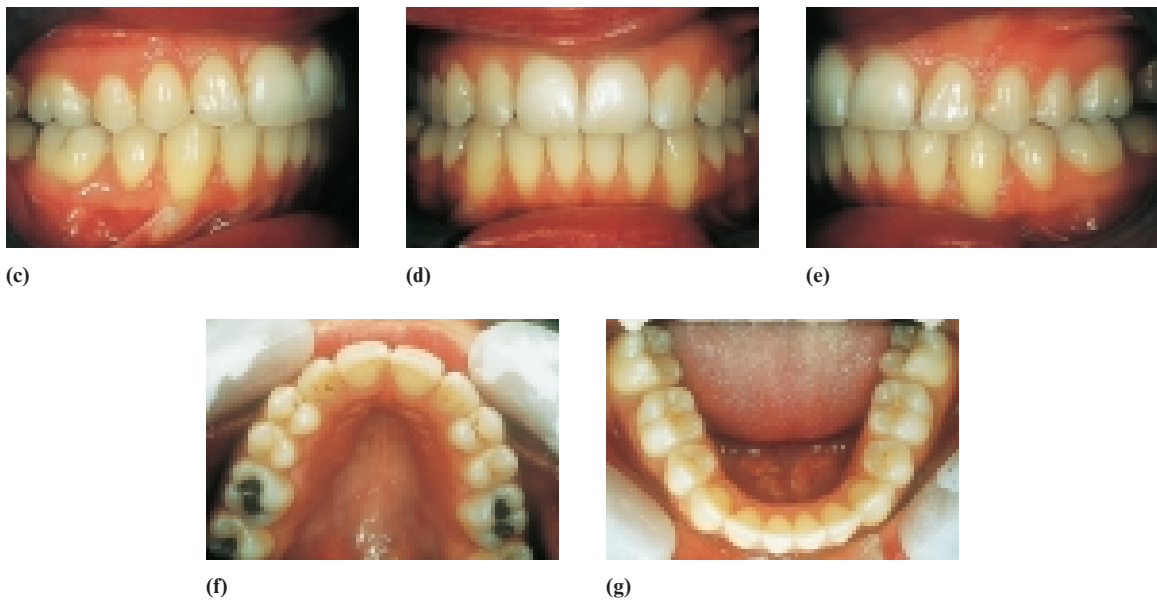


Fig. 14 (a–g) Case 2: end of treatment.

debond modified Hawley retainers were fitted and the total treatment time was 20 months.

Post-treatment evaluation

The management of this case had been somewhat compromised by loss of permanent teeth in both arches. A slight improvement in facial profile has resulted from forward movement of the lower labial segment offering greater support for the lower lip (Figure 14a,b). In addition, there has been a slight improvement in the lower face height proportion. The improvement in dental appearance was the result of not only a good level of arch alignment and crown torque in the upper labial segment, but also the excellent crown morphology of the maxillary first premolars, enabling these teeth to simulate the absent canines (Figure 14c–g). The patient now has a mutually protected occlusion. The dental cast analysis revealed an increase in both maxillary and mandibular arch length (Figures 16 and 17), with an end of treatment PAR score = 2. Therefore, this treated case is in the 'greatly improved' category of the PAR nomogram.

The Class II malocclusion has been corrected through a combination of skeletal and dentoalveolar changes (Table 2). During treatment very little general or maxillary skeletal growth took place (Figures 15 and 16). The mandible rotated 2 degrees backward during treatment (Figure 17).



Fig. 15 Case 2: pre- and post-treatment cephalometric tracings superimposed along the anterior cranial base.

Retention and stability

She was fitted with modified Hawley retainers, with clear labial acrylic on the bows, at the completion of her orthodontic treatment. Following 6 months of full-time wear the patient instructed to wear her retainers on at

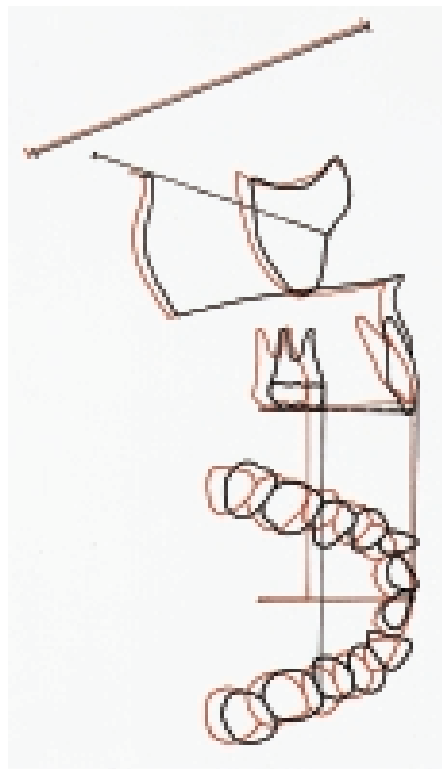


Fig. 16 Case 2: dental arch form and cephalometric superimposition (on stable structures) of maxilla.

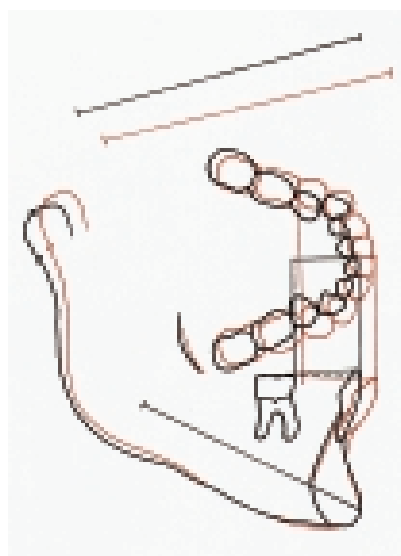


Fig. 17 Case 2: dental arch form and cephalometric superimposition (on stable structures) of mandible.

night time only. The periodontal health of the right mandibular canine, following the initial free gingival graft remained good, aided by the maintenance of the lower inter-canine width during treatment. It could be argued that stability has been compromised for aesthetics by advancing the lower labial segment and, thus, ensuring a need for a prolonged phase of retention. This was felt to be an important treatment objective by both the patient and clinician.

Case report 3

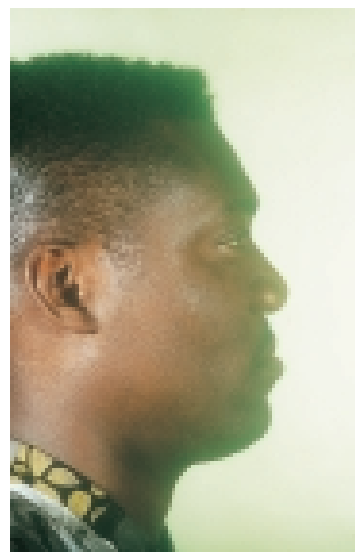
The patient presented aged 28 years and 10 months concerned with the appearance of his anterior teeth and nasal asymmetry. The patient had previously undergone the primary repair of his unilateral cleft lip and palate as an infant, but had not received any orthodontic treatment.

Clinical examination

Extra-oral features (Figure 18a,b). The patient presented with a mild Skeletal III pattern due to maxillary



(a)



(b)



(c)



(d)



(e)



(f)



(g)

Fig. 18 (a–g) Case 3: start of treatment photographs.

retrognathia and forward mandibular displacement on closure. The lower anterior face height was increased, with facial asymmetry present as a result of nasal tip deviation, flaring of the left alar base and a left-sided displacement of the mandible on closure. The patient could achieve lip competence. There was an acute nasio-labial angle with an absent columella. The lower lip prominence was principally due to the forward mandibular displacement on closure.

Intra-oral features (Figure 18c–g). The gingivae looked healthy and the standard of oral hygiene was reasonably good. There was also a large unrepaired cleft of the left alveolus and oro-nasal fistula, with associated discharge.

Functional examination

The patient could achieve an edge-to-edge incisor relationship, from which there was a significant forward mandibular displacement. The patient could not readily undertake lateral excursion owing to the collapsed labial arch-form. There were no signs or symptoms of temporomandibular joint dysfunction.

Dental casts

Maxillary arch. The upper labial segment was retroclined and mildly crowded. The left lateral incisor was absent with the canine and central incisor in contact. In addition, the left deciduous canine was firm and retained. The right quadrant showed spacing due to the absent

second premolar and the left quadrant was spaced between the two molars, as a result of forward drift of the second molar.

Mandibular arch. The lower labial segment was upright and aligned. The lower buccal segments were spaced with the premolars showing significant rotations.

Occlusion. Overjet 0 mm (centric relation) and –3 mm (centric occlusion), the overbite was increased (10 mm) and incomplete, and the upper centreline deviated to the left. Buccal segment relationship on the right and left sides was Class I and Class II, respectively.

Radiographic examination

The panoramic radiograph (Figure 19) confirmed the absence of: $\overline{65|256 / \overline{6|6}}$.

The unrepaired alveolar cleft was apparent with significant mesial tipping of the left permanent canine. There was an area of sclerosing osteitis associated with the distal root of the lower right second molar. The long cone peri-apical and upper standard occlusal radiographs confirmed and clearly delineated the size of the alveolar cleft deformity.

The pre-treatment cephalometric radiograph (Figure 20) demonstrated a moderate Skeletal III pattern, due to a combination of maxillary retrognathia and mandibular posturing, with a slightly reduced maxillary-mandibular planes angle (Table 3). The upper incisors were significantly retroclined, with the lower incisors being 8 mm in front of the APo line.

Table 3 Cephalometric morphological analysis for case 3

	Pre-treatment	Post-treatment	Mean SD
<i>Sagittal skeletal relationships</i>			
Maxillary position S–N–A	80	78.5	82 ± 3.5
Mandibular position S–N–Pg	85	83.5	80 ± 3.5
Sagittal jaw relation A–N–Pg	5	5	2 ± 2.5
<i>Vertical skeletal relationships</i>			
Maxillary inclination S–N/ANS–PNS	2	4	8 ± 3.0
Mandibular inclination S–N/Go–Gn	25	25	33 ± 2.5
Vertical jaw relation ANS–PNS/Go–Gn	23	21	25 ± 6.0
<i>Dento-basal relationships</i>			
Maxillary incisor inclination I–ANS–PNS	98	120	110 ± 6.0
Mandibular incisor inclination I–Go–Gn	77	89	94 ± 7.0
Mandibular incisor compensation I–A–Po (mm)	+8	+8	2 ± 2
<i>Dental relationships</i>			
Overjet (mm)	–3	2	3.5 ± 2.5
Overbite (mm)	10	2	2 ± 2.5
Inter-incisal angle I I	163	130	132 ± 6.0



Fig. 19 Panoramic radiograph of case 3.

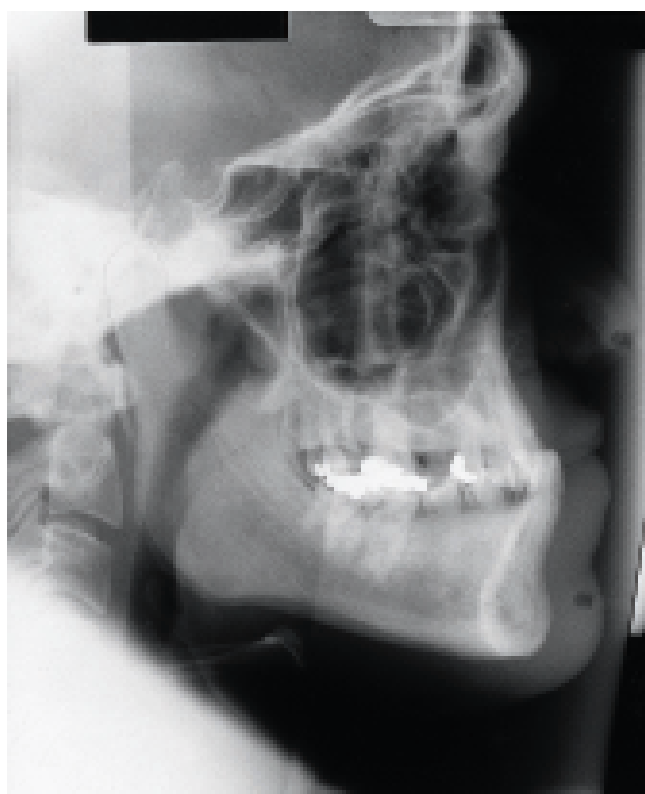


Fig. 20 Lateral cephalogram of case 3.

Aetiology

The cleft lip and palate deformity has significantly contributed to the aetiology of this malocclusion. The presence of a significant forward displacement of the mandible on closure exaggerates the anteroposterior discrepancy.

Treatment plan

In order to achieve optimal facial and dental aesthetics a multi-disciplinary approach to management was required. The elimination of the anterior cross-bite and

associated anterior displacement would significantly facilitate the treatment objectives outlined.

IOTN Dental Health Component score = 5p

IOTN Aesthetic Component score = 10

Pre-treatment PAR score = 54

Aims of treatment: orthodontic

1. Eliminate the anterior cross-bite and associated displacement.
2. Arch alignment and space redistribution to facilitate prosthetic replacement for 5|2.
3. Retraction of 3 into Class I to facilitate repair of alveolar cleft deformity.
4. Achieve a Class I incisor relationship.
5. Achieve Class I buccal occlusion RHS and Class II LHS.
6. Improve the facial profile.
7. Removable retainers with 5|2 pontics.

Aims of treatment: surgical

1. Closure of oro-nasal fistula.
2. Repair of alveolar cleft deformity.
3. Nasal revision.

Aims of treatment: restorative

1. Adhesive bridges to replace 5|2.
2. Re-contour 1| and 1̄|.

Progress of case

Treatment commenced with placement of the upper pre-adjusted Edgewise fixed appliance (Roth prescription) utilizing the 0.022 × 0.028-inch slot. The lower fixed appliance was placed after 4 months. Following arch alignment, a Begg bracket was placed on the palatal surface of 2| and an anterior cross-elastic used to eliminate the mandibular displacement. (Figure 21) A temporary posterior bite plane, constructed from glass ionomer cement, was used to disengage the occlusion. A joint Orthodontic-Surgical-Restorative consultation outlined the timing of the planned alveolar bone graft. Prior to the bone graft the lc was extracted and the 3 retracted in to a Class I occlusion, using a super-elastic NiTi coil spring. The alveolar bone graft was combined with the repair of the oro-nasal fistula. Final detailing of the occlusion was performed on a 0.018-inch stainless steel archwire. At debond modified Hawley retainers were fitted, with the total treatment time being 29 months. The patient

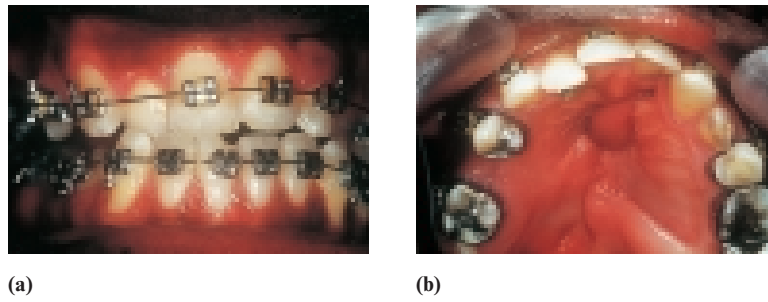


Fig. 21 (a,b) Upper pre-adjusted Edgewise fixed appliance with Begg bracket on the palatal surface for attachment of an anterior cross-elastic to eliminate anterior cross-bite and displacement.

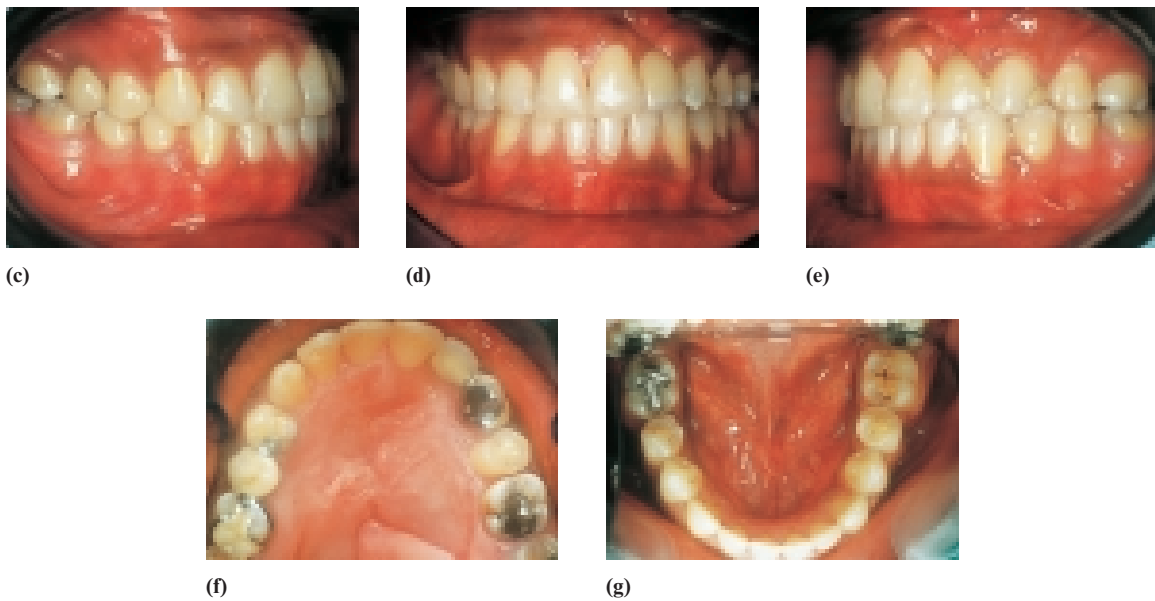
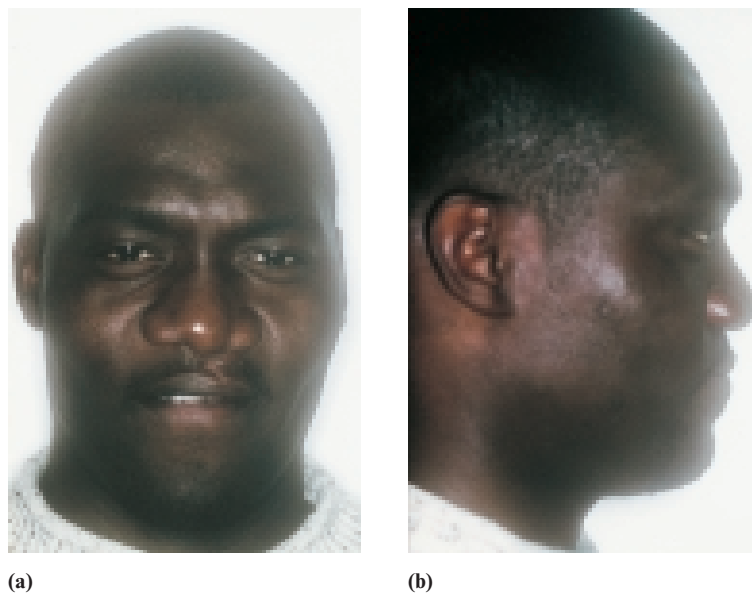


Fig. 22 (a–g) Case 3: end of treatment.

subsequently underwent a nasal revision and adhesive bridges were constructed to replace the absent $\overline{5}2$.

Post-treatment evaluation

A significant improvement in his facial and dental appearance has been achieved through a multi-disciplinary approach (Figure 22a–g). The elimination of the anterior cross-bite and associated displacement, establishment of a normal incisor relationship and alveolar bone grating plus nasal revision have all improved the appearance of the upper lip and nose. The improvement in dental appearance and the establishment of a mutually protected occlusion has been facilitated by the retraction of the $\overline{3}$ in to a Class I position and prosthetic replacement of the $\overline{2}$ with re-contouring of the incisor crowns. The dental cast analysis revealed an increase in both maxillary and mandibular arch length (Figures 24 and 25), with an end of treatment PAR score = 0. Therefore, this treated case is in the 'greatly improved' category of the PAR nomogram.

The Class III malocclusion has been corrected through a combination of skeletal and dentoalveolar changes (Table 3). During treatment very little general or maxillary skeletal growth took place (Figure 23 and 24). The mandible showed a significant backward rotation (3 degrees) during treatment, as a result of elimination of the anterior cross-bite and displacement (Figure 25).

Retention and stability

He was fitted with modified Hawley retainers, incorporating pontics for the absent $\overline{5}2$, at the completion of



Fig. 23 Case 3: pre- and post-treatment cephalometric tracings superimposed along the anterior cranial base.

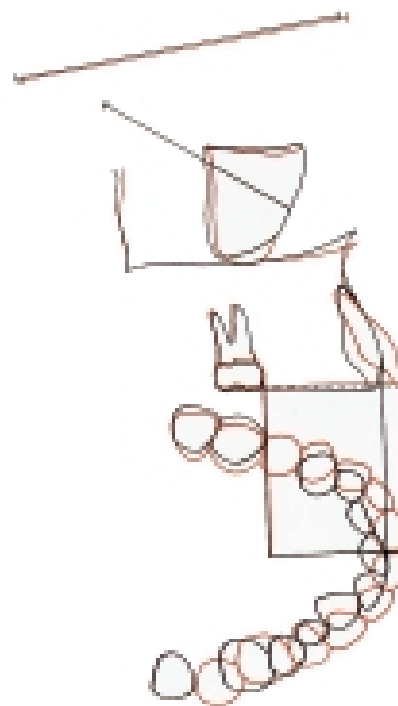


Fig. 24 Case 3: dental arch form and cephalometric superimposition (on stable structures) of maxilla.

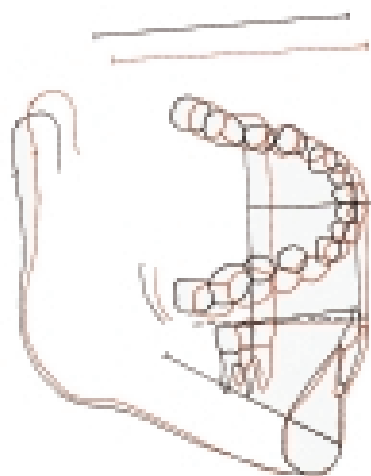


Fig. 25 Case 2: dental arch form and cephalometric superimposition (on stable structures) of mandible.

orthodontic treatment. Following 7 months of full-time wear adhesive bridges replacing the absent teeth were fitted. A new upper Hawley retainer was fabricated and the patient instructed to wear his retainers on at night time only. The patient will require a prolonged phase of retention in view of the risks of rotational relapse and space opening in the mandibular arch.

