

Clinical Section

Forestadent Travel Award

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Introduction

The Forestadent Young Specialist Prize is awarded following the submission of case records of three treated cases displayed in the Clinical Demonstrations section at the annual British Orthodontic Conference. This award is given to support a visit to an overseas centre or conference. Cases must have been treated by the orthodontic practitioner within the first twelve years after gaining their initial orthodontic qualification. The three cases presented for the award during the 1997 conference in Harrogate are described.¹

Case Report 1

A 12-year-old Caucasian female presented complaining that her upper anterior teeth were prominent. Extra-oral examination revealed a Class II Skeletal base with an average Frankfort-mandibular planes angle and normal lower anterior face height proportion. Her lips were incompetent with the lower lip functioning behind the upper labial segment and the facial profile was slightly convex. There was no history of digit sucking.

Examination of the dentition revealed the presence of all permanent teeth apart from third molars. The lower arch was moderately crowded with the lower labial segment at an average inclination to the dental base. The upper arch was mildly crowded with a narrow, 'V' shaped arch form, the labial segment appeared proclined to the dental base. $\overline{6}/\overline{6}$ and $\underline{6}/\underline{6}$ were affected by enamel hypoplasia and there was a history of sensitivity from these teeth. $\underline{6}/\underline{6}$ had a two surface restoration.

In occlusion, the overjet measured 14 mm, the overbite was increased and incomplete, with a Class II molar relationship bilaterally. Dental centre lines were coincident with each other and with the facial midline. The panoramic radiograph showed the present of all four third molars which were of good size and satisfactory developmental position. The mesio-occlusal restoration $\underline{6}/\underline{6}$ appeared close to the pulp chamber (Fig. 1a-g).

Cephalometric analysis (Table 1) confirmed the clinical findings relating to her skeletal pattern. The maxillary-mandibular planes angle was increased at 36 degrees, but the lower anterior face height was within the normal range

at 55 per cent. The upper incisors were significantly proclined at 122 degrees.

IOTN score (DHC) = 5

Pretreatment weighted PAR score = 38

The aims of treatment were:

- (1) relief of labial segment crowding;
- (2) growth modification to address mandibular retrognathia;
- (3) correction of the buccal segment relationship to Class I;
- (4) expansion of the upper arch;
- (5) levelling and alignment;
- (6) reduction of overbite and overjet;
- (7) closure of residual extraction space;
- (8) arch co-ordination.

The treatment plan was as follows:

- (1) extraction of all four first permanent molars in view of their poor long-term prognosis;
- (2) fit an upper removable appliance to expand the upper arch;
- (3) commence sagittal correction with a medium opening activator functional appliance;
- (4) integrate lower pre-adjusted edgewise fixed appliance (0.022 × 0.028-inch Roth prescription) during the functional phase to commence levelling, alignment and space closure;
- (5) proceed to an upper fixed appliance and detail the occlusion using Class II intermaxillary elastics;
- (6) retain and monitor development of the third molars.

TABLE 1 Case report 1. Pre- and post-treatment cephalometric analysis

	Pretreatment	Post-treatment
SNA (degrees)	79	78
SNB (degrees)	74	76
ANB (degrees)	5	2
MMPA (degrees)	36	31
Lower face height (as a % of total face height)	55	55
SN to maxillary plane (degrees)	3	6
UI to MxP (degrees)	122	105
LI to MnP (degrees)	86	89
Interincisal angle (degrees)	117	136
LI to A-Pog plane (mm)	-1	0.5
Wits analysis (mm)	-0.5	-0.5

¹ These cases were awarded the Forestadent prize 1997.

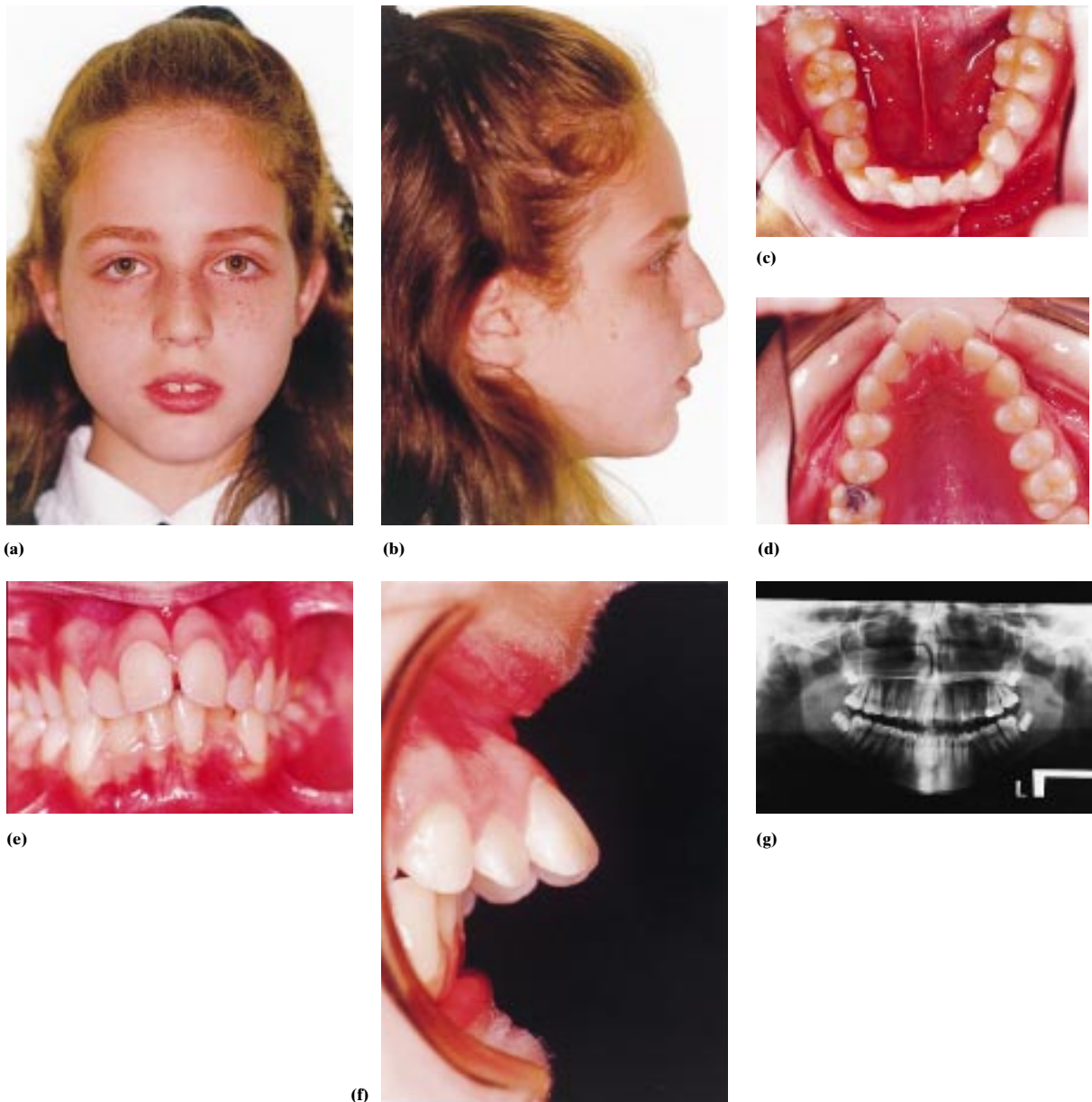


FIG. 1 (a–g) Case report 1: pretreatment photographs and orthopantomograph.

Treatment consisted of a total of 20 visits over a period of 26 months. The upper removable appliance produced expansion of the upper inter-premolar and inter-canine width by means of an expansion screw and crossed palatal wire springs constructed in 0.9-mm stainless steel wire. Lower incisor attachments were engaged following some lower canine retraction with lacebacks. The functional appliance was reactivated with further mandibular forward posture within 6 months by replacement of the acrylic pillars (Fig. 2a–d). A lingual crown torque adjustment was added to the working stainless archwire (0.019 × 0.025-inch) to prevent excessive lower labial segment proclination. Following debond upper and lower Hawley type removable retainers were fitted with instructions that they should be worn full time for a period of 6 months and a further 6 months of part time wear.

Case 1 Assessment

There was an improvement in skeletal pattern during treatment with vertical and horizontal growth aiding correction to a Class I occlusion. Compliance with the functional appliance was good and produced the desired change in sagittal arch relationship, this reduced anchorage requirements during the fixed appliance phase of treatment. Adequate coverage of the labial surface of the upper incisors by the lower lip was achieved. This, together with lip competence at the end of treatment, should ensure stability of the overjet reduction. Some lower labial segment proclination occurred and was felt to be acceptable in view of the pretreatment soft tissue behaviour with the lower lip functioning behind the upper incisors. Satisfactory closure of the first permanent molar extraction



FIG. 2 (a-d) Case report 1: appliances during treatment.



FIG. 3 (a-e) Case report 1: post-treatment photographs.

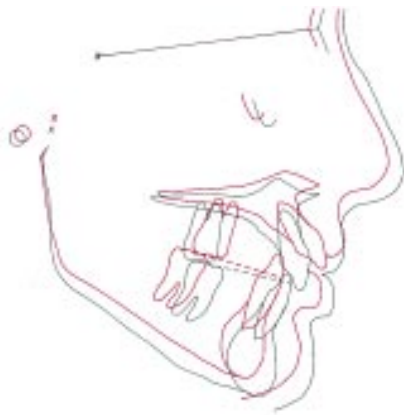


FIG. 4 Case report 1: pre- (red) and post-treatment (black) cephalometric tracings superimposed on SN at sella.

TABLE 2 Case report 2. Pre- and post-treatment cephalometric analysis

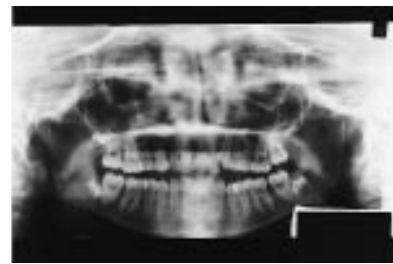
	Pretreatment	Post-treatment
SNA (degrees)	79	78
SNB (degrees)	82	81
ANB (degrees)	-3	-3
MMPA (degrees)	31	30
Lower face height (as a % of total face height)	58	57
SN to maxillary plane (degrees)	1.5	1.5
UI to MxP (degrees)	108	111
LI to MnP (degrees)	85	82
Interincisal angle (degrees)	133	137.5
LI to A-Pog plane (mm)	3	1.5
Wits analysis (mm)	-4	-5



(a)



(b)



(c)



(d)



(e)



(f)

FIG. 5 (a-f) Case report 2: pretreatment photographs and orthopantomograph.

space was achieved and her developing third molars appear well positioned for eruption. Growth of her nose has not been beneficial with regard to her post-treatment facial profile (Figs 3a-e and 4).

Post-treatment weighted PAR score = 1

Percentage reduction in PAR score = 97 per cent

Case Report 2

This Caucasian female patient presented at the age of 14 years 5 months concerned about the appearance of her anterior teeth. Clinical examination revealed a Class III incisor relationship on a Skeletal III base with an increased Frankfort-mandibular planes angle and slightly increased

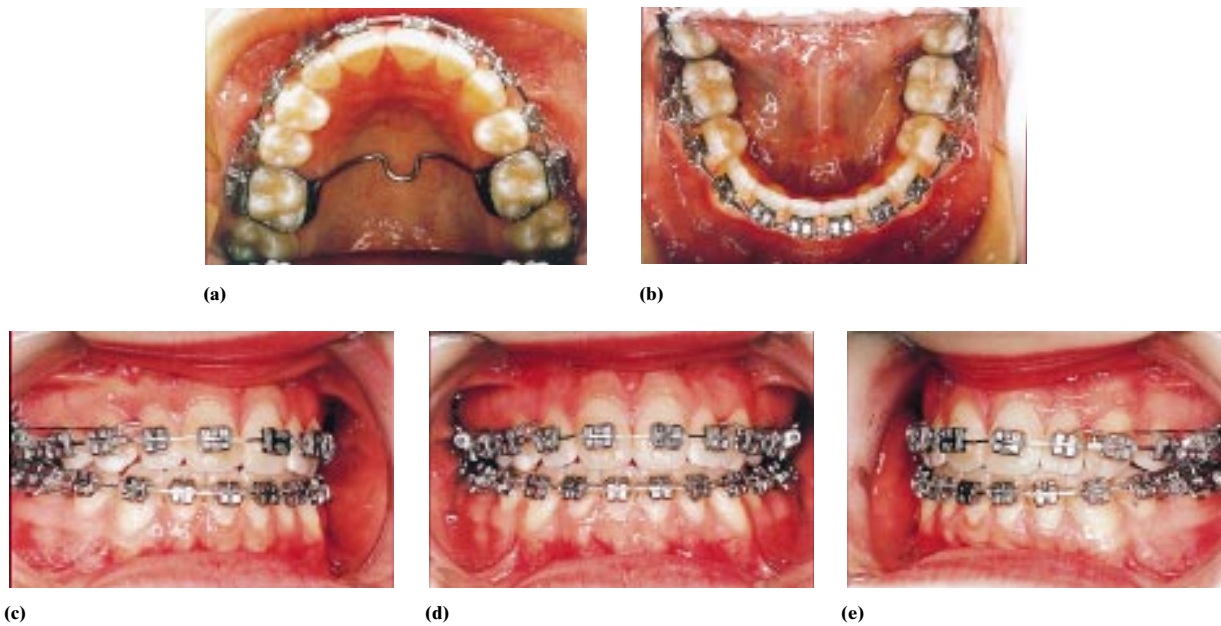


FIG. 6 (a-e) Case report 2: appliances during treatment.

lower anterior face height. Intra-orally, all permanent teeth were erupted except for $\overline{3}/$ and her third molars. The lower labial segment was moderately crowded and slightly retroclined to the dental base. The upper labial segment was severely crowded with $\overline{13}$ positioned buccally, $\overline{42}/$ were in contact. There was mild crowding in the buccal segments. In occlusion, the overjet was reduced with $\overline{431}/\overline{34}$ in crossbite and the overbite reduced, but complete. The upper centreline was displaced 3 mm to the right. Her buccal segment relationship was $\frac{1}{4}$ unit Class III on the left and Class I on the right. Radiographs revealed the presence of all permanent teeth including all four third molars. $\overline{3}/$ was unerupted, severely ectopic, high and almost horizontal with the crown positioned buccal to the line of the arch (Fig. 5a-f).

Cephalometric analysis (Table 2) confirmed the Class III Skeletal pattern. The maxillary-mandibular planes angle was at the upper limit of the normal range at 31 degrees. Whilst the upper incisor inclination was at an average value for a Caucasian patient, the lower incisors were already somewhat retroclined to compensate for the antero-posterior skeletal discrepancy.

The aims of treatment were:

- (1) relief of crowding;
- (2) levelling and alignment within the arches;
- (3) elimination of the crossbites;
- (4) correction of the upper centreline shift;
- (5) slight retroclination of the lower labial segment to compensate for the Class III Skeletal pattern;
- (6) closure of residual extraction space;
- (7) arch co-ordination.

IOTN score = 5

Pretreatment weighted PAR score = 52

The treatment plan was as follows:

- (1) extraction of $\overline{14}$ and $\overline{44}$ to provide relief of crowding. An Oral Surgery opinion was obtained with regard to the unerupted $\overline{3}/$, it was decided to leave this tooth in situ in view of the potential damage to the adjacent teeth if this was surgically removed;
- (2) fit a 1-mm stainless steel transpalatal arch with bands $\overline{6}/\overline{6}$ to reinforce anchorage in the upper arch;
- (3) upper and lower pre-adjusted edgewise (0.022 × 0.028-inch) fixed appliance with Andrews' standard prescription. $\overline{21}/\overline{21}$ not included initially, engage with $\overline{7}/\overline{7}$ following $\overline{3}/\overline{3}$ retraction;
- (4) levelling and alignment;
- (5) residual extraction space closure and retroclination of the lower labial segment using co-ordinated (0.019 × 0.025-inch) working stainless steel archwires;
- (6) detailing of the occlusion;
- (7) retain and monitor $\overline{3}/$ with third molars.

Treatment consisted of a total of 18 visits over a period of 19 months. Initial alignment was achieved with nickel-titanium archwires. Upper dental centreline correction was addressed towards the end of treatment, without removal of the transpalatal arch, using intra-maxillary traction on the left. An inter-maxillary seating elastic was used to detail the occlusion in the premolar region on the left hand side. A second order archwire adjustment was required $\overline{1}/$ to compensate for inaccurate bracket positioning (Fig. 6a-e). Upper and lower removable retainers were fitted for 6 months full time wear and 6 months part time wear.

Case 2 Assessment

On presentation this patient appeared to have completed the majority of her growth. In view of the mild degree of

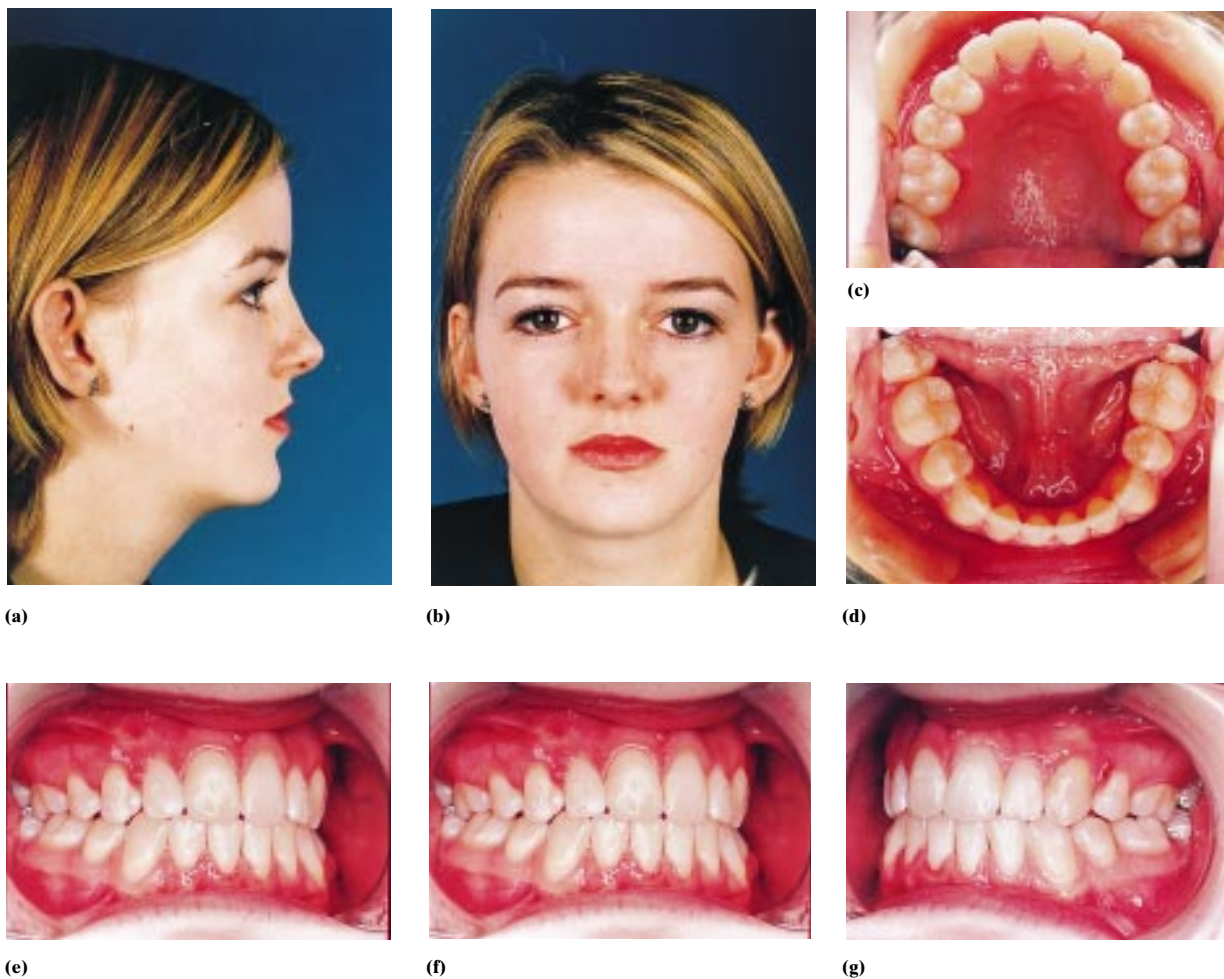


FIG. 7 (a–g) Case report 2: post-treatment photographs.

Class III skeletal discrepancy, which was confirmed cephalometrically, it was felt that treatment of her malocclusion would be possible by orthodontic correction without the need for orthognathic surgery. Cephalometric superimposition revealed that facial growth during treatment was not unfavourable for producing a Class I occlusion at the end of treatment. There was minimal change in her facial profile following treatment. Retroclination of the lower incisors produced further compensation for her skeletal pattern enabling a positive overbite and overjet to be achieved. This should ensure stability of the anterior crossbite correction. The attachment on $\underline{4}$ was positioned to produce slight extrusion and had a suitable crown morphology to mimic $\underline{3}$ (Figs 7a–g and 8).

It will be necessary to monitor the unerupted upper right permanent canine with periodic radiographic review and surgically remove this together with her potentially impacted third molars if pathology develops.

Post-treatment weighted PAR score = 5

Percentage reduction in PAR score = 90.4 per cent

Case Report 3

This Caucasian girl presented at the age of 14 years 11 months. Her concern was the appearance of her front teeth and she also reported some difficulty incising food. On examination she had a Class I dental base relationship, but with an increased Frankfort-mandibular planes angle and increased lower anterior face height. Intra-orally, all permanent teeth were present apart from third molars. There was mild crowding in the lower arch with vertical impaction of $\overline{75}$, and the lower incisors appeared retroclined to the mandibular base. The upper arch was moderately crowded with multiple incisor rotations.

In occlusion, her overjet was measured at 5 mm and she had a 2–4 mm anterior open bite extending forwards from the second premolars. Her dental centrelines were not coincident, with the lower displaced 1 mm to the left, and the upper 1 mm to the right. Her buccal segment relationship displayed a Class III tendency bilaterally, with a potential bilateral crossbite in the premolar region. Radiographs showed the presence of four third molars that appeared to be of good size and in a favourable vertical developmental position (Fig. 9a–j).

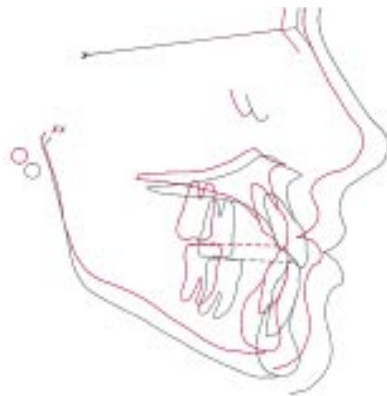


FIG. 8 Case report 2: pre- (red) and post-treatment (black) cephalometric tracings superimposed on SN at sella.

Cephalometric analysis (Table 3) revealed that by reference to the ANB difference of 2 degrees her skeletal pattern was Class I. However, the Wits analysis value of -8.5 was suggestive of a Class III antero-posterior dental base relationship. The maxillary-mandibular planes angle at 34 degrees and the lower face height percentage at 59 per cent were both beyond the normal range for a female Caucasian subject. The discrepancy in the vertical dimension was indicative of a backward mandibular growth rotation. Therefore, assessment of the antero-posterior jaw relationship by reference to the ANB difference alone was viewed with caution.

$$\text{IOTN} = 5$$

$$\text{Pre-treatment weighted PAR score} = 45$$

The aims of treatment were:

- (1) relief of crowding;
- (2) intrusion of the molar teeth;
- (3) modify further vertical skeletal development;
- (4) levelling and alignment;
- (5) correction of centre line discrepancy;
- (6) arch co-ordination.

The treatment plan was as follows:

1. Arrange extraction of all four second molars.
2. Fit an upper removable buccal intrusion splint with 1.5–2 mm palatal relief and extra-oral traction with a vertical direction pull to promote intrusion of the maxillary first molars and attempt to inhibit further vertical maxillary growth.
3. Upper arch expansion using a midline expansion screw to address the potential buccal segment crossbite and provide space for labial segment alignment.
4. Commence levelling and alignment in the lower arch with a pre-adjusted edgewise appliance (0.022×0.028 -inch Roth prescription).
5. Integrate upper fixed appliance attachments $5/5$ with the intrusion splint to commence alignment.
6. Proceed to full arch fixed appliance mechanics maintaining EOT to bands $6/6$ with closure of the openbite aided by levelling.
7. Detailing of the occlusion.

TABLE 3 Case report 3. Pre- and post-treatment cephalometric analysis

	Pretreatment	Post-treatment
SNA (degrees)	78	80
SNB (degrees)	76	79
ANB (degrees)	2	1
MMPA (degrees)	34	30
Lower face height (as a % of total face height)	58	58
SN to maxillary plane (degrees)	8	7
UI to MxP (degrees)	111	113
LI to MnP (degrees)	83	83
Interincisal angle (degrees)	133	135
LI to A-Pog plane (mm)	1	2
Wits analysis (mm)	-8	-3

8. Pericision $1/1$.

9. Retention and monitor third molar eruption.

Treatment consisted of 21 visits over a period of 26 months. Improvement in the extent of the open bite occurred as a result of a combination of second molar extractions and the intrusive mechanics. The mild crowding in the lower buccal segments resolved following extraction of the second molars and $\overline{75}$ was allowed to erupt prior to starting levelling and alignment. Following provision of the upper fixed appliance it became necessary to commence Class III inter-maxillary elastics in order to control the sagittal arch relationship. This was useful in preventing significant lower incisor proclination. Co-ordinated upper and lower 0.019×0.025 -inch stainless steel archwires were used to achieve arch co-ordination with a labial root torque adjustment incorporated $2/$. $1/1$ were pericised at debond and upper and lower removable retainers fitted (Fig. 10a–e).

Case 3 Assessment

In view of the vertical pattern of facial growth the likely success of a treatment approach involving orthodontics alone was uncertain. However, her compliance with appliance therapy was excellent. Superimposition of the pre- and post-treatment lateral skull tracings showed some mandibular autorotation occurred as a result of second molar extraction, a small amount of upper first molar intrusion and restraint of vertical maxillary development. These changes, together with levelling and premolar extrusion within the arches, produced successful closure of the openbite and interdigitation of the occlusion. Class III inter-maxillary elastics, used in combination with EOT, were effective in controlling the antero-posterior position of the lower incisors (Figs 11a–h and 12).

$$\text{Post treatment weighted PAR score} = 2$$

$$\text{Percentage reduction in PAR score} = 96 \text{ per cent}$$

Acknowledgements

I would like to thank the staff of the hospital orthodontic departments at Kingston-upon-Thames, Queen Mary's, Roehampton, and the Eastman Dental Institute for their assistance in the treatment and presentation of these cases. I would also like to thank Mr N. M. Brown (General Manager) of Forestadent for kindly sponsoring this award.



(a)



(b)



(c)



(d)



(e)



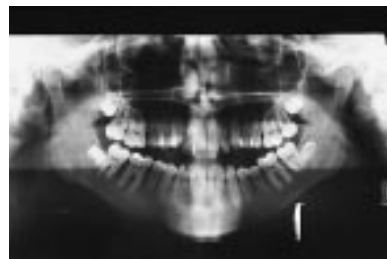
(f)



(g)



(h)



(i)



(j)

FIG. 9 (a-j) Case report 3: pretreatment photographs, lateral cephalogram and orthopantomograph.



(a)



(b)



(c)



(d)



(e)

FIG. 10 (a-e) Case report 3: appliances during treatment.



(a)



(b)



(c)



(d)



(e)



(f)



(g)



(h)

FIG. 11 (a–e) Case report 3: post-treatment photographs and lateral cephalogram.



FIG. 12 Case report 3: pre- (red) and post-treatment (black) cephalometric tracings superimposed on SN at sella.