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Clinical Section

The William Houston Gold Medal 1997

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Introduction

The William Houston Gold Medal is presented to the candidate achieving the most outstanding and meritorious performance in the M.Orth. examinations of the Royal College of Surgeons of Edinburgh. Five clinical cases are presented by the candidate for the purposes of the examination. Two of these are described: the first is a Class III malocclusion with ectopic maxillary canines and the second is a mild Class II division I malocclusion with crowding.

Case Report 1

A 14½-year-old Caucasian female presented complaining of the appearance of the gaps between her upper front teeth (Figure 1a–i). Her medical history was unremarkable and, although a regular dental attender, there had been a recent unscheduled visit to her General Dental Practitioner following the loss of a restoration.

Extra-oral clinical examination revealed a straight profile with an increased lower anterior face height and Frankfort–mandibular planes angle. There was no facial asymmetry or mandibular displacement on closure. The lips were competent with effort, and tongue activity, speech and mandibular function were all normal.

Intra-oral examination revealed the maxillary canines were unerupted, although |3 was palpable palatally. The location of 3| was less certain by palpation, but the labial inclination of 2| increased the suspicion of a more buccal placement. Oral hygiene was generally good, but there was a large temporary dressing in the lower left mandibular first molar and an occlusal amalgam in the lower right mandibular first molar.

Examination of the dental arches demonstrated mild crowding in the lower labial segment with an increased curve of Spee and an arch length discrepancy of 3·5 mm. In the upper arch, there was mild spacing in the labial segment, but severe crowding in the buccal segments with virtual exclusion of the unerupted 3|3 and a space discrepancy of 11·5 mm. In occlusion there was a Class III incisor relationship with the overjet and overbite just positive, except on the left lateral incisors, which were edge to edge. Centrelines were coincident and the buccal segment relationship was a quarter unit Class II bilaterally.

Panoramic radiography confirmed the presence of all permanent teeth, including unerupted maxillary canines and third molars (Figure 2a). There was gross caries in the lower left first permanent molar. The 3| was located high at the apex of 2| and less than 45 degrees to the occlusal plane with an enlarged follicle. The |3 was more favourably angulated. Vertical parallax with the panoramic and upper standard occlusal radiographs suggested 3| was in the arch line and confirmed the palatal location of |3 (Figure 2b). The roots of the maxillary incisor teeth were sound. Cephalometric evaluation supported the clinical impression of a Class III skeletal pattern with a degree of dento-alveolar camouflage. The corrected ANB angle was –2·0 degrees and the Wits difference was –6·0 mm, with the upper incisors slightly proclined at 114 degrees and the lower incisors retroclined at 87 degrees. The lower face height was only marginally increased and the maxillary–mandibular planes angle was actually reduced, probably due to the inclination of the palatal plane.

The Dental Health Component of the Index of Treatment Need was 5i and the pretreatment weighted PAR score was 29.

The aims of treatment were:

1. Camouflage of the antero-posterior skeletal discrepancy.
2. Relieve upper and lower arch crowding, incorporating teeth of poor prognosis.
3. Increase or maintain the present overbite and overjet to achieve a Class I incisor relationship.
4. Produce a good buccal segment cusp fossae relationship and a functional occlusion.

The treatment plan was as follows:

1. Oral hygiene instruction and dietary advice.
2. Removal of 3|3 / 6|6 (referral to the Oral and Maxillofacial Surgeons)
3. Upper and lower pre-adjusted Roth 0·022 prescription fixed appliances to level, align and close space using predominantly intra-arch mechanics. The molar relationship was to be a full unit Class II between the upper first molars and the lower second molars, and the upper first premolars were to mimic the maxillary canines.
4. Retain and monitor the development of the lower third molars.

Active treatment consisted of 20 visits over 24 months. Levelling and alignment was achieved with super-elastic nickel-titanium archwires and lower arch space closure commenced on 0·020-inch round stainless steel wire. Forward movement of the lower second molars was hampered by their position behind the distal of the upper first molars and they also showed a tendency to roll lingually. This was managed by alignment of 7|7, and progression to upper and lower 0·019 × 0·025-inch stainless steel wires

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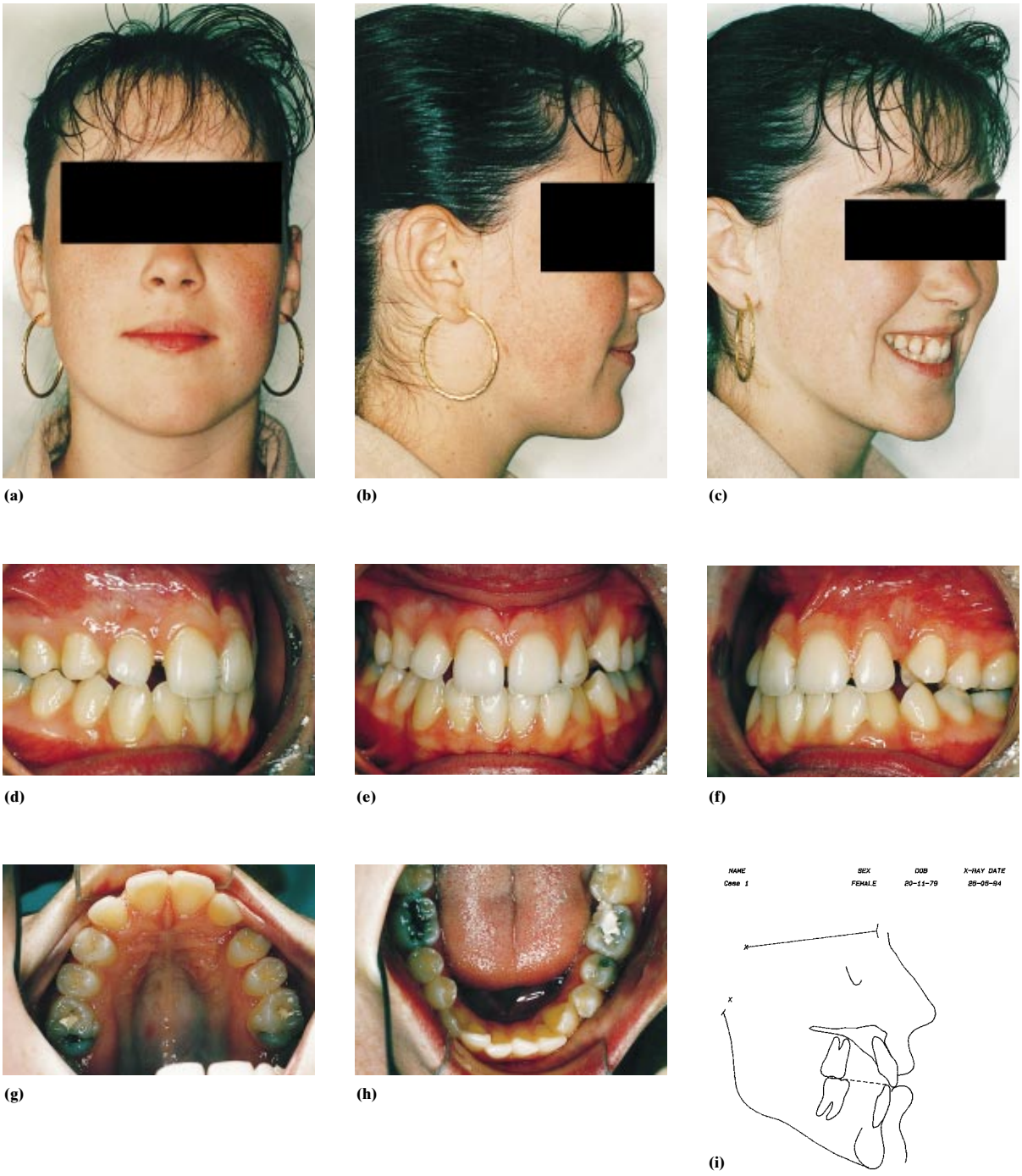

FIG. 1 (a–h) Case report 1: pretreatment clinical photographs; (i) cephalometric tracing.

(a)

(b)

FIG. 2 (a,b) Case report 1: pretreatment radiographs.

with 2 mm of intrusion, introduced distal to the upper and lower second premolars, and buccal crown torque in the lower arch wire. Once the lower second molars were sufficiently clear of the upper first molars, upper arch space closure was also commenced. Light Class II elastics (3½-ounce, 5/16-inch) were used in the later stages of treatment to aid forward movement of the lower second molars. An upper standard Hawley and lower spring Hawley were fitted at debond (Figure 3a–i).

Case 1 Assessment

Treatment aims were achieved in this case addressing the patients aesthetic concerns and eliminating the poor quality lower first molars. As the patient appeared to have completed the majority of her growth at presentation, orthodontic camouflage of her Class III skeletal discrepancy was deemed appropriate. The lower arch extraction pattern was less than ideal in terms of both arch length discrepancy and anchorage balance, but was determined by the teeth of poorest prognosis. The 3| was unfavourably positioned, both vertically and horizontally, with cystic degeneration of the follicle and, on balance, was felt to be the most appropriate unit to be lost for relief of crowding in this quadrant. The |3 could probably have been aligned with relative ease, but would have necessitated loss of a premolar unit, and the decision was made at the treatment planning stage to maintain symmetry and accept 4|4, due to their reasonably good position and suitable morphology.

TABLE 1 *Case report 1. Cephalometric changes*

	Pretreatment	Post-treatment
SNA (degrees)	85·5	85·5
SNB (degrees)	86	86
ANB (degrees)	–0·5 (–2·0)	–0·5 (–2·0)
Wits analysis (mm)	–6·0	–6·5
SnMxP (degrees)	10	9
MxMdP (degrees)	24·5	26
LAFH/TAFH (%)	57	59
UI/MxP (degrees)	114	117
LI/MnP (degrees)	87	86·5
I/I angle (degrees)	134·5	130
LI/APo (mm)	2·5	2·0

Space closure was principally completed by intra-arch mechanics, although light Class II elastics were used judiciously towards the end of treatment. This may be regarded as a high risk strategy in the camouflage of a Class III malocclusion, but careful visit by visit monitoring of the overjet and overbite with these mechanics enhanced forward movement of the lower molar and maintenance of the lower labial segment position. A group function occlusion with a full unit Class II molar relationship has been established with good aesthetics, although increased mesiopalatal rotation of |4 would have improved this further.

Cephalometric superimposition revealed that only a small amount of favourable growth occurred during the treatment period (Figure 4). The antero-posterior relationship of the skeletal bases remained largely unchanged and the lower incisors have been maintained close to their original inclination (Table 1). The upper and lower third molars will be kept under review.

Post-treatment weighted PAR score = 4

Percentage reduction in PAR score = 86 %

Case Report 2

A boy aged 12 years, 10 months had been under review to the orthodontic department following initial referral by his General Dental Practitioner at the age of 9 years for crowding in the mixed dentition. His main concern at the last review was the appearance of his upper canine teeth (Figure 5a–i). Previous interceptive orthodontic treatment had been carried out and involved loss of all four deciduous canines at 10 years of age, together with a course of oral hygiene instruction. This was followed by loss of lower first premolars at 11 years.

On examination, he had a mild Class II skeletal base with an average Frankfort–mandibular planes angle and normal lower anterior face height to total face height ratio. The lips were competent, and their were no signs of TMJ dysfunction or pathology.

Intra-orally he presented in the permanent dentition having had earlier loss of lower first premolars. Oral hygiene was generally good, but with some further improvement required. The lower dental arch had residual mild crowding in the lower labial segment with little space remaining from the premolar extractions and an increased curve of Spee. In the upper arch there was severe crowding, with a 9-mm arch length discrepancy and 2| palatally displaced.

FIG. 3 (a–h) Case report 1: post-treatment clinical photographs; (i) cephalometric tracing.

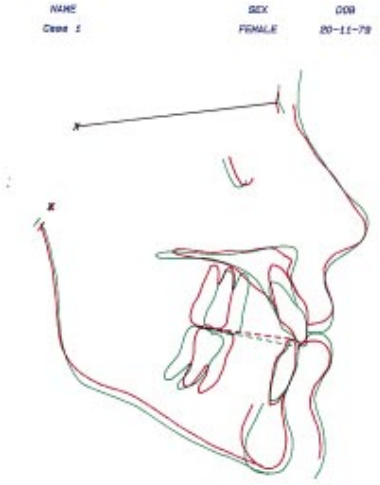

FIG. 4 Case report 1: cephalometric superimposition (SN at S).

In occlusion, the overjet was increased to 5 mm due to the mesio-labial rotation of |1. The 2| was in crossbite, and associated with a small forward and left lateral mandibular displacement on closure with a 1-mm shift of the lower centre-line to the left in maximum intercuspation. The overbite was increased and complete. The molar relationship was Class I bilaterally with the canines on the right side three-quarters of a unit Class II and half a unit Class II on the left.

Panoramic radiography confirmed the presence of developing third molars. Shadowing in the occlusal aspects of the lower first and second molars was suggestive of caries. Cephalometric evaluation revealed a Class II skeletal base with an ANB of 5·5 degrees and a Wits difference of 5 mm. The vertical facial proportions, and upper and lower incisor inclinations were within normal limits.

The IOTN score (DHC) was 4d and the weighted PAR score was 41. Standard pretreatment records were taken prior to planning, but unfortunately the clinical photographs had to be repeated, and at this stage the extractions and restorations had been completed by the General Dental Practitioner (Figure 5a–h).

The aims of treatment were to produce a Class I, mutually protected functional occlusion, camouflaging the mild Class II skeletal discrepancy with:

1. Elimination of the mandibular displacement.
2. Relief of upper arch crowding, and upper and lower arch alignment.
3. Reduction of overbite and overjet.

The treatment plan was as follows :

1. Render caries free and improve oral hygiene.
2. Extraction of 4|4.
3. Bond and band upper and lower arches with Tip-Edge® (TP Orthodontics, Inc., 100 Center Plaza, LaPorte, IN 46350, USA) appliance, initially leaving off the premolar brackets and 2|. Use 0·016-inch stainless steel arch wires with cuspid circles and bite opening bends. Start full time Class II elastics running directly to power pin on 3|.
4. Once sufficient space is available bond 2| and align.
5. When overjet and overbite reduction are complete engage premolars.
6. Proceed to 0·020-inch stainless steel wires with an increased upper curve of Spee and reverse lower curve of Spee, using necessary intra-arch mechanics to close space and correct centrelines.
7. Place 1-mm molar offsets and 7–10 degree toe-ins just prior to the end of space closure.
8. Place 0·0215 × 0·028-inch stainless steel archwires and Sidewinder® (T.P. Orthodontics Inc., 100 Plaza, La Porte, IN 46350, U.S.A.) springs to upright and torque teeth.
9. Detail the occlusion.
10. Retain and monitor the third molars.

Treatment consisted of 18 visits over 21 months. There were some initial problems with elastic wear, but sufficient space was available to align 2| after 4 months. Despite good overbite reduction, a lower acrylic clip over removable appliance was required to disclude the anterior teeth to give enough occlusal clearance for bond placement (Figure 6a). Once 2| was over the occlusion and the displacement eliminated the lower centreline was shifted to the right (Figure 6b). A clockwise Sidewinder® was added to the lower right canine to favour centreline correction in Stage I (Figure 6c). Stage II took just over 3 months as there was little residual extraction space and Stage III was of 8 months duration, with hyper-activation of the Sidewinder® on 2| to express the appropriate buccal root. At debond an upper standard Hawley and lower spring Hawley were fitted (Figure 7a–i).

Case 2 Assessment

Treatment aims have been achieved despite initial problems of compliance with elastic wear, which prolonged the early stages of treatment. After elimination of the mandibular displacement, a centreline discrepancy was evident, unfavourably influencing the lower arch length discrepancy. The early loss of lower premolars may have improved the lower labial segment alignment in the shorter term, but the resultant loss of space and potential lower arch anchorage, in this case, seem to outweigh any positive benefits.

Cephalometric superimposition shows the patient has grown in a vertical direction, with little help from

TABLE 2 *Case report 2. Cephalometric changes*

	Pretreatment	Post-treatment
SNA (degrees)	80	77·5
SNB (degrees)	74·5	73·5
ANB (degrees)	5·5	4·0
Wits analysis (mm)	5	2·5
SnMxP (degrees)	10·5	12·0
MxMdP (degrees)	28	27
LAFH/TAFH (%)	54·5	53·5
UI/MxP (degrees)	108·5	114
LI/MnP (degrees)	94·5	96·0
I/I angle (degrees)	128	123
LI/APo (mm)	2	3·5

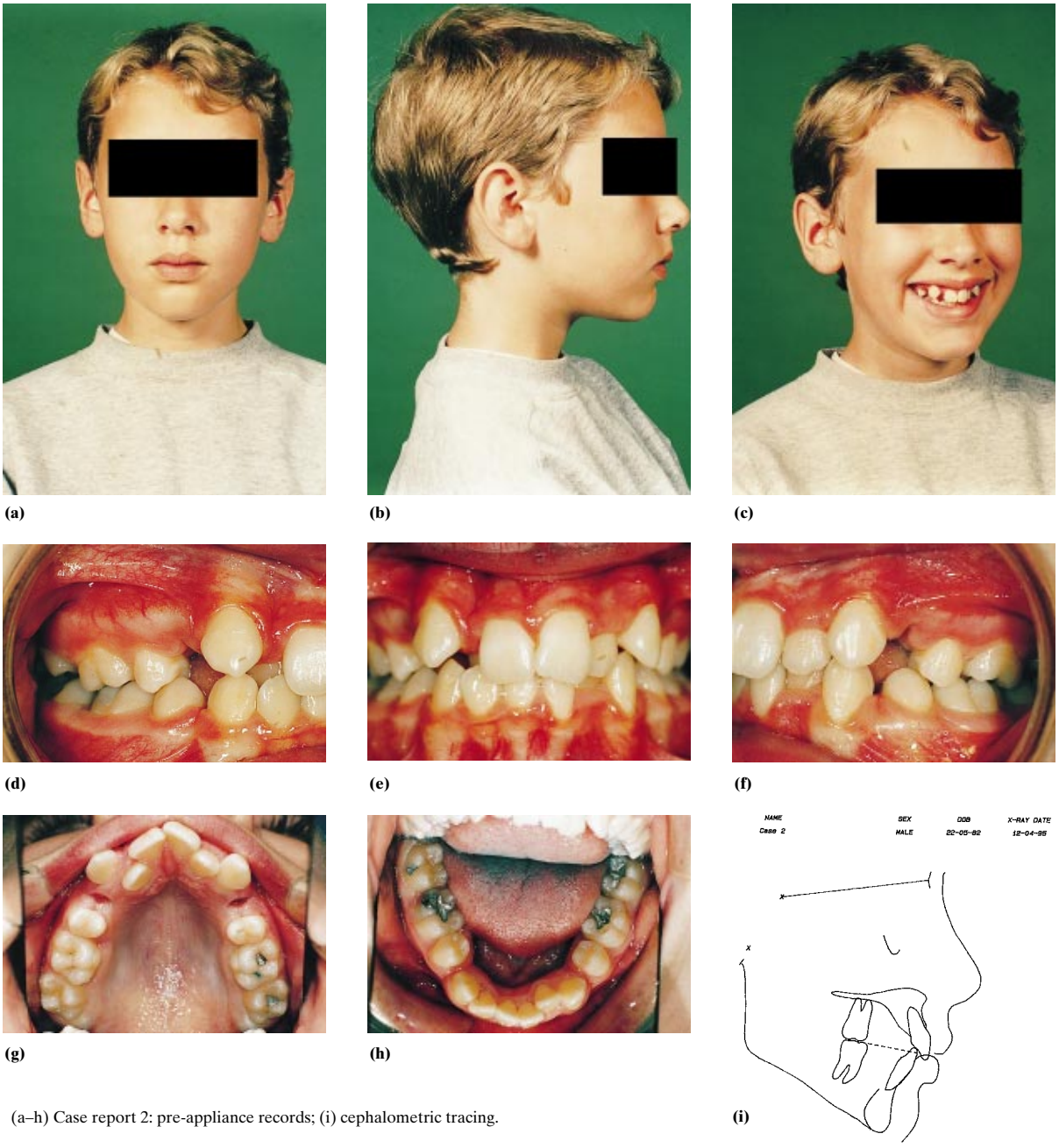

FIG. 5 (a–h) Case report 2: pre-appliance records; (i) cephalometric tracing.

FIG. 6 (a-c) Case report 2: in treatment clinical photographs.

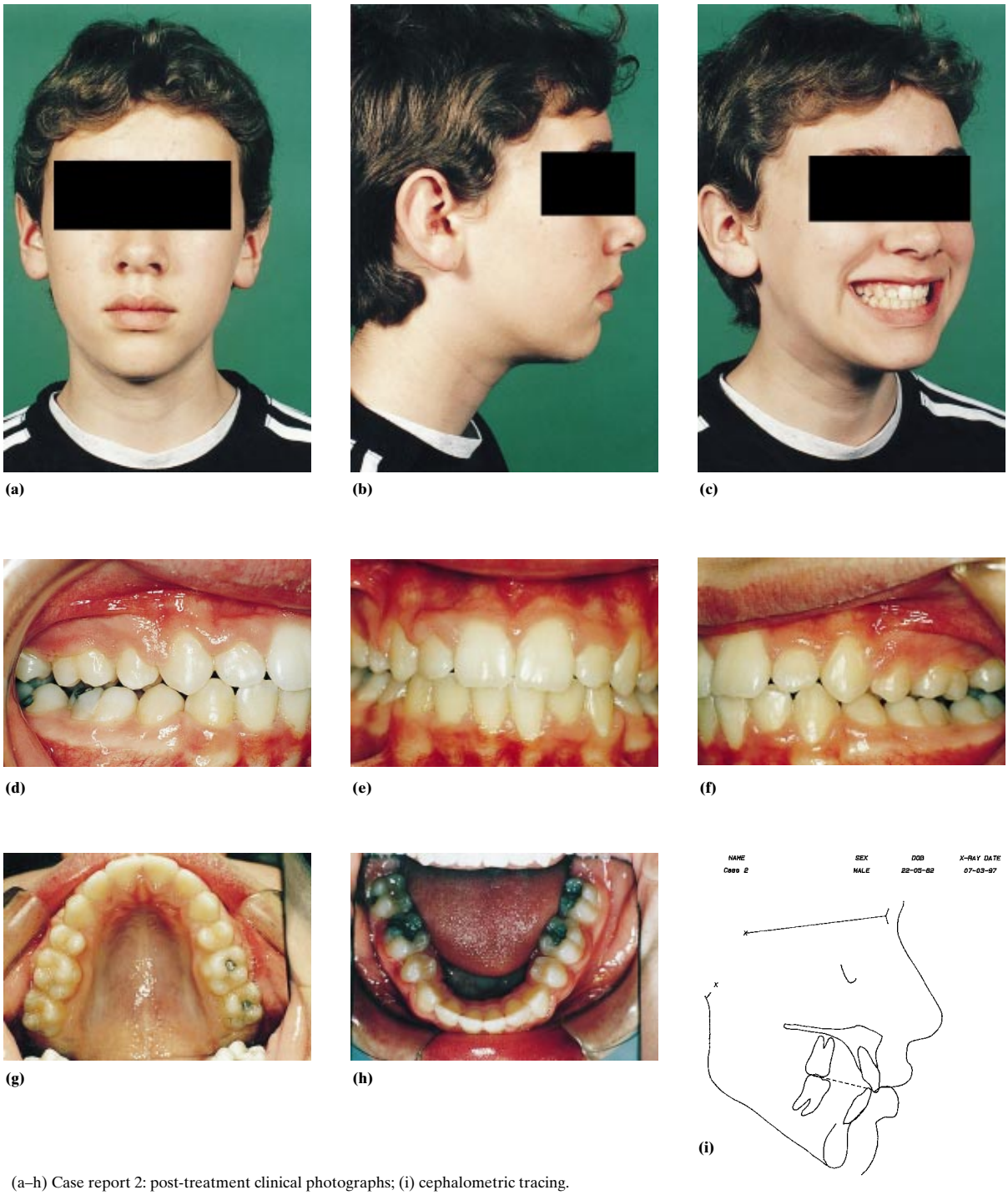

FIG. 7 (a–h) Case report 2: post-treatment clinical photographs; (i) cephalometric tracing.

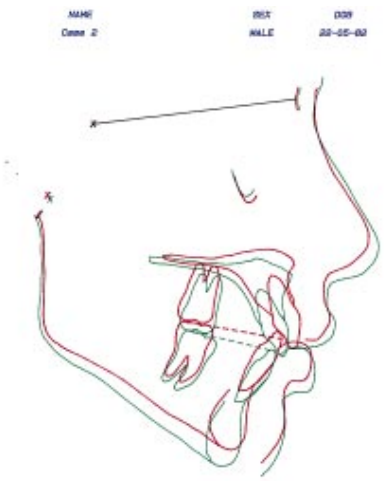

FIG. 8 Case report 2: Cephalometric superimposition (SN at S).

horizontal growth during correction of the malocclusion (Fig. 8). The overjet has been reduced predominantly by movement of the upper incisors. There has also been a small amount of upper and lower incisor proclination during treatment, and may be related to inadequate adjustment of the anterior torque, to compensate for the bite sweeps in the full dimensional Stage III arch wires (Table 2). A cephalometric assessment at the end of Stage II may have been helpful and indicated that night-only headgear support was required to limit the forward movement of the dentition seen in Stage III Tip Edge®.

Oral hygiene levels were inconsistent during treatment and, despite vigorous hygienist support, gingival hyperplasia was present, mitigating against alignment of the second molars as a finishing procedure. The prognosis for the long-term stability of the lower labial segment must be guarded, although relapse of $\underline{2}|$ should be controlled by the good buccal root torque achieved.

Post-treatment weighted PAR score = 2

Percentage reduction in PAR score = 95 %.

Acknowledgements

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