

Clinical Section

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Introduction

This award was established in 1988, the first year in which the Membership in Orthodontics was examined at the Royal College of Surgeons of England. The gold medal was presented to the College by the British Society for the Study of Orthodontics, and the medal and certificate are presented to the candidate at the examination with the highest overall mark in Part II of the M.Orth examination. The prize is only awarded if the examiners believe the candidate's performance is of a sufficiently high standard.

The various parts of the examination include a long clinical case, diagnostic tests, oral examinations and a written paper, the candidate must present three personally-treated, fully documented cases on which the candidate is examined orally. Details of two of the treated cases are presented in this paper.

Case Report 1

A 12-year 11-month-old boy was referred by his General Dental Practitioner and he presented complaining of the appearance of his upper lateral incisors.

On examination he presented with a Class Ii division 2 incisor relationship on a moderate Class II skeletal base with mandibular retrognathia and a FMPA within normal limits. His lips were competent at rest with a high lip line and 5-mm gingival exposure on smiling. The lower lip was slightly behind Ricketts' aesthetic 'E' line and the nasio-labial angle was slightly obtuse.

Intra-oral examination revealed that the standard of oral hygiene was poor and there was generalized marginal gingivitis. He was in the late mixed dentition with all second deciduous molars present. There was mild crowding of the lower labial segment which was retroclined, both lower canines were upright. The upper labial segment was mildly crowded with both upper central incisors retroclined and slight distopalatal rotations of both upper lateral incisors. Both upper canines were also upright and the buccal segments were generally well aligned. A Bolton tooth size discrepancy revealed a relative mandibular excess of tooth tissue in the order of 4.6 mm.

The incisor relationship was Class II division 2 with an overjet of 3.5 mm and an overbite increased to 8 mm and complete to soft tissue. Both upper and lower centrelines were correct with the facial midline. The molar relationship in the right buccal segment was a full unit post normal and

the left buccal segment was a half unit post-normal. The canine relationship on the right was three quarters Class II and on the left half a unit Class II. (Fig. 1a-h).

The panoramic radiograph revealed the presence of all second premolars and second molars, but all four third molars appeared to be absent. A lateral cephalogram confirmed that this patient had a moderate Class II skeletal pattern as, using the SNA correction, the ANB difference was 6 degrees and the Wits difference was +5.5 mm. The upper incisors were retroclined at 88.5 degrees to the maxillary plane and the lower incisors were also retroclined at 84.5 degrees to the mandibular plane. The edge-centroid relationship was -5.0 mm and the inter-incisal angle 159.5 degrees (Table 1).

For Case 1 the Dental Health Component (DHC) score on the Index of Treatment Need (IOTN) was 3f. The pretreatment weighted Peer Assessment Rating (PAR) score was 24. The inherited Class II skeletal pattern has contributed to the post-normal buccal segment relationship. The soft tissue pattern with a high lower lip position covering the gingival third of the upper incisor crowns has contributed to the retroclination of the upper incisors. Dentoalveolar disproportion has manifested as mild upper and lower labial segment crowding.

The aims of the treatment were:

- (1) correction of sagittal discrepancy to establish a Class I molar relationship;
- (2) level and align the arches;
- (3) achieve normal intercuspal angle and correct upper incisor root centroid relationship to lower incisor tip;
- (4) maintain a good profile;
- (5) establish a good functional occlusion.

Following improvement in the oral hygiene, treatment involved fitting a modified Twin Block functional appliance to achieve sagittal correction. This was followed by levelling, aligning, and detailing with upper and lower pre-adjusted edgewise fixed appliances. Active treatment required 21 visits over a 26-month period. The modified Twin Block was worn for a period of 8 months, during which time the T-springs were adjusted to aid proclination of the upper labial segment. At each visit the labial bow was adjusted to lie just in front of the incisors, thereby allowing incisor proclination.

Post-functional cephalometric analysis confirmed a reduction in the ANB had been achieved. The mandibular molars moved in a vertical direction with an increase in the

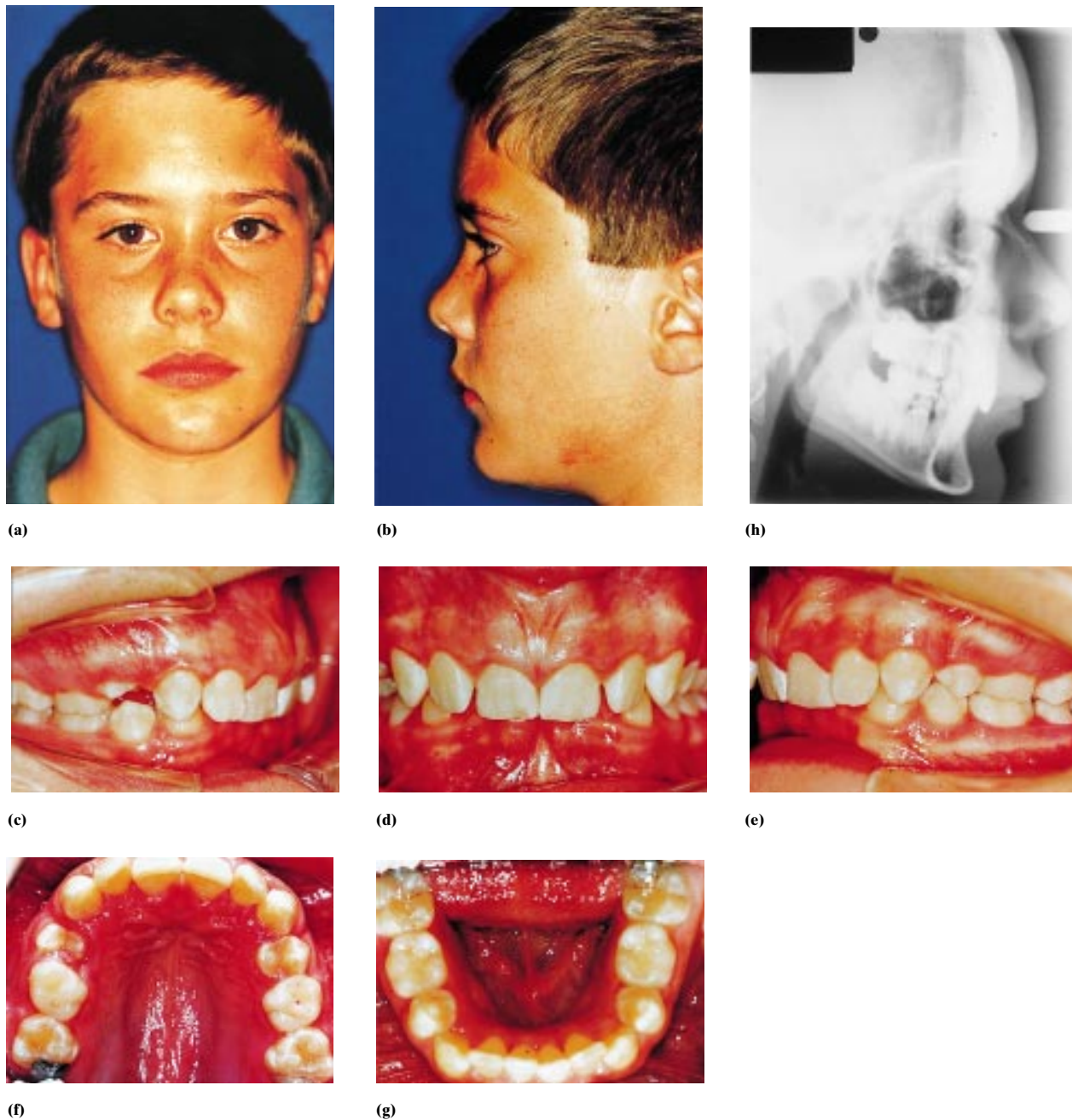


FIG. 1 (a-j) Case report 1: pretreatment photographs and lateral cephalogram.

lower anterior face height. The maxillary and mandibular planes angle remained constant and the maxillary plane tipped downwards. Dentoalveolar movements involved proclination of upper and lower incisors contributing to a reduction in the overjet and overbite and the inter-incisal angle was reduced by 15 degrees.

At the end of Twin Block therapy there were substantial lateral open bites with the incisors the only teeth in contact and sagittally a Class III buccal segment relationship was achieved.

A clipover inclined bite plane was fitted to maintain anteroposterior correction and allow reduction of the lateral open bite. Upper and lower pre-adjusted edgewise

fixed appliances (0.022×0.028 -inch slot, Roth prescription mini twin) were placed and a 100 per cent Euro arch form was used. Following initial alignment using 0.016 Neosentalloy we progressed through upper and lower 18/25 rectangular Neosentalloy to upper and lower 19/25 stainless steel. Final space closure in the upper arch proceeded on an upper 0.018 high tensile stainless steel wire. Small residual space has remained distal to both upper laterals which was anticipated following the Bolton tooth size analysis. A lower lingual fixed retainer in 0.0175 twist flex and upper Hawley retainer, with the addition of a flat anterior bite plane to support overbite correction, were fitted (Fig. 2a-h).

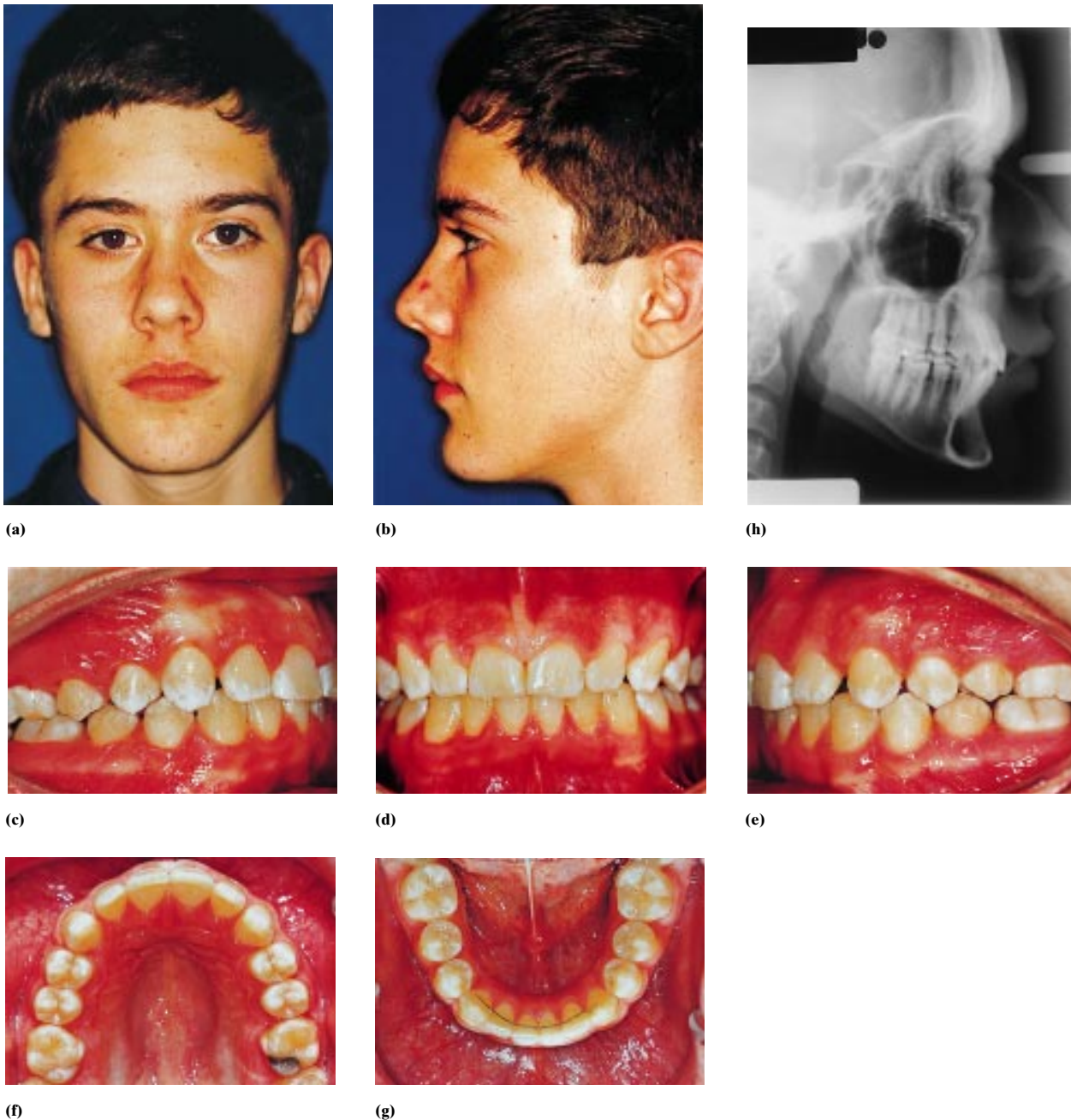


FIG. 2 (a-h) Case report 1: posttreatment photographs and lateral cephalogram.

Case 1 Assessment

This case presented with a Class II division 2 incisor relationship on a moderate Class II skeletal pattern. Treatment of this patient involved the use of a modified Twin Block appliance to procline the upper labial segment, whilst encouraging forward repositioning of the mandible to correct a post-normal buccal segment relationship. Effective reduction of the overbite has been achieved. Treatment with a functional appliance supported the facial profile whilst reducing the relative mandibular retrognathia. A Class III molar relationship was achieved at the end of the functional appliance phase, this case has been

finished using pre-adjusted edgewise fixed appliances without the need for any inter-maxillary elastics.

Cephalometric superimposition reveals that sagittal correction was achieved by an increase in the SNB value. The ANB value decreased from 7 to 5 degrees. Proclination of the upper incisors by 18.5 degrees was achieved and the lower incisors were also proclined by 9.5 degrees. The inter-incisal angle reduced to 131 degrees with the upper incisor centroid lingual to the lower incisor tip which is believed to be important in the long-term stability of the corrected Class II division 2 incisor relationship (Figs 3 and 4). The lower inter-canine width was maintained at 26.5 mm and on completion of treatment, the patient exhibited a good

TABLE 1 Case 1: pretreatment, post-functional and post-treatment cephalometric analysis

	Pretreatment	Post-functional	Post-treatment
SNA (degrees)	80	80	79
SNB (degrees)	73	75	74
ANB (degrees)	7	5	5
SNMxP (degrees)	10	12	10
MxMdP (degrees)	28	28	26
Wits analysis	5.5	0	3
UI/MxP (degrees)	88.5	94	107
LI/MdP (degrees)	84.5	94.5	94
I/I Angle	160	145	131
Edge-centroid relationship (mm)	-5.0	0	+2.0
LI/APo (mm)	-6.0	-2.0	0
LAFH/TAFH %	54.0	55.3	54.6
Lower lip to 'E' line	-3.0	-2.0	-4.0

functional occlusion. Canine guidance was present on the right and left lateral excursion. There was an absence of non-working interferences with anterior guidance on protrusion.

With a final PAR score of 2 this case demonstrated an 83.3 per cent reduction in weighted PAR score which lies in the 'improved' category of the PAR nomogram.

Case Report 2

This 11-year 10-month-old Caucasian female, referred by her GDP, was concerned about the appearance of her upper canines. She presented with a Class II division 1 incisor relationship on a mild Class II skeletal base. Lower anterior face height was average whilst the FMPA appeared to be reduced. The nasiolabial angle was normal and the lips were competent at rest and were just behind Ricketts' aesthetic 'E' plane.

With the exception of third molars all permanent teeth had erupted. Her standard of oral hygiene was excellent, however, there was mild fluorosis affecting all the perma-

TABLE 2 Case Report 2: pre- and post-treatment cephalometric analysis

	Pretreatment	Post-treatment
SNA (degrees)	80	80
SNB (degrees)	75	78
ANB (degrees)	5	2
SNMxP (degrees)	11	3
MxMdP (degrees)	21	21
Wits analysis	1.5	0
UI/MxP (degrees)	111	108
LI/MdP (degrees)	108	101
I/I Angle	120	139
Edge-centroid relationship (mm)	-1	-1
LI/APo (mm)	+2	+1
LAFH/TAFH %	54.3	53.0
Lower lip to 'E' line	+2	-3

nent dentition. The lower labial segment was proclined to the dental base and moderately crowded with both lower canines distoangularly positioned. The upper labial segment was at a normal angulation to the dental base with severe crowding. Both upper lateral incisors were disto-palatally rotated and both canines were distally angulated. Both upper and lower buccal segments were well aligned.

The incisor relationship was Class II division 1 and the overjet was 8 mm with an overbite increased to 5 mm and complete. The upper centreline was coincident to the facial midline, the lower centreline displaced 3 mm to the left. The buccal segments were three quarter unit Class II on the right and left (Fig. 5a-h).

Cephalometric analysis confirmed the mild skeletal Class II pattern with an ANB difference of 4 degrees and a Wits analysis of 1.5 mm. The lower incisors had an inclination of 105 degrees to the mandibular plane, the upper incisors 110 degrees to the maxillary plane. The inherited Class II skeletal pattern has contributed to the increased overjet, although there has been some dento-alveolar compensation with the proclination of the lower incisors (Table 2). The upper canines are buccally displaced due to the later eruption of these teeth and radiographs confirmed the presence of all four third molars.



FIG. 3 Case report 1: pretreatment (black) and post-functional treatment (blue) cephalometric tracings superimposed on SN at sella.



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

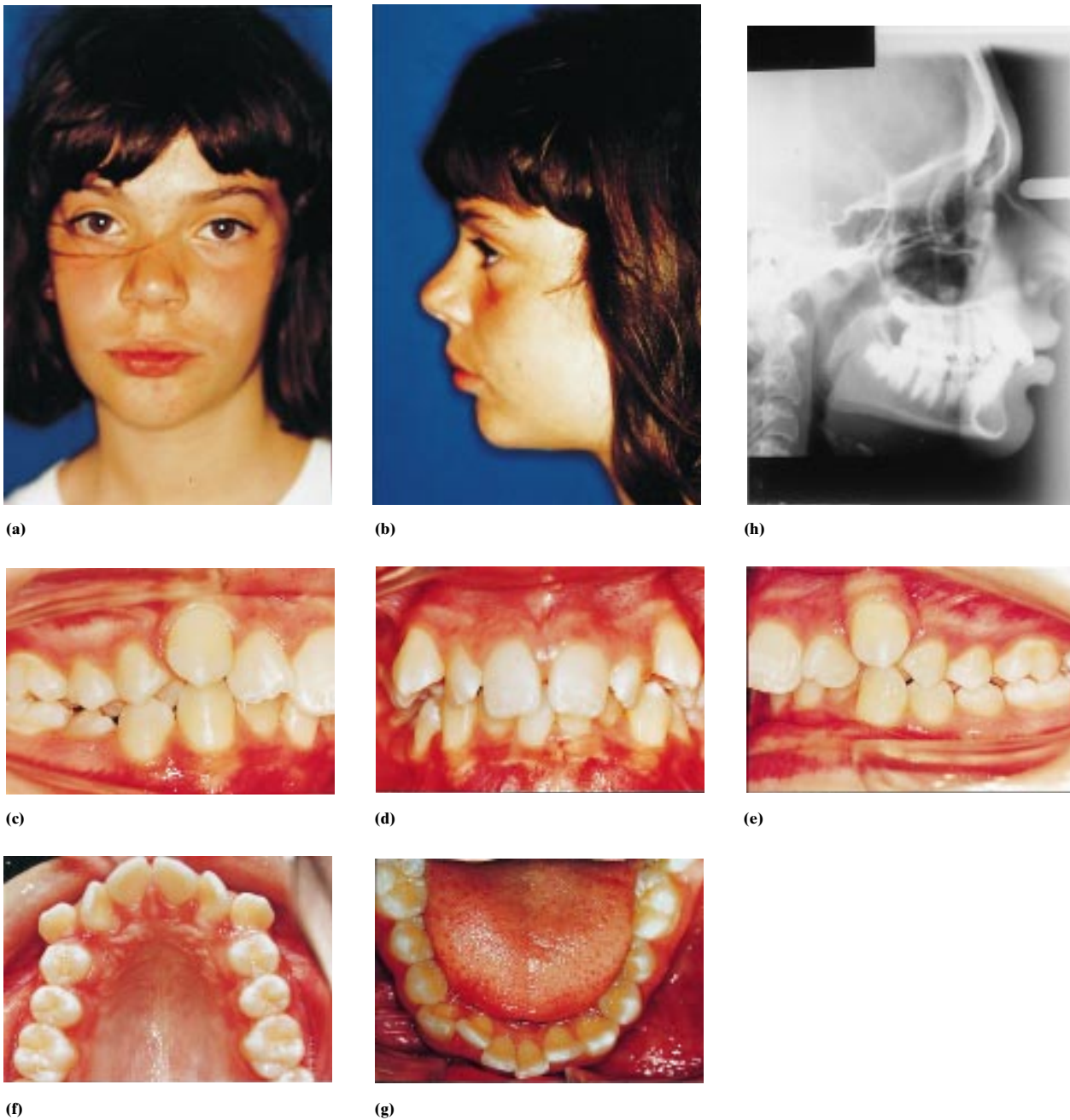


FIG. 5 (a-j) Case report 2: pretreatment photographs and lateral cephalogram.

The aims of the treatment were:

- (1) relief of crowding;
- (2) correction of the molar relationships;
- (3) levelling and alignment of both arches;
- (4) correction of the overbite, overjet and axial inclinations of the labial segments;
- (5) correction of the centrelines;
- (6) closure of residual spaces;
- (7) establishment of a good functional occlusion.

Space analysis demonstrated the need for 8 mm space in the lower arch to relieve crowding and 20 mm in the upper arch

to relieve crowding. The extraction of upper first premolars and lower second premolars was indicated, together with reinforcement of the anchorage and distal movement of the upper buccal segments using a straight pull Kloehn bow type headgear. An Interlandi headcap was fitted and, following satisfactory co-operation from the patient, extractions were performed and upper and upper and lower pre-adjusted edgewise fixed appliances (0.022 × 0.028-inch slot, Roth prescription) were fitted, utilizing an arch form adapted to fit the patient's original arch form.

Active treatment consisted of 20 visits over a 30-month period. Initially, 0.016 Neosentalloy upper and lower arch



FIG. 6 (A–j) Case report 2: pretreatment photographs and lateral cephalogram.

wires were fitted and adjusted over visits to enable full engagement. A fixed anterior bite plane (glass ionomer cement) was fitted to aid overbite reduction and levelling and aligning was continued on a 16/22 Neosentalloy. This was followed by placement of a 18/25 Neosentalloy then 19/25 stainless steel. Space closure and use of Class II intermaxillary elastics were carried out on 19/25 stainless steel archwires with a reverse curve of Spee in the lower arch and increased curve of Spee in the upper arch.

Increased palatal root torque was applied to the upper labial segments to improve the inclination of the teeth. Final centreline correction was achieved with asymmetric Class II elastics.

On debonding an upper removable Hawley retainer was fitted together with a lower bonded retainer (twist flex 0.0175-inch). The patient is currently wearing the Hawley retainer full time for the first six months and the lower lingual retainer will remain until the third molars have either erupted or have been removed (Fig. 6a–h).

Case 2 Assessment

Asymmetric premolar extractions were undertaken to provide space for relief of crowding and differential movement of the molars to facilitate correction of the molar



FIG. 7 Case report 2: pretreatment (black) and post-treatment (red) cephalometric tracings superimposed on SN at sella.

relation in Class 1. Space analysis shows there is a high anchorage requirement in the upper arch if a Class I relationship was to be achieved. This patient was exemplary in her wear of headgear and intermaxillary elastics during the treatment period. Full correction of the molar relationships has been achieved because the patient wore headgear for the majority of her treatment for about 120 h per week.

This co-operation with headgear may have contributed to the reduced forward growth of the maxilla. During the course of treatment there has also been favourable anterior and vertical growth of the mandible facilitating correction of the molar relationship.

The lower intercanine width has remained stable at 28 mm during treatment. In lateral excursions there was bilateral canine guidance and an absence of non-working side interferences. Protrusive movements produced gentle posterior disclusion with anterior guidance.

A cephalogram taken prior to debond demonstrated the achievement of significant palatal root torque and the return of upper incisor inclination to within normal limits. The lower incisors have remained proclined at a value of 101 degrees, but this is within normal limits for a reduced maxillary/mandibular planes angle of 20.5 degrees (Table 2, Fig. 7).

The post-treatment of PAR score was 2. This treated case was therefore in the 'greatly improved' category of the PAR nomogram and represents a 95 per cent (43 to 2) reduction in the weighted PAR score.

Acknowledgements

I would like to express my thanks to all clinical supervisors who taught me during my postgraduate training conducted at Chesterfield Royal Hospital, Calow, and The Charles Clifford Dental Hospital, Sheffield. Special thanks must go to Mr Jonathan Sandler who supervised the above cases.