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CLINICAL SECTION

TP MOrth Cases Prize 2002

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Introduction

The TP MOrth Cases Prize is held annually at the British Orthodontic Conference and entry is open to those who have passed their Membership in Orthodontics examination during the 13 months prior to the Conference. The prize is awarded to the person showing the best MOrth cases, judged on difficulty, clinical management, and documentation. The two cases successfully submitted for the award during the 2002 Glasgow Conference are described.

Case report 1

A 13 year-old Caucasian male was referred by his General Dental Practitioner regarding his palatally impacted upper left canine. The main features of his malocclusion were: a Class I incisor relationship with a molar relationship that was ½ unit II on the right and a ¼ unit II on the left; crowding in both arches; buccally excluded upper right canine, palatally impacted upper left canine; upper right first molar in crossbite; and an upper centreline shift of 2 mm to the left.

Extra-oral assessment

He presented with a mild Class II skeletal pattern with an average Frankfort mandibular planes angle and lower face to height ratio. Soft tissue assessment revealed lips of normal length, which were competent at rest. The lower lip was 1 mm ahead of the Ricketts' E plane and the nasiolabial angle was increased.

Intra-oral assessment

All permanent teeth were present except the upper left canine and all third molars. The gingival tissues were healthy and the oral hygiene was good. There was evidence of a wear facet on the upper left lateral incisor.

In the mandibular arch the canines were mesially angulated and there was imbrication of the lower labial segment and mild crowding in the left buccal segment resulting in 5 mm of crowding. In the maxillary arch the incisors were spaced, but there was 9 mm potential crowding owing to the exclusion of both maxillary canines from the arch. The buccal segments were reasonably well aligned.

In occlusion, the incisor relationship was Class I with an average and complete overbite. There was a 2 mm upper centreline shift to the left. The right buccal segment relationship was ½ unit II and ¼ unit II on the left. The upper right first molar was in crossbite. There were no displacements (Figure 1).

The Dental Health Component score on the Index of Treatment Need was 5i due to the impeded eruption of the upper left canine. The pre-treatment weighted Peer Assessment Rating was 25.

Special investigations

Radiographs. The panoramic radiograph revealed a full complement of teeth, with root and bone lengths within normal limits that, together with the upper anterior occlusal radiograph, confirmed that the upper left canine was significantly displaced palatally (Figure 2). The lateral cephalogram indicated a skeletal II pattern with mandibular retrognathia. SNA was 80 degrees and SNB was 76 degrees with an ANB of 4 degrees. The maxillary mandibular planes angle and anterior face height ratio were both average. The lower incisors were proclined at 102 degrees and the upper incisors were normally inclined at 107 degrees. Cephalometric analysis is presented in Table 1.

Aetiology

The Class II skeletal base relationship is inherited. Peck *et al.*[1] suggest the polygenic multifactorial inheritance of

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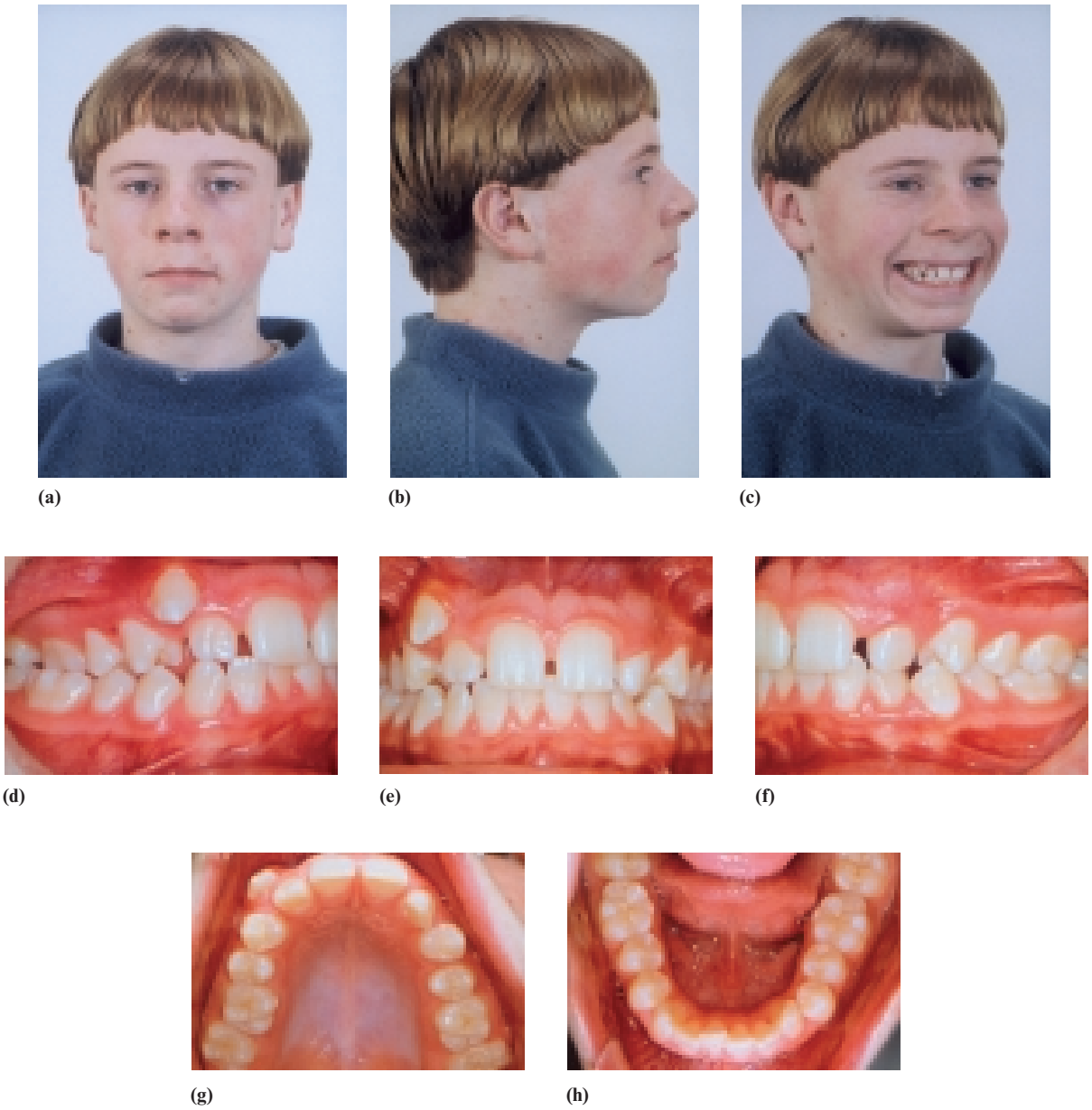


Fig. 1 Case report 1: pre-treatment photographs.

the palatally displaced upper left canine is associated with the diminutive upper left lateral incisor. In addition, there was a dentoalveolar disproportion in both arches.

Aims of treatment

1. Expose upper left canine.
2. Relieve crowding.
3. Localize upper arch space for upper left canine.
4. Level and align the arches.
5. Correction of upper right first molar crossbite.
6. Achieve good buccal segment inter-digitation with a Class I molar and canine relationship.
7. Restore incisal edge of upper left lateral incisor.
8. Retain.

Treatment plan

1. Exposure of upper left canine, and extraction of both upper first premolars and lower left first premolar and lower right second premolar.

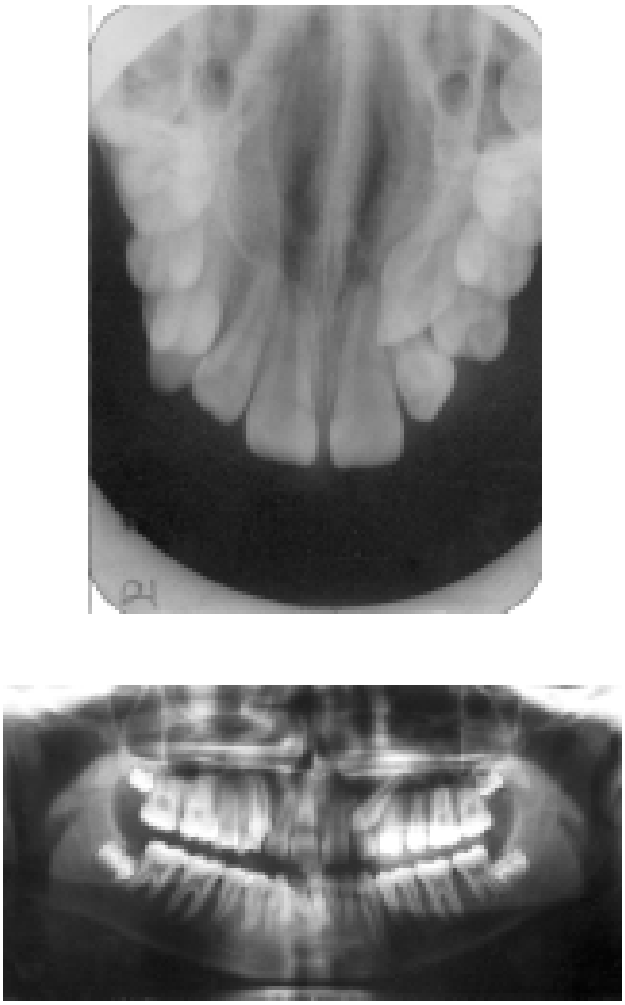


Fig. 2 Case report 1: Pre-treatment orthopantomograph and upper anterior occlusal radiographs.

2. Fit of expanded palatal arch with Nance acrylic button to correct crossbite of the upper right first molar.
3. Fit of upper and lower pre-adjusted Edgewise fixed appliances using an MBT™ prescription with a 0 degree torque bracket on the upper right canine, and a –7 degree torque bracket and single tooth torquing auxillary on the upper left canine to provide maximum buccal root torque to this tooth.
4. Restore incisal edge of upper left lateral incisor.
5. Retention.

Treatment progress

Pre-adjusted Edgewise brackets and bands (0.022 × 0.028 inch slot, MBT™ prescription) were placed on all fully erupted teeth in the upper and lower arches, with the exception of the second molars and the upper left canine.

Table 1 Case report 1: pre- and post-treatment cephalometric analysis

	Pre-treatment	Post-treatment
SNA (°)	80	80
SNB (°)	76	77
ANB (°)	4	3
MMPA (°)	26	26
SnMx plane (°)	6	5
LAFH/TAFH (%)	56	56
UI/Mx plane (°)	107	101
LI/Mn plane (°)	102	90
I/I angle (°)	125	143
LI/APo (mm)	6	3
Lower lip/E plane (mm)	1	–1
Wits (mm)	1	0

Fig. 3 Case report 1: upper occlusal view showing displacement of upper left canine.

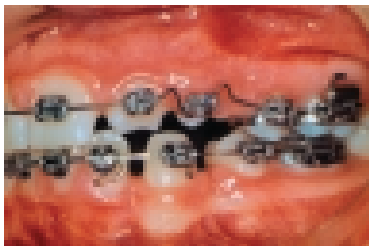


Fig. 4 Case report 1: 0.016 inch special plus archwire extruding the upper left canine.

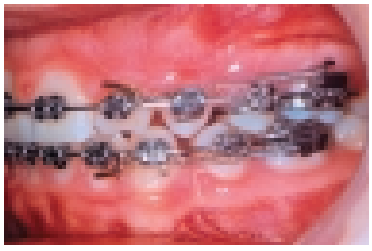
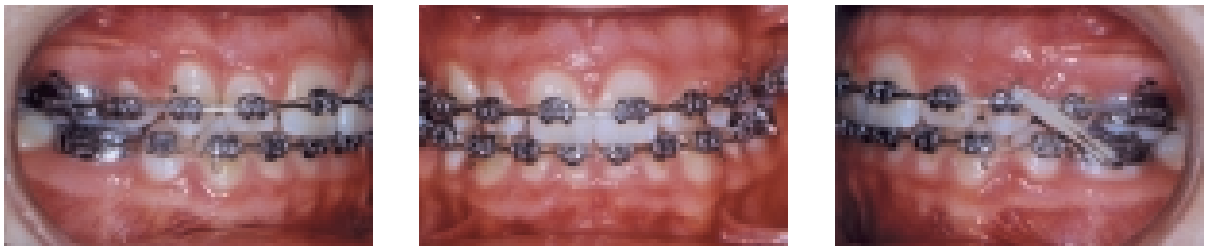


Fig. 5 Case report 1: single tooth torquing auxillary applied to the upper left canine.



(a) (b) (c)

Fig. 6 Case report 1: 0.016 inch stainless steel lower archwire with finishing bends and an orange Class II elastic to the upper left canine.

(a) (b) (c)

(d) (e) (f)

(g) (h)

Fig. 7 Case report 1: post-treatment photographs.

A 0 degree torque bracket was placed on the buccally displaced upper right canine, a lower incisor bracket on the lingual aspect of the upper left canine, and an expanded palatal arch with a Nance acrylic button was fitted to the first molars. A 0.016 inch super-elastic Nickel Titanium archwire was ligated to begin mandibular alignment and levelling. In the upper arch, a 0.018 inch stainless steel main archwire was placed together with a 0.012 inch super-elastic Nickel Titanium piggyback archwire to pick up the upper right canine. An active ligature was applied from the upper left first molar to the upper left canine to begin retracting this tooth (Figure 3).

Space was created for the upper left canine by closing space between the upper anterior teeth with powerchain.

After 3 months a 0.016 inch stainless steel special plus archwire was placed with an offset to extrude the upper left canine (Figure 4).

Following the alignment of the teeth and the placement of a –7 degree bracket on the upper left canine, a single tooth torquing auxillary was placed to apply buccal root torque to the upper left canine when the patient was in 0.019 × 0.025 inch stainless steel archwires (Figure 5). Mid-treatment radiographs were taken showing uprighting of both upper and lower incisors and good alignment of the upper left canine, and at this stage the incisal edge of the upper left lateral incisor was restored with composite resin.

To complete treatment a band was added to the upper left second molar and a 0.016 inch stainless steel archwire with finishing bends was placed in the lower arch together with an orange Class II elastic (4½ ounce, ¼ inch) to the upper left canine (Figure 6).

Following debond (Figure 7), an upper Begg retainer and a lower Trutain retainer were fitted.

Case 1 assessment

The duration of active treatment was 23 months and buccal root torque was applied to the upper left canine for 11 months of this time. Gingival recontouring on the upper left canine was suggested to improve aesthetics, but was declined by the patient. It was also discussed that space posterior to the upper left canine would need to be closed restoratively if the patient desired because of a tooth tissue deficiency in the maxillary arch. At the end the upper left canine had good buccal root torque aiding the prognosis of stability for this tooth. In addition, the wear facet on the upper left lateral incisor edge was also restored with a composite restoration.

Fig. 8 Case report 1: pre-treatment (black) and post-treatment (red) cephalometric tracings superimposed on SN at sella.

The incisor relationship had been maintained and the lower incisors had been uprighted in relation to the mandibular base. The ANB had been reduced by 1 degree due to growth of the mandible (Figure 8).

During treatment, the patient's facial appearance improved as the chin point moved anteriorly and the lower lip now lies more favourably behind Ricketts' E plane.

The post-treatment PAR score is 2, which demonstrates a 92 per cent reduction in weighted PAR score.

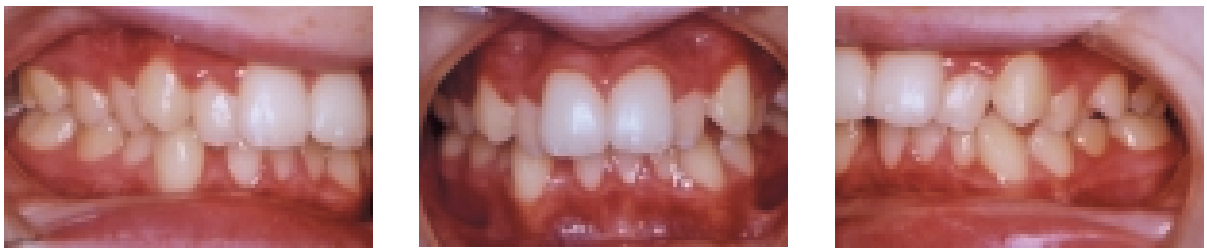
Case report 2

A 12 year-old Caucasian male was referred by his General Dental Practitioner regarding his increased overjet. The main features of his malocclusion were: crowding in both arches; increased overbite and overjet; and buccal segments that were a three-quarter unit Class II.

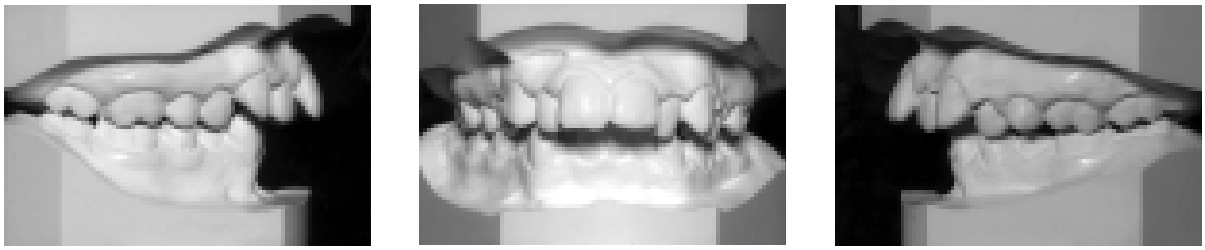
Extra-oral assessment

He presented with a moderate Class II skeletal pattern with an average Frankfort mandibular planes angle and lower face height ratio. Soft tissue assessment revealed

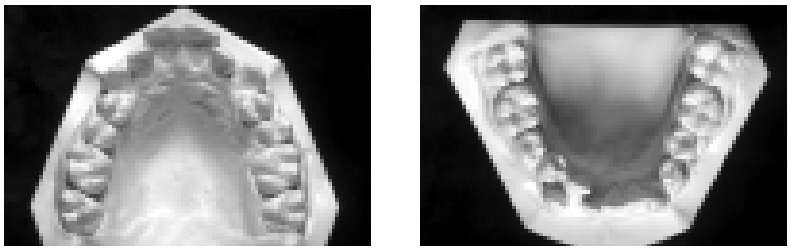
(a) (b)



(c) (d) (e)



(f) (g) (h)



(i) (j)

Fig. 9 Case report 2: pre-treatment photographs.

lips of normal length, but that were incompetent at rest. The lower lip was 4 mm behind the Ricketts' E plane and the nasiolabial angle was average.

Intra-oral assessment

All permanent teeth were present except the third molars. The oral hygiene was poor with generalized marginal gingival hyperplasia being present.

In the mandibular arch there was severe crowding of the lower labial segment and the mandibular canines were mesially angulated. In the maxillary arch the incisors were mildly crowded. The buccal segments were reasonably well aligned.

In occlusion the incisor relationship was Class II division 1 with an overjet of 10 mm and an increased and incomplete overbite. The centrelines were correct and coincident with the facial midline. Both buccal segment relationships were a ¾ unit II. The upper left second premolar was in lingual crossbite with the lower left second premolar. There were no displacements (Figure 9).

The Dental Health Component score on the Index of Treatment Need was 5a due to the increased overjet being greater than 9 mm. The pre-treatment weighted Peer Assessment Rating was 49.

Special investigations

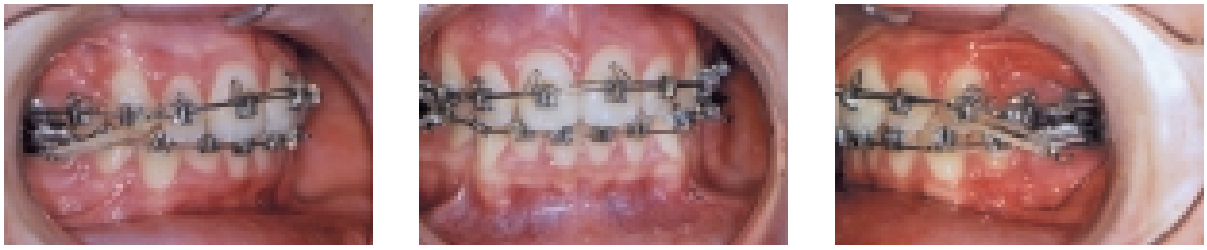
Radiographs. The panoramic radiograph revealed a full complement of teeth, with root length and bone lengths within normal limits. The lateral cephalogram indicated a skeletal II pattern with mandibular retrognathia. SNA was 81 degrees and SNB was 74 degrees with an ANB of 7 degrees. The maxillary mandibular planes angle and anterior face height ratio were both average. The upper and lower incisors were within a range of normal inclination at 113 and 92 degrees, respectively. Cephalometric analysis is presented in Table 2.

Table 2 Case report 2: pre- and post-treatment cephalometric analysis

	Pre-treatment	Post-treatment
SNA (°)	81	80
SNB (°)	74	76
ANB (°)	7	4
MMPA (°)	26	26
SnMx plane (°)	8	9
LAFH/TAFH (%)	56	55
UI/Mx plane (°)	113	111
LI/Mn plane (°)	92	96
I/I angle (°)	129	127
LI/APo (mm)	–2	2
Lower lip/E plane (mm)	–4	0
Wits (mm)	4	2

(a) (b) (c)

Fig. 10 Case report 2: stage II upper 0.016 inch Australian wire with closing loops.



(a) (b) (c)

Fig. 11 Case report 2: the two spur Begg torquing auxillary and uprighting springs on the maxillary second premolars and upper right lateral incisor.

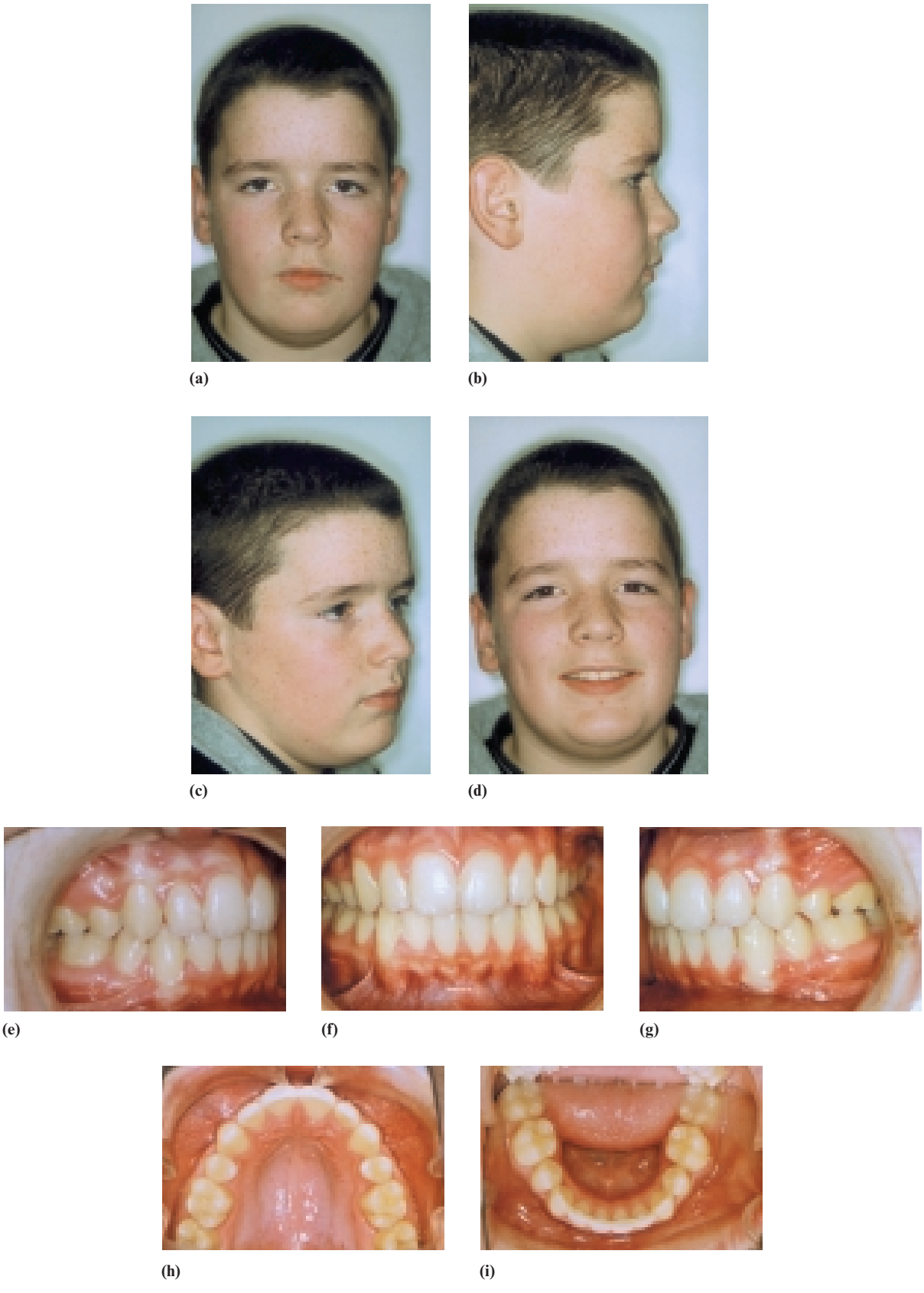


Fig. 12 Case report 2: post-treatment photographs.

Aetiology

The Class II skeletal base relationship is inherited. The incomplete overbite may in part be due to a previous thumb sucking habit and the development of a tongue to lower lip adaptive swallowing habit. The lower lip acting behind the upper incisors also contributes to the increased overjet. In addition, there was a dentoalveolar disproportion in both arches.

Aims of treatment

1. Improve oral hygiene.
2. Relieve crowding.
3. Correct upper left second premolar crossbite.
4. Align the arches.
5. Reduce overbite and overjet obtaining lip competency.
6. Achieve good buccal segment inter-digitation with a Class I molar and canine relationship.
7. Retain.

Treatment plan

1. Oral hygiene instruction.
2. Extraction of upper first and lower second premolars.
3. Fit of upper and lower Begg appliances.
4. Retention.

Treatment progress

Begg brackets were placed on all teeth anterior to the first molars. An upper aligning 0.014 inch super-elastic Nickel Titanium was placed together with a 0.014 inch stainless steel mandibular archwire bypassing the right lateral incisor and powerchain from the lower first molars to premolars. After 6 weeks, a 0.012 inch super-elastic Nickel Titanium mandibular archwire was placed engaging all the lower teeth and 4 months after appliance placement 0.016 inch high tensile Australian stainless steel Stage I Begg archwires were placed to begin overbite and overjet reduction with full-time wear of green Class II elastics (3½ ounce, 5/16 inch). When the overjet had been reduced to 2 mm a Stage II 0.016 inch Australian wire was placed with closing loops mesial to the upper canines to complete upper arch space closure (Figure 10). Stage III arches were placed 8 months into treatment (0.020 inch upper and 0.018 inch lower Australian wires), together with a maxillary two spur Begg torquing auxillary and uprighting springs on the lower canines and premolars. Over the next 5 months uprighting springs were added to the maxillary canines and premolars and the upper right lateral incisor and were removed as required. Figure 11 shows the two spur Begg torquing auxillary and uprighting springs on the maxillary second premolars and upper right lateral incisor 13 months into treatment. Mid-treatment radiographs were taken 3 months after this and following the placement of 0.016 inch Australian finishing archwires with maxillary first molar and canine offsets and bends to intrude the upper incisors, the appliances were removed 22 months after their placement. Following debond (Figure 12) a lower 0.0175 inch multi-strand stainless steel retainer was bonded to the lingual aspects of the lower incisors. This was due to the risk of the lower incisor crowding, which was the patient's presenting complaint and the fact that the lower incisors had been moved forward increasing the risk of instability. In addition upper and lower Trutain retainers were fitted.

Case 2 assessment

Sagittal correction has occurred as a result of growth and dentoalveolar movement. The extraction pattern permitted relief of dental crowding and provided a favourable anchorage balance to correct the Class II buccal segment

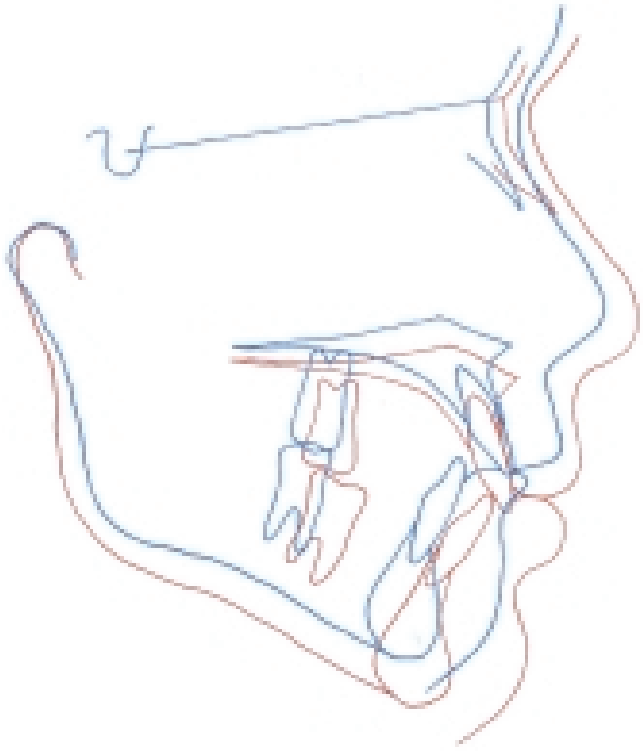


Fig. 13 Case report 2: pre-treatment (black) and post-treatment (red) cephalometric tracings superimposed on SN at sella.

relationships. The incisor relationship was corrected by retroclination of the maxillary incisors and a proclination of the lower incisors. The facial profile has improved relative to the Ricketts' E plane (Figure 13). The lip competency present at the end of treatment should retain the overjet reduction and give a good prognosis for the antero-posterior correction.

The post-treatment PAR score is 2, which demonstrates a 96 per cent reduction in weighted PAR score.

Acknowledgements

I would like to thank all my supervisors at Birmingham Dental Hospital, Queens Hospital, Burton-On-Trent, and New Cross Hospital, Wolverhampton, for the clinical and academic training I received during my specialist registrar training. In particular, to Mr Geoffrey Wright and Mr David Spary who supervised these two cases. I would also like to thank TP Orthodontics for their generous sponsorship of this prize.

References

1. Peck S, Peck L, Kataja M. The palatally displaced canine as a dental anomaly of genetic origin. *Angle Orthod* 1994; **64:** 249–256.