

**CLINICAL
SECTION**

British Orthodontic Society – Maurice Berman Prize 2007

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This paper describes the orthodontic treatment of a multidisciplinary case, which was awarded the Maurice Berman Prize in 2007 at the British Orthodontic Conference, Harrogate.

Key words: Maurice Berman Prize, orthodontics, clinical case report, ectopic canine, root resorption

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Introduction

The Maurice Berman Prize is held annually and is open to any member of the British Orthodontic Society. It is awarded for the best presentation of a complex case treated to a high standard, the initial severity of the case, optimal facial and dental aesthetics, final occlusion, and quality and completeness of photographic records are taken into account. This case was successfully submitted for the award in 2007 having been completed during the FTTA period leading up to the ISFE in October 2006.

Case report

A female Caucasian patient presented aged 15 years and 2 months concerned with the appearance of her upper anterior teeth and thought that she had missing teeth on the upper left side. She was medically fit and healthy and presented in the permanent dentition with a Class I incisor relationship on a Class I skeletal base with average vertical proportions, complicated by an ectopic upper left canine, a severely resorbed upper left central incisor, peg-shaped upper lateral incisors and a lower centreline, which was displaced to the right.

Clinical examination

Extra-oral assessment

She presented with a Class I skeletal pattern with average vertical proportions and no asymmetry. Soft tissue assessment revealed competent lips but both lips were behind E-line. There was 3 mm of upper incisor tooth show at rest and 1 mm of gingival show on smiling. There were no signs or symptoms of TMJD (Figure 1).

Intra-oral assessment

All permanent teeth were present with the exception of the upper left canine, upper left second premolar, lower left second premolar and the third molars. The dentition was un-restored and caries free, her oral hygiene was of a good standard.

In the mandibular arch the labial segment was mildly crowded and upright. The buccal segments were relatively well aligned with the lower left second premolar unerupted.

In the maxillary arch the labial segment was spaced with an average inclination to the maxillary plane, with the exception of the upper left lateral incisor which was palatally inclined. Both upper lateral incisors were peg-shaped and the upper left canine was unerupted but palpable palatally. The buccal segments were well aligned with the exception of the upper left first premolar which was rotated disto-palatally and the upper left second deciduous molar was still *in situ*.

In occlusion, the incisor relationship was Class I with an overjet of 2 mm, and a slightly increased and complete to tooth overbite. The upper centreline was correct to the facial midline and the lower centreline was displaced to the right by 3 mm. The molar relationship was Class I bilaterally and both lower canines were in crossbite. There were no displacements detected (Figure 2).

The Dental Health Component of the Index of Treatment Need (IOTN) was 5i and the aesthetic component was 9. The pre-treatment weighted peer assessment rating (PAR) was 42.

Special investigations

Radiographs. The panoramic radiograph confirmed the presence of all permanent teeth including the

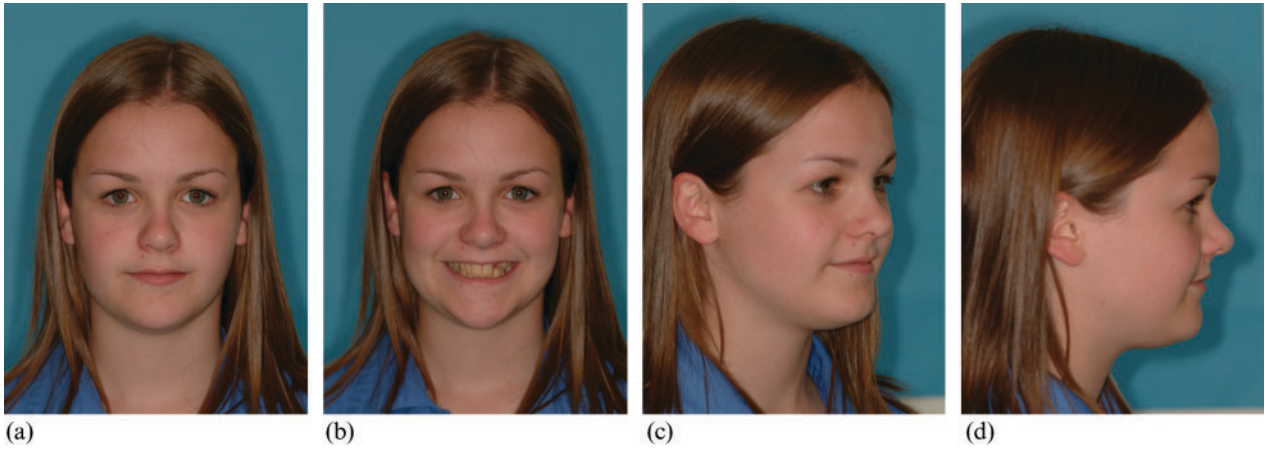


Figure 1 Pre-treatment photographs – Extra-oral

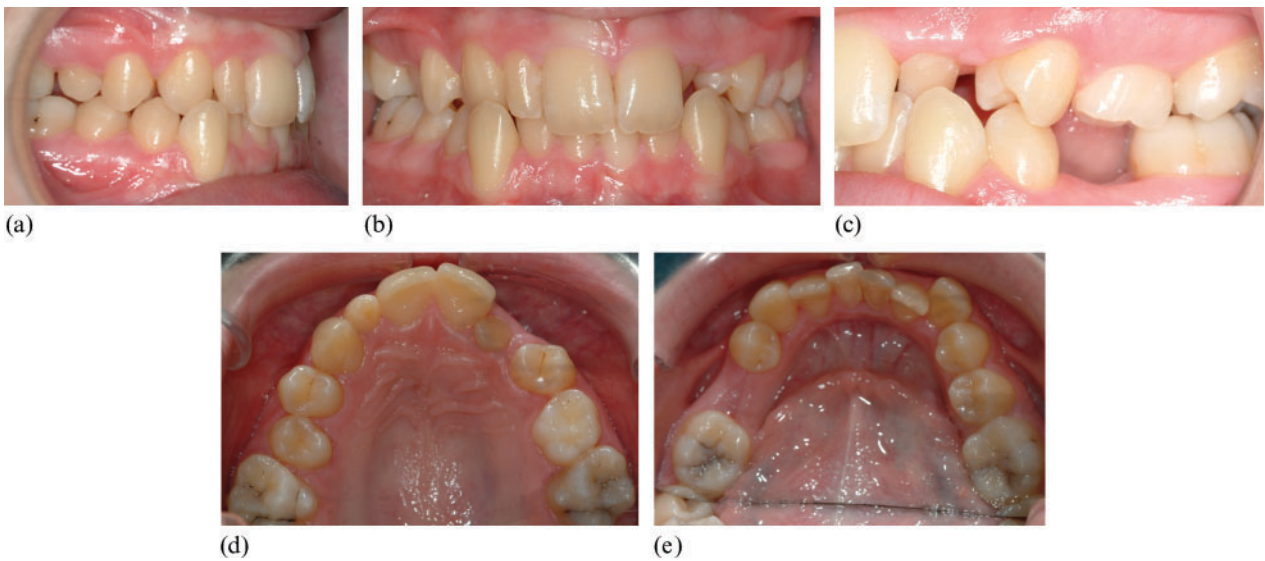


Figure 2 Pre-treatment photographs – Intra-oral

unerupted upper left canine and the left sided second premolars. The panoramic radiograph used in conjunction with an upper standard occlusal showed the palatal position of the upper left canine, severe resorption of the upper left central incisor, shortened root length of the upper right central incisor and small crown-root form of both upper lateral incisors (Figure 3). The lateral cephalogram indicated a Class I skeletal pattern with average vertical proportions (Figure 4). All other values were within normal limits. Cephalometric analysis is presented in Table 1.

Aetiology. The main features of the malocclusion were the consequence of an ectopic maxillary canine. The maxillary canine is second only to the mandibular third molar in its frequency of impaction. The prevalence is about 1.5% and the canine becomes ectopic more often

palatally than buccally with over double the frequency.¹ The aetiology of the palatal canine ectopia remains unclear but it is likely to be polygenic² and

Table 1 Cephalometric analysis: Pre-treatment, post-treatment & treatment change

	Pre-treatment	Post-treatment
SNA (°)	81	81
SNB (°)	79	79
ANB (°)	2	2
UI/MxP (°)	109	116
LI/MdP (°)	87	93
I/I (°)	136	126
MM (°)	24	24
LAFH (%)	55	55
Wits (mm)	-1 mm	0



Figure 3 Pre-treatment radiographs: Orthopantomogram and upper standard occlusal

multifactorial.³ There is evidence of palatally ectopic canines occurring more often among family members and may be linked⁴ with absent or anomalous (in size or morphology) lateral incisors⁵ an absence of crowding, and late developing dentitions.⁶ This patient had upper lateral incisors that were both diminutive in size and peg-shaped. The upper left lateral incisor was palatally positioned as a consequence of the position of the upper left canine. There was also an absence of crowding in the upper arch. One of the main sequelae of canine ectopia is root resorption of adjacent teeth, usually incisors. It has been estimated that 0.6–0.8% of children in the 10–13 year old age group have permanent incisors resorbed, as a result of canine ectopia.¹ However, using CT

scanning, root resorption has been detected in up to 48% of incisors adjacent to ectopic maxillary canines.⁷ This patient had severe resorption of the upper left central incisor. In the lower arch, the mild crowding has resulted from dento-alveolar disproportion. The crowding related to the lower right canine has led to the lower centreline shift to the right.

Aims of treatment

1. Extract the upper left central incisor and align the ectopic and palatally positioned upper left canine (to be camouflaged as the upper left central incisor);



Figure 4 Pre-treatment and post-treatment radiographs: Lateral cephalogram

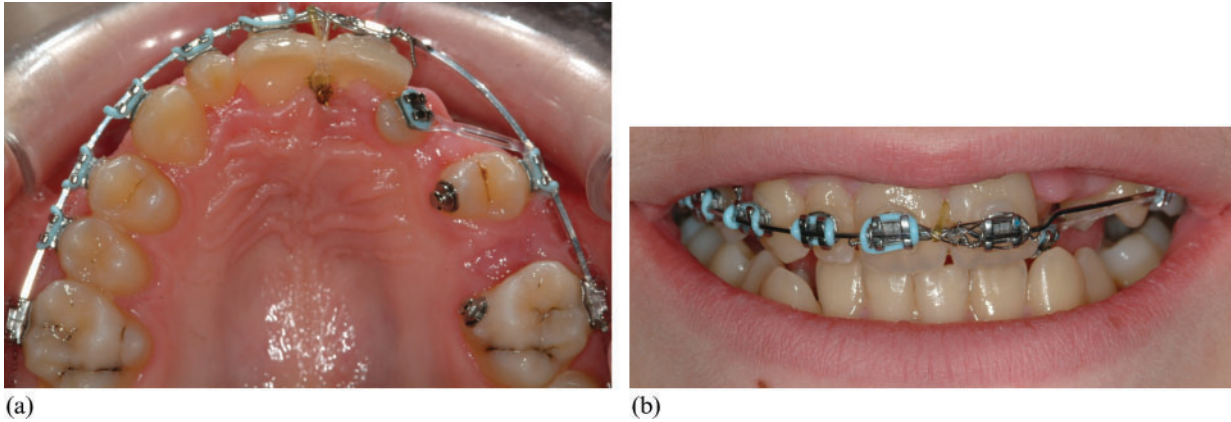


Figure 5 Upper left central incisor pontic, traction to unerupted upper left canine and distalisation of the upper left lateral incisor

2. Use the sectioned upper left central incisor crown as a temporary pontic;
 3. Level and align the arches;
 4. Maintain a Class I incisor relationship;
 5. Correct centrelines;
 6. Create space to build up peg-shaped upper lateral incisors and the upper left canine (which is in the upper left central incisor position);
 7. Intrude the upper left first premolar and restore to simulate the appearance of the upper left canine;
 8. Achieve a Class I molar relationship on the right and a full unit Class II molar relationship on the left with good buccal inter-digitation;
 9. Retention.
2. Fit upper and lower pre-adjusted appliances (0.022 × 0.028 inch slot) with MBT prescription and use bondable tubes on molars;
 3. Composite build ups of UR2, UL2, UL3 and UL4;
 4. Vacuum formed Essix retainers.

Treatment progress. The patient and parent had an initial consultation with the orthodontic and restorative team and consent was taken for treatment. A referral was made to the Day Surgery Unit to organize the extraction and the expose and bond. While awaiting surgery, orthodontic treatment commenced initially in the upper arch with an upper pre-adjusted fixed appliance (MBT prescription) with a 0.022 × 0.028 inch slot.

An initial 0.016 inch super-elastic nickel titanium (NiTi) aligning arch was inserted. The upper left central incisor, upper left lateral and upper left second deciduous molar were left off the arch initially and a

Treatment plan

1. Day case general anaesthetic – Extract upper left central incisor and expose and bond upper left canine;

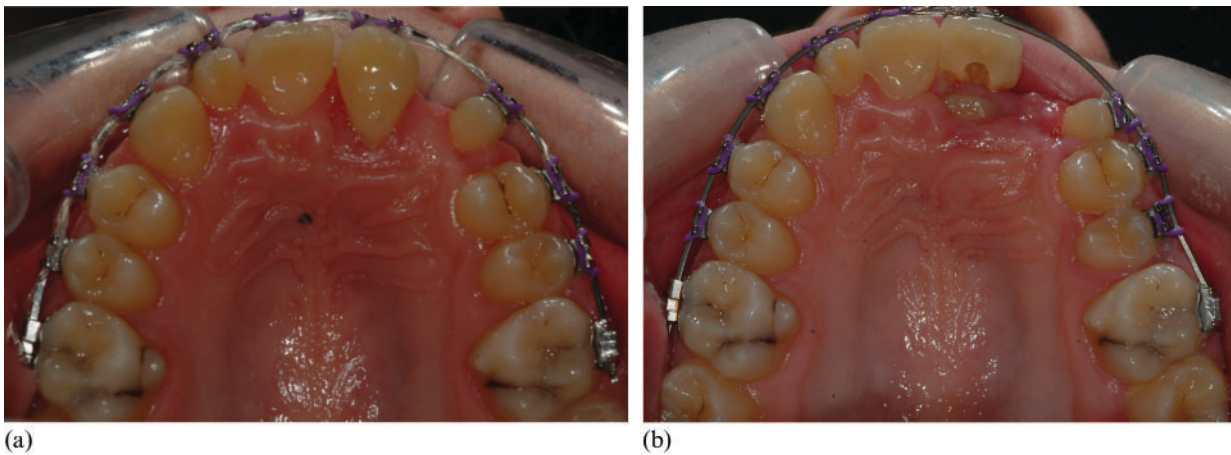


Figure 6 Upper left premolar erupting and canine erupting palatally

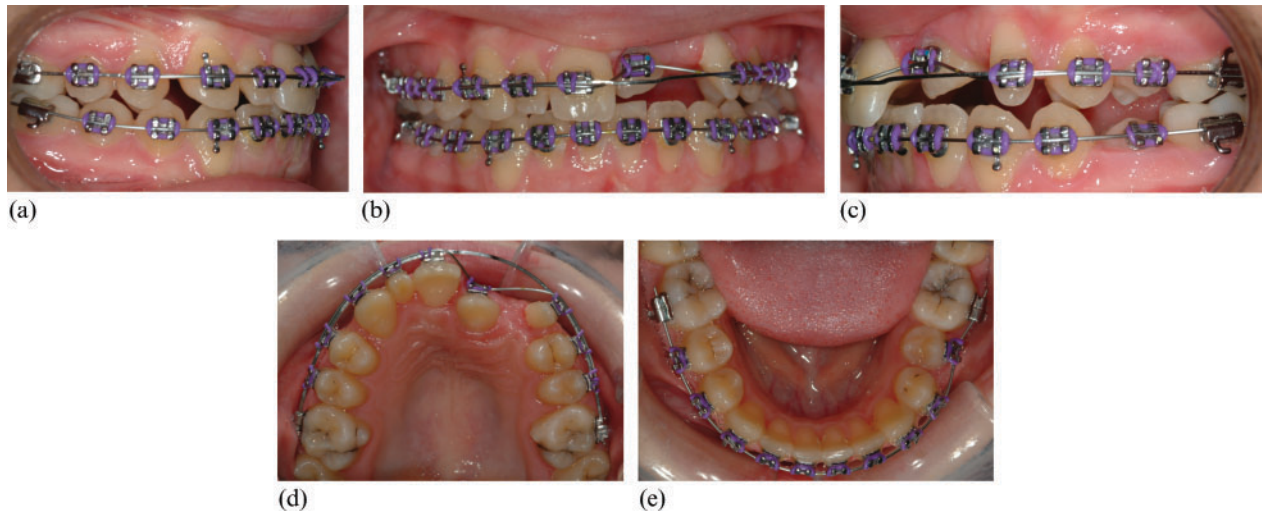


Figure 7 Upper left canine “piggy back” wire and engagement of the lower left second premolar

button placed palatally on the upper left first premolar and upper left first molar to help with derotation of the premolar. Surgery occurred 10 weeks after bond up, the patient was seen a few days later to place the upper left central incisor as a pontic (the root was removed and the crown debulked to form a veneer-like pontic), the patient was extremely anxious not to be seen without a front tooth. With a 0.019×0.025 inch NiTi wire *in situ*, zing string was attached to the gold chain of the upper left three to start gentle traction and power chain placed to start derotating the upper left first premolar.

After three months of treatment a 0.019×0.025 inch stainless steel arch wire was *in situ*, the upper left lateral incisor was bonded but not engaged and power chain used to start to move it distally and away from the upper left canine (Figure 5). Once the upper left lateral incisor started to move distally a ‘piggy-back’ 0.014 inch super-elastic NiTi arch wire was placed to engage it and draw it towards the working arch wire. Traction was continued on the upper left canine.

Six months into treatment and both deciduous second molars had exfoliated, the lower arch was bonded up and dead coil used to maintain the space for the erupting second premolars. A lower 0.016 inch super-elastic NiTi was placed to start the alignment and levelling process. The upper left canine started to erupt palatally behind the central incisor pontic (Figure 6), when sufficient enamel was present this canine was bonded up and a 0.014 inch super-elastic ‘piggy-back’ NiTi used to draw it to the working arch wire. The patient was warned that she would have to lose the pontic in order to progress with treatment. The left sided second premolars had now erupted and were engaged on the archwire. The

upper left canine and upper left lateral incisor were engaged gradually onto the arch wire (Figure 7).

Fifteen months into treatment and 0.019×0.025 inch stainless steel arch wires were *in situ* in both arches. A gable bend was placed to upright and move the root of the upper left canine mesially (Figure 8). Power chain and Class III elastics were used on the left side to close down residual spacing in the upper left quadrant. Space was maintained with dead coil to allow for build ups of the peg-shaped upper lateral incisors and upper left canine (Figure 9). The upper left canine was debulked palatally and the incisal edge disked.

Final seating and detailing of the occlusion was achieved with first and second order bends on 0.019×0.025 inch braided stainless steel arch wires with bilateral box elastics. Labial root torque was placed to further improve the position of the upper left canine. The upper left first premolar was intruded slightly to allow for a build up incisally. The patient had a final consultation with the restorative dentist before debond, it was agreed that the upper right central incisor required reduction mesially to allow for sufficient space to build up the upper left canine mesially and correct the upper dental centreline.

Case assessment. Treatment was completed after a period of 1 year and 9 months when fixed appliances were removed and upper and lower Essix retainers fitted (Figure 10). The patient saw the restorative dentist that same month for the reduction of the mesial aspect of the upper right central incisor and composite build-ups of the upper lateral incisors, upper left canine and the upper left first premolar (Figure 11).

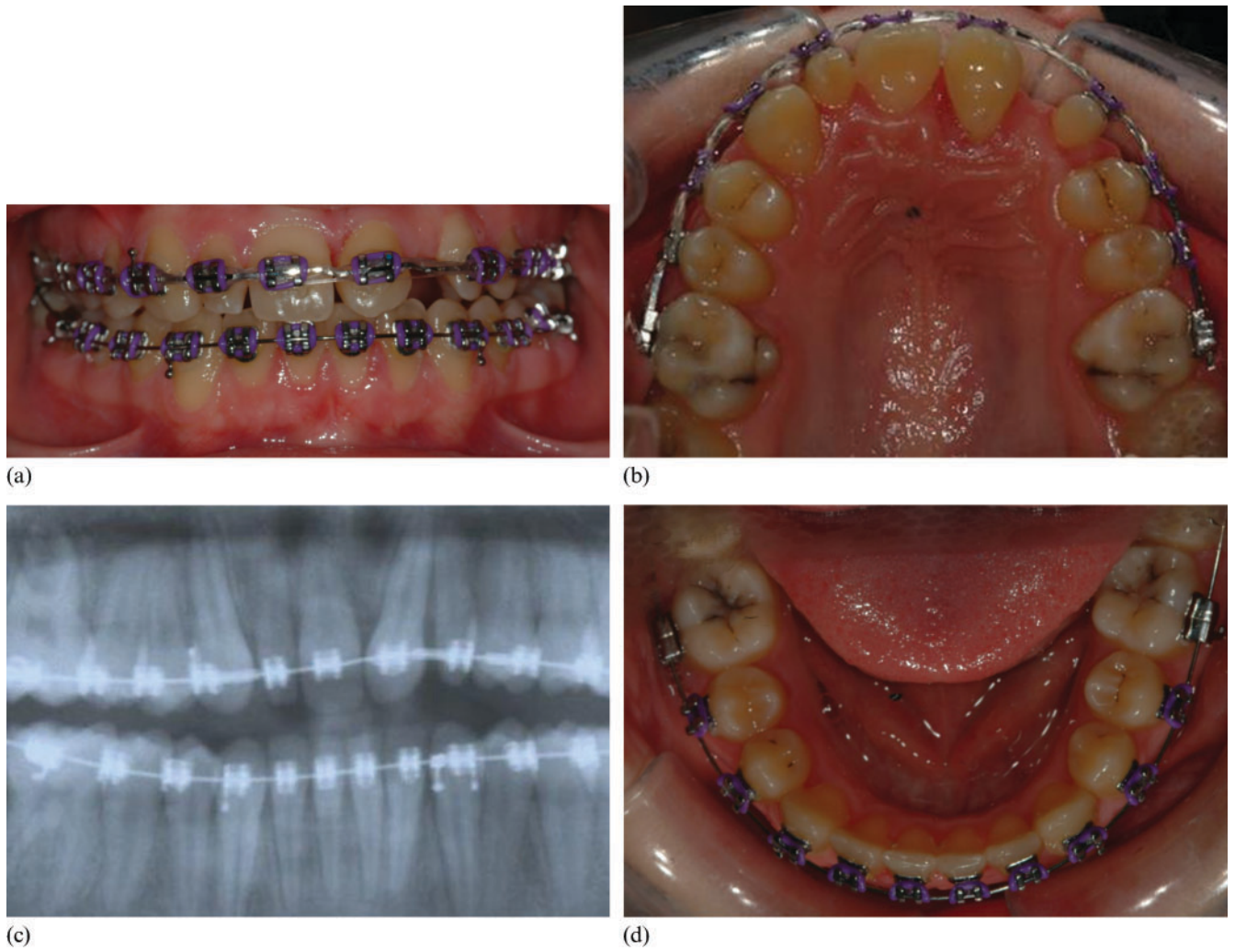


Figure 8 Gable bend to upright the upper left canine and move the root mesially

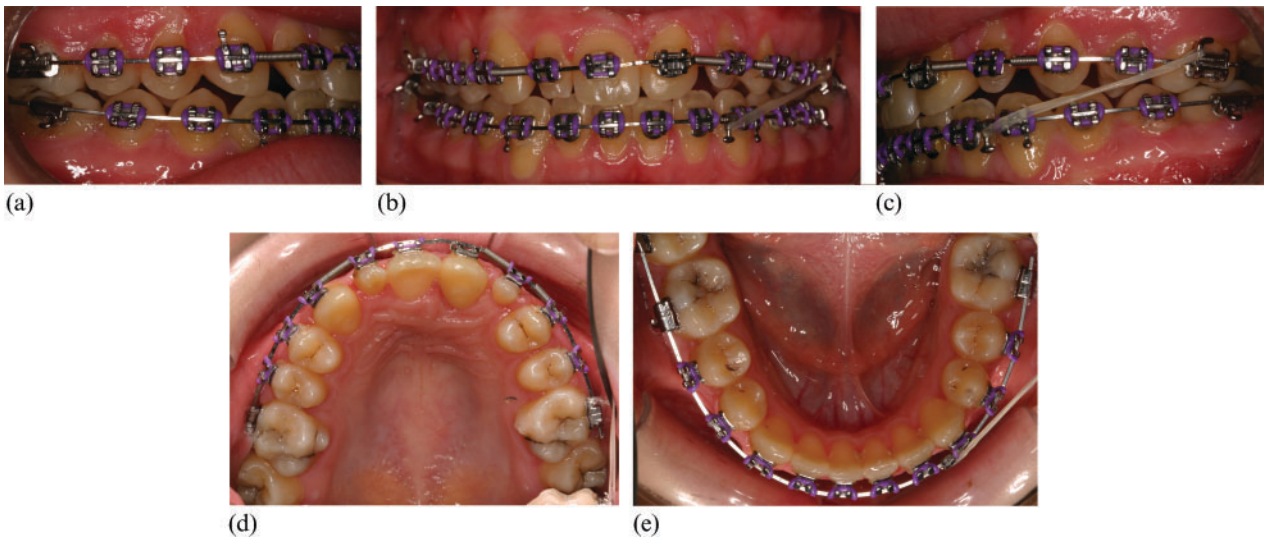


Figure 9 Consolidation of space in the upper left quadrant with a Class III elastic, maintain space for the build ups of the upper lateral incisors

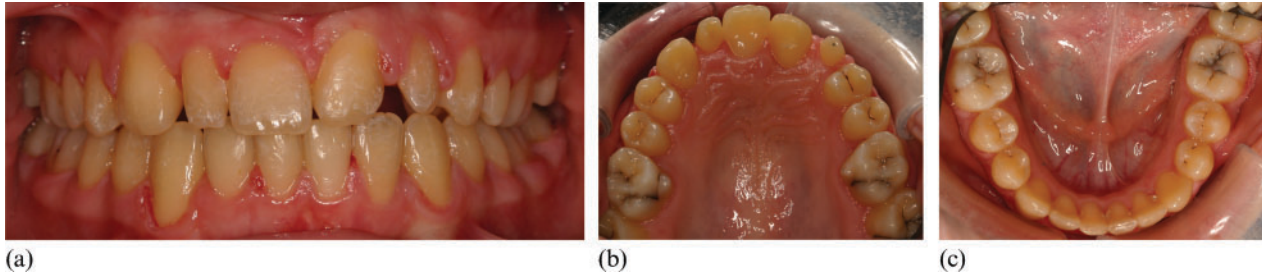


Figure 10 Immediately post debond

A new upper Essix retainer was made following this session. There has been a significant improvement in dental appearance and the treatment objectives have been achieved. The improvement in dental aesthetics of this case was the result of not only comprehensive orthodontics but also excellent restorative treatment

enabling the upper left canine to mimic the upper left central incisor, the upper left first premolar to mimic the upper left canine and the improvement in morphology of the peg-shaped lateral incisors. Cephalometric superimposition demonstrates that little has changed skeletally but the incisors have proclined favourably to



Figure 11 Post restorative treatment: Extra-oral and intra-oral

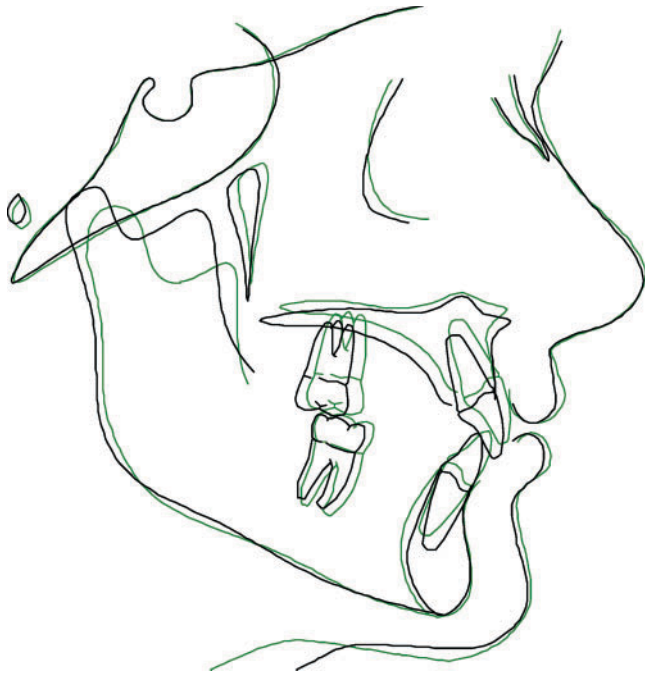


Figure 12 Cephalometric superimposition: pre-treatment (black) and post-treatment (green)

improve the overall dental aesthetics (Figure 12). Radiographs taken during treatment showed no change in the root length of the upper right central incisor and the upper lateral incisors. Periodic radiographs would be recommended long term to keep these teeth under observation.

Retention and stability. At the completion of treatment the patient was fitted with Essix retainers. These were instructed to be worn at night for six months then alternate nights for a further six months. Long term, the patient was instructed to continue wearing the Essix retainers twice a week. The patient is now more than a year into retention and continues to wear her retainers as instructed and the occlusal relationship remains unchanged. The orthodontic treatment aims were achieved and the long term stability had been

improved by the good interdigitation of the buccal segments and the minimal lower labial segment change.

The post-treatment/post restorative PAR score was 2, which categorized this case treatment result as greatly improved.

Acknowledgements

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