

Clinical Section

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Introduction

This prize is awarded to the candidate presenting the best two M.Orth. examination cases, which are displayed at the Clinical Demonstration section of the annual British Orthodontic Conference. The two cases successfully submitted for the award during the 1998 Torquay Conference are described: the first a Class II division 1 malocclusion and the second a Class III malocclusion, both treated by orthodontic camouflage.

Case Report 1

A 12-year-old female of Somalian origin was referred by her dental practitioner. She complained that her upper front teeth were both crooked and protruding (Fig. 1a-j). On examination, she presented with a moderate Class II division 1 malocclusion on a mild skeletal 2 base with significantly increased Frankfort-mandibular planes angle and associated increased lower anterior face height, due primarily to vertical maxillary excess. The lip pattern was grossly incompetent and demonstrated an increased clinical crown show at rest, and whilst in function, giving a 'gummy-smile'. The profile was convex, and her lips were full and everted, in advance of Ricketts aesthetic E line.

Intra-orally, oral hygiene was fair and caries present $\overline{16}$ (36) occlusally. The patient presented in her early permanent dentition was lower second permanent molars erupting. There was no history of early deciduous tooth loss.

The lower arch was moderately crowded with the arch form constricted across the premolar area, and a mildly increased Curve of Spee of 2-3 mm per side. The lower labial segment was clinically retroclined. The upper labial segment was severely crowded with $\underline{22}$ (12,22) palatally positioned and $\underline{313}$ (13,23) excluded buccally. Upper central incisors were proclined and outside lower lip control. Slight space was available in both upper buccal segments due to upper first premolars being rotated slightly disto-palatally.

In occlusion, the incisors exhibited an 8mm overjet with $\underline{111}$ (11,21) in 2-mm anterior open bite, but $\underline{212}$ in positive overbite. Dental centrelines were coincident and correct to the mid-facial axis. A mandibular displacement existed from initial contact on $\underline{12}$ and $\overline{11}$ (22 and 31), with a resultant 1-2-mm forward and upward slide into intercuspation position. The molar relationship on both sides was $\frac{1}{4}$ unit Class II in retruded contact position.

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The panoramic radiograph confirmed the presence of all permanent teeth except $\underline{818}$ (18,28). The lateral cephalogram (Table 1) confirmed the primary skeletal factor in this malocclusion to be a vertical one, with maxillary-mandibular planes angle of 46 degrees, and Bjorks facial polygon of 412 degrees. Upper central incisors were slightly proclined at 116 degrees, whilst the lower incisors were retroclined at 74 degrees, in compensation for the steep mandibular plane.

The IOTN Dental Health Component scored as 4a, whilst the pre-treatment weighted PAR score total was 51. A Bolton analysis of tooth size ratio indicated that upper teeth were slightly large relative to lower teeth.

The aims of treatment were:

1. Relief of crowding and alignment of teeth.
2. Co-ordination of the arches and creation of a positive overbite.
3. Retroclination of the upper incisors and appropriate labial root torque to upper lateral incisors. Maintenance of the lower incisor inclination.
4. Space closure and attainment of a Class I incisor and a Class I molar relationship.

The treatment plan was one of orthodontic camouflage, attempting to restrict further vertical maxillary growth and resultant backward mandibular rotation, by the use of high-pull headgear applied to the upper molars. A low trans-palatal arch was used in addition, to control the 'flaring' effect of the headgear on the upper molars and to permit the effect of some tongue pressure.

TABLE 1 Case 1. Cephalometric values

| | Pre-treatment | Post-treatment |
|-------------------------------|---------------|----------------|
| SNA (degrees) | 71.5 | 74 |
| SNB (degrees) | 69.5 | 70.5 |
| ANB corrected (degrees) | 6.5 | 7 |
| MMPA (degrees) | 46 | 46 |
| LAFH/TAFH (per cent) | 58 | 57 |
| Mx Unit Length (Co-ANS) (mm) | 77 | 80 |
| Mand Unit Length (Co-Gn) (mm) | 105 | 108 |
| McNamara analysis (mm) | | |
| A point | -5.5 | -5 |
| Pogonion | -13.5 | -12.5 |
| Bjorks polygon | 412 | 412 |
| UI/Mx.P (degrees) | 116 | 104 |
| LI/Md.P (degrees) | 74 | 82 |
| LI/A-Po line (mm) | +2 | +3 |
| Wits (mm) | -6 | -2.5 |
| Lower lip to 'E' line (mm) | +4 | +2 |



(a)



(b)



(c)



(d)



(e)



(f)



(g)



(h)



(i)



(j)

FIG. 1 (a-j).



(a)



(b)



(c)



(d)



(e)



(f)



(g)



(h)



(i)



(j)



(k)

FIG. 2 (a-k).

Once satisfactory compliance had been confirmed, extraction of 4|4 and 5|5 (14, 24 and 35,45) was carried out under local anaesthetic. Upper and lower pre-adjusted edgewise fixed appliances (0.022 × 0.028-inch slot) were fitted utilizing Andrews' non-extraction prescription series bands and brackets, except for 2|1|12, where the 'super-torque' prescription was used. This was semi-customized by inverting the brackets on 2|2.

Treatment consisted of 14 visits over a 22-month period. Lacebacks were used in all four quadrants during aligning and levelling, which was sufficient to create space for 1|2. However, 2|2 were not bonded initially, but picked up once space had been created using medium force nickel titanium open-coil springs between adjacent teeth on an 0.018-inch round Australian special plus stainless steel archwire. Lower second molars were banded early, engaged on an intermediate 0.018 × 0.025-inch thermally-activated nickel titanium archwire, prior to placing co-ordinated 0.019 × 0.025-inch stainless steel arches with appropriate torque control. A small amount of space closure was necessary using active tie-backs. Detailing involved an upper 0.014-inch stainless steel arch and a lower 0.019 × 0.025-inch niobium finishing wire with triangular seating elastics (3½ oz, 3/16 inch).

Upper (2|1|12) and lower (3|2|1|12|3) bonded lingual retainers were preferred, along with an upper Begg-style wraparound retainer worn full-time for 6 months, then night-only (Fig. 2a–k).

Case 1 Assessment

Cephalometric superimposition shows that there has been forward and downward mandibular growth, with a small improvement in the anteroposterior position of pogonion (Fig. 2k). Vertical growth has been well controlled by a consistently worn high pull headgear. Angle ANB has actually increased through treatment; indicating that this case is a good example that cephalometric analyses are not always valid, as both the McNamara and Wits values suggest a favourable treatment change. Racial normal values are not published for Somalians, who clearly have different skeletal morphology to negroids. Clinical judgment was therefore the ultimate guide to treatment goal in terms of incisor positioning, within the existing skeletal and soft tissue framework.

Further growth is likely to be predominantly vertical, with a strong likelihood of a posterior growth rotation. The lower incisors have come forward to a small extent relative to both the mandibular plane and the A–pogonion line. A stable inter-incisal angle has been created with lower incisor edges in advance of the upper incisor centroid.

The end treatment molar relationship is ¼ unit Class III bilaterally, despite lack of residual space, and a Class I incisor and canine relationship. This is due to two factors: the Bolton tooth size discrepancy described above, and the fact that the lower labial segment is more retroclined than in a six keys occlusion, in compensation for the high MMPA and, therefore, the buccal segments are more mesially positioned. Lip pattern has improved somewhat in full-face and profile views, although lip competency could only be achieved via surgical approach to the underlying VME. Mandibular function post-treatment is physio-

logical, with elimination of the mandibular displacement and absence of non-working side interferences.

Post-treatment weighted PAR score = 2

Therefore, this case is the 'greatly improved' category of the PAR nomogram with a 96 per cent reduction from the pretreatment score of 51.

Case Report 2

This 13-year-old female complained that her front teeth were biting the wrong way around (Fig. 3a–j). On examination, she presented with a mild Class III incisor relationship on a mild Skeletal 3 base with a Frankfort–mandibular planes angle and a lower anterior face height ratio within the normal range. The lip pattern was competent and the nasolabial angle obtuse, mostly due to an elevated nasal tip. There were no concerns regarding facial appearance.

All four first permanent molars had been extracted due to caries at the age of 11.5 years with residual spacing present in both arches. The four third molars were unerupted, but favourably positioned. The lower labial segment was well aligned but retroclined, and both lower second molars were tipped and rolling lingually. The upper labial segment was mildly crowded, with mesiolabial rotations affecting 2|2 (12,22). Following initial contact on 1|1 and 1|1 (12, 41) the mandible slid anteriorly and vertically into 2-mm reverse overjet, with a tenuous overbite of 1 mm. The upper dental centreline was correct with the midfacial axis, whilst the lower dental centreline was 2 mm to the right of this. Buccal segment occlusion tended to a bilateral posterior crossbite, with a Class I type relationship on second molars. Lateral openbites were present on both sides with a 4-mm deep Curve of Spee in the lower arch.

The cephalometric values support the clinical finding of a mild Skeletal 3 pattern, due primarily to maxillary retrusion with a maxillary unit length (Co–ANS) of 79 mm. Upper incisors were at average inclination (108 degrees) and lower incisors retroclined (72 degrees) to their respective dental bases.

IOTN score = 3b

Pre-treatment weighted PAR score = 42

The aims of treatment were:

1. Alignment and levelling of both arches.
2. Camouflage of the mild Skeletal 3 base by proclination of the upper incisors with maintenance of the lower incisor inclination.
3. An improvement of the overbite to aid stability.
4. Co-ordination of the arches and correction of the centrelines to attain a Class I incisor and buccal segment relationship.

Treatment mechanics employed were based upon the principle of Class III camouflage, using intermaxillary elastics. All erupted teeth were bonded or banded with a pre-adjusted edgewise system, (0.022 × 0.028-inch) of Andrews' non-extraction series, except for 'supertorque' to 2|1|12. Lacebacks were used during alignment to control 3|3, but omitted in the upper arch. Full-time Class III elastics (4oz 5/16 inch) were worn once archwires of appropriate stiffness were in place, these were upper 0.019 × 0.025-inch



(a)



(b)



(c)



(d)



(e)



(f)



(g)



(h)



(i)



(j)

FIG. 3 (a-j).



(a)



(b)



(c)



(d)



(e)



(f)



(g)



(h)



(i)



(j)



(k)

FIG. 4 (a-k).

TABLE 2 Case 2. Cephalometric values

| | Pre-treatment | Post-treatment |
|-------------------------------|---------------|----------------|
| SNA (degrees) | 83 | 82.5 |
| SNB (degrees) | 86 | 84.5 |
| ANB (degrees) | -3 | -2 |
| MMPA (degrees) | 25 | 27 |
| LAFH/TAFH (per cent) | 55 | 56 |
| Mx unit length (Co-ANS) (mm) | 79 | 79 |
| Mand unit length (Co-Gn) (mm) | 115 | 118 |
| UI/Mx.P (degrees) | 108 | 121 |
| LI/Md.P (degrees) | 72 | 69 |
| LI/A-Po line (mm) | +3 | 0 |
| Wits (mm) | -11 | -3.5 |
| Lower lip to 'E' line (mm) | -3 | -5 |

stainless steel and lower 0.018-inch Australian special plus stainless steel, with circle hooks mesial to $\overline{33}$. Once the overjet was positive, a vertical 'check' component was added to the elastic vector, from lower to upper canine, with a full-size 0.019 × 0.025-inch lower arch now in place. Lower space closure took 4 months using active tie-backs (Bennett modules). Removable retainers were provided in the form of an upper Begg and lower vacuum formed type. Overall treatment time was 16 months requiring 12 scheduled visits (Fig. 4a-k).

Case 2 Assessment

Superimposition upon anterior cranial base shows that the majority of growth during treatment has been vertical, with a tendency towards a backward rotation of the mandible. This has contributed to reducing the severity of the Skeletal Class 3 pattern, albeit to an end of treatment ANB angle of -2 degrees. A 2-degree increase in MMPA to 27 degrees

and a 1 per cent increase in the lower anterior face height ratio to 56 per cent have reflected the slight backward rotation of the mandible. Upper incisors have been proclined from 108 degrees to an end treatment position of 121 degrees, although they do not appear clinically proclined. The lower incisors have been retroclined very slightly from 72 to 69 degrees, reflecting the anteroposterior anchorage balance in the lower arch closing first molar extraction space and also due to the Class III elastic effect. Despite this, the lower incisor is positioned on the A-Po line at the end of treatment. The steepness of the occlusal plane has flattened due to the Class III elastics. The lower dento-alveolar height has increased through treatment which has contributed to the over-corrected overbite at the end of treatment.

In profile, the appearance is pleasing being less Class 3 following treatment, due in part to the elimination of the mandibular displacement and the backward rotation. Also, the upper lip has approached the E-line and the lower lip has retracted slightly. The prognosis for stability of Class III camouflage cases is always debatable, however the patient was approaching 15 at the end of treatment and was near to the standing height of her mother. Although further mandibular growth is anticipated, it is likely to be more vertical than anterior.

Post-treatment weighted PAR score = 1

Therefore, this case is in the 'greatly improved' category of the PAR nomogram with a 98 per cent reduction from the pre-treatment score of 42.

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