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Case Report

Two-phase treatment of an Angle Class II division 2 malocclusion

Morris Rapaport
BDS(Syd), MDSc(Syd)
Private Practice.
Hon. Clinical Associate Lecturer,
University of Sydney

This case was awarded the 1996 Begg Medallion by the Australian Begg Orthodontic Society.

This case report describes a two-phase approach to the treatment of an Angle Class II division 2 malocclusion in a growing boy. The first phase utilised a functional appliance (Clark Twin Blocks) during puberty and achieved a pleasing improvement in the facial profile. The second phase involved a fixed upper and lower Begg appliance without extractions, followed by retention. An unexpected complication was the failure of the lower left second molar to erupt; surgical removal of cystic elements surrounding this tooth, followed by traction and, later, mechanics to correct the buccal cross-bite, eventually corrected its position.

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Introduction

Although two-phase treatment plans are now commonplace — if still controversial[1] — in the early nineties, when this case was commenced, they were still unusual. The traditional Begg approach to the treatment of a severe Class II division 2 malocclusion would have been a single phase of fixed appliance treatment, most likely with the extraction of two upper bicuspids. Two lower bicuspids may have been extracted later, after bite opening had been achieved; depending upon whether there was sufficient anchorage in the lower arch to support Class II elastics during Stage III torque to the upper central incisors. Assessment of the lower arch anchorage potential would have taken into account the position and inclination of the lower incisors relative to the APo line.

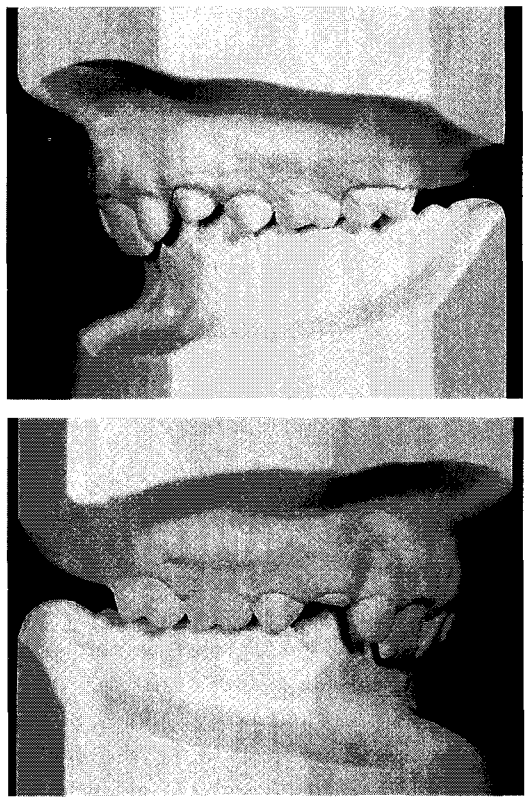
This patient, however, was treated differently: first, his upper central incisors were proclined to create an overjet; then a functional appliance was used to advance his mandible; then fixed Begg appliances were fitted without extractions, and this was followed by retention.

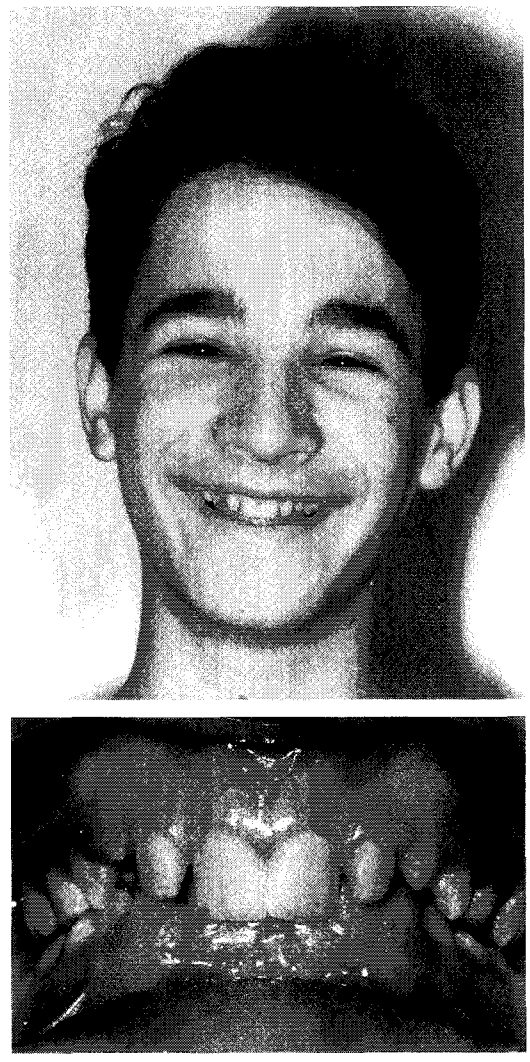
The award of the Begg medallion for this particular case shows that Begg-trained orthodontists are influenced by current orthodontic trends and that their treatment approach, and maybe even their appliance manipulation and design, continues to evolve. Those who might think that Begg therapy remains as they remember it years ago, or who label it 'dated' or 'extraction treatment', are out of touch with current Begg thought.

Patient's Chief Complaint

"My top front teeth are slanting inwards."

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Figures 1a, b, c and d. Pre-treatment records: study models showing the Angle Class II division 2 malocclusion and rotated upper incisors; the smiling, full-face view; and the intra-oral, frontal view.

Medical and dental history

The patient was a healthy young male who had no relevant medical history and no dental restorations. He first presented at age thirteen years, four months, when it was noted that his dental age lagged behind his chronological age. His voice had already begun to break but all deciduous second molars were still present.

Diagnostic features

Clinical examination revealed a retrusive mandible and an associated deep labiomental fold. Upon smiling he displayed retroclined, rotated and spaced teeth, the spacing caused by narrow upper lateral incisors. (Figures 1a, 1b, 1c and 1d)

The dental casts showed: an Angle Class II division 2 malocclusion with a 110 per cent overbite, a marked Curve of Spee and retroclined central incisors.

The orthopantomogram radiograph (Figure 4) confirmed the late mixed-dentition stage of his dental development, and at that time it appeared that all the wisdom teeth, except the lower left third molar, were congenitally missing; however, the upper right third molar appeared on a subsequent film. There was no indication in the pre-treatment radiographs that the left mandibular second molar would not eventually erupt normally.

The cephalometric analysis confirmed the existence of a mandibular retrusion with an SNB of only 72 degrees (78° ± 3°). The SNA of 78 degrees (81° ± 3°) was at the lower end of the normal range. The maxillary central incisors measured only 72 degrees to SN (103° ± 5°), so they were very retroclined. These cephalometric measurements were consistent with the diagnosis of an Angle Class II division 2 malocclusion.

Treatment planning

Bass[2] has identified three features of the face that he suggests are especially important components of attractiveness. They are: the position of the chin, the slope of the upper lip, and the slope and vertical position of the crowns of the maxillary incisors. If the clinician can place these optimally, a well-balanced face and a pleasing smile should result.

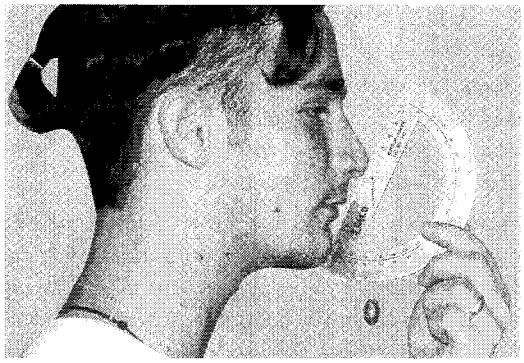


Figure 2. Construction of the Bass Aesthetic Horizontal. The first step is fabricating a vertical. The base of a simple protractor is held against the tip of the nose and chin (the E-plane). From a plumb line (construction from a length of wire and a lead fishing-line sinker) suspended from the base of the protractor, the angle the E-plane makes with the vertical is read.

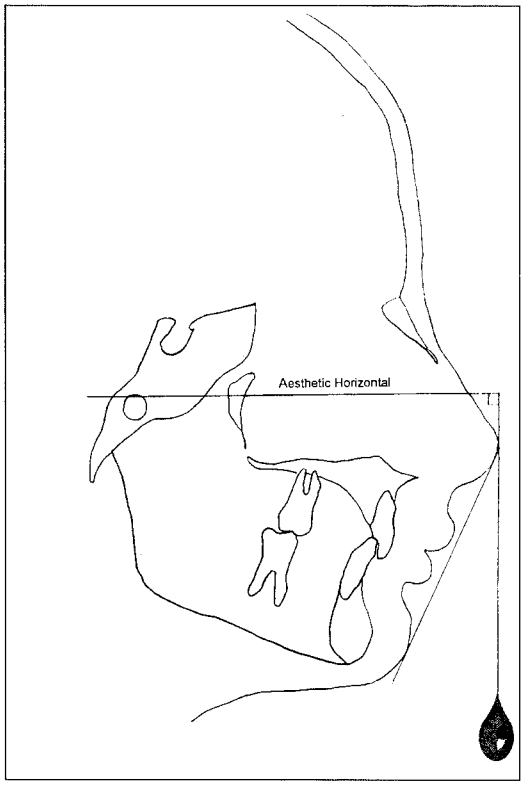


Figure 3. A vertical is drawn on the lateral cephalogram tracing at an angle to the E-plane previously read off the protractor. The Aesthetic Horizontal is a perpendicular to this vertical. Its height is arbitrarily made, approximately the same height as the Frankfort Horizontal.

Applying the Bass Aesthetic Analysis to this patient's pre-treatment lateral cephalograph helps determine how close the above components of his face are to the Bass aesthetic ideal, and how much movement is required during treatment and in what direction it should be. Comparing subsequent films allows an assessment of how well the treatment goals were met.

The first step in this particular aesthetic analysis is the construction of a horizontal reference line on the lateral cephalograph tracing, which Bass

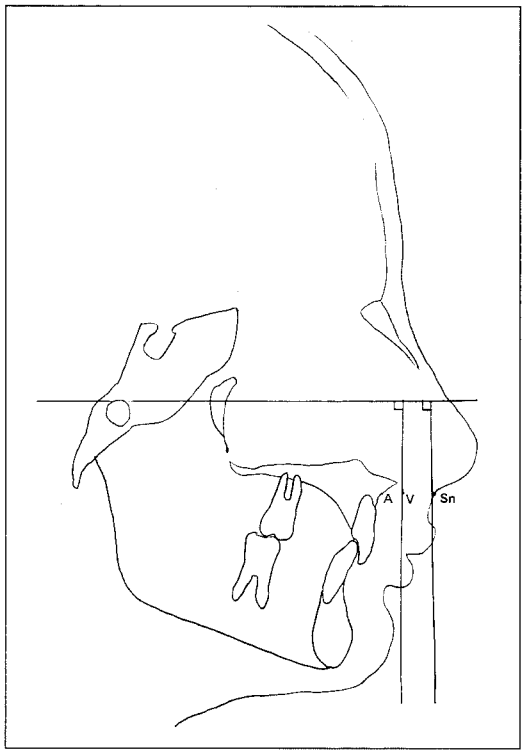


Figure 4. For good chin projection the soft tissue chin should lie between two perpendiculars dropped from the Aesthetic Horizontal through Subnasle and Point V. This patient's chin is clearly retrusive.

calls the "aesthetic horizontal". Figure 2 shows the patient in profile, with the base of a simple protractor held against the tip of his nose and chin (Rickett's E-plane). It can be visually determined that his head is not tipped up or down. Bass contends that subsequent measurements based on this visually determined head position are very reproducible. From a plumb line (constructed from a piece of wire and a lead fishing-line sinker that hangs from the centre of the base of a protractor) the angle the E-plane makes with the vertical is recorded and transferred to the lateral cephalograph. The aesthetic horizontal is a perpendicular to this vertical and is drawn on to the tracing at an arbitrary height, but placed approximately where the clinician expects to see the Frankfört Horizontal (Figure 3).

Perpendicular lines are dropped from the aesthetic horizontal to determine the anterior and posterior limits for the soft tissue chin. In Caucasians the chin would appear protrusive if it lay ahead of a vertical through Subnasale, and retrusive if it lay behind a vertical through Point V, which is defined as a point at half the horizontal distance between Point A and Subnasale. Figure 4 shows that the patient's chin should come at least four millimetres forward to be within the range for a harmonious chin position.

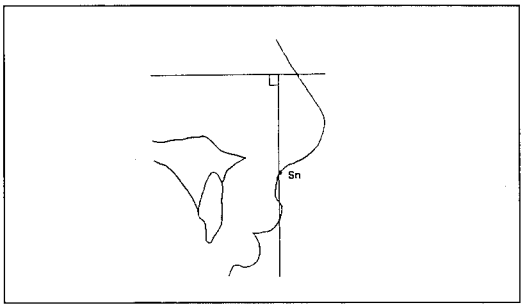


Figure 5. A perpendicular from the Aesthetic Horizontal passing through Subnasle should lie on, or be slightly behind, the slope of the upper lip. The most anterior part of the upper lip should be 1-2 mm in front of this line, and the most anterior part of the lower lip should be slightly behind it.

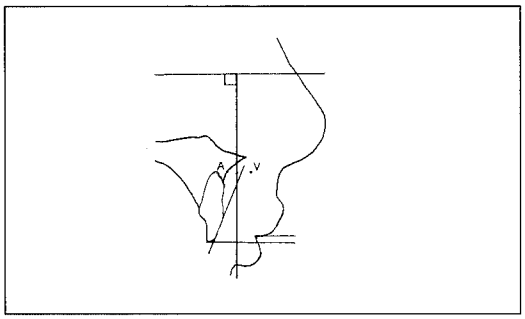


Figure 6. A perpendicular from The Aesthetic Horizontal passing through a point half way between Point V and Point A should be tangent to the slope of the middle third of the labial surface of the maxillary central incisor. This patient's maxillary central incisor is, in fact, too posteriorly placed and requires substantial torque as well as forward bodily movement, although its vertical position is satisfactory.

The slope of the upper lip should lie on or be slightly in front of the vertical through Subnasale, with the most anterior part of the upper lip one to two millimetres in front. The most anterior part of the lower lip should be no more than one millimetre behind the line. Figure 5 shows that the slope of the patient's upper lip is not on the vertical through Subnasale, nor slightly in front of it, but one and a half millimetres behind it; and that the lower lip is not slightly behind it but well behind it. The most anterior part of the upper lip is just a half a millimetre in front rather than one to two millimetres. Therefore, it can be concluded that the upper lip is slightly retrusive and, as expected, the lower lip is very retrusive.

According to Bass, the maxillary central incisor must be correctly positioned horizontally and vertically, relative to the upper lip, and the slope of the middle third of the labial surface also is important. To examine the position of the maxillary central incisor, another perpendicular is dropped from the aesthetic horizontal, this time passing through a point at half the horizontal distance between points A and V, which is equivalent to a quarter the thickness of the upper lip. The middle third of the labial surface of the maxillary central incisor should lie tangent to this line to ensure a good display of teeth during expression, without appearing too proclined or too retroclined.

Figure 6 shows that the labial surface of the patient's maxillary central incisor is far from tangent to this perpendicular and lies as much as seven millimetres behind it. Considering the vertical dimension: the incisal edge should lie two to three millimetres below Stomion to ensure a good display of teeth during expression, without an excessive display of gingival tissue. The incisal edge is three millimetres below Stomion, which is within the normal range.

In summary, this analysis indicates that, if good facial aesthetics, including a sufficient display of the teeth, were to be achieved, treatment to orthopaedically advance the mandible at least four millimetres, and procline and torque the maxillary central incisors by as much as twenty degrees, was desirable.

The next step in planning this patient's treatment was to match the capabilities of the appliance (and the operator in manipulating that appliance) with the treatment goals. In early 1992, when treatment commenced, the Clark Twin Block appliance was new. It had some advantages over other designs, one being the fact that the patient ate with the appliance in his or her mouth and it was, therefore, truly functional (and also less likely to be lost when out of the mouth during meals). In this low-angle case it gave an immediate profile improvement, which was a good patient motivator. As long as the upper incisors were proclined first, it was hoped that it would achieve the four millimetres of mandibular advancement that the aesthetic analysis indicated was the minimum required.

The other important requirement is that the fixed appliance had to have the capacity to deliver substantial torque to the maxillary central incisors. Torque auxiliaries used with the Begg appliance can be allowed to remain in place, producing torque forces continuously until the operator deems that sufficient torque has been achieved.

Phase I treatment

Treatment commenced in November 1991, when the patient was thirteen and a half years old. He was issued with an upper removable Hawley appliance with Z-springs behind the

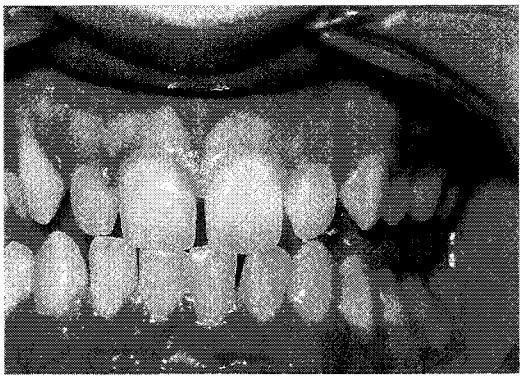


Figure 7. After four months of wearing Clark Twin Blocks, a large bilateral posterior open bite remained to be closed, partly by passive eruption and partly with the fixed appliances that were to follow.

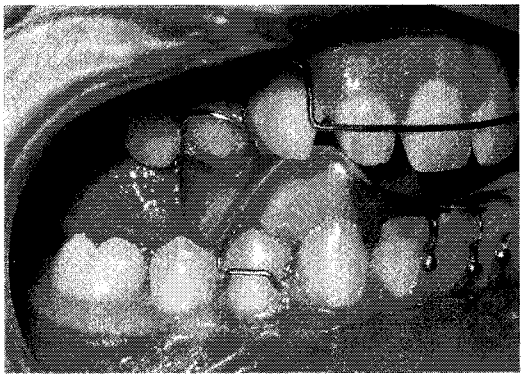


Figure 8. To enable eruption of posterior teeth, the posterior parts of the upper Twin Block were cut away and the appliance was worn at night only to retain the sagittal correction.

central incisors to procline those teeth so that an overjet could be created, thereby converting the malocclusion from Angle Class II division 2 to Angle Class II division 1.

After two months, the central incisor teeth seemed sufficiently proclined to record a construction bite for a functional appliance. It was taken in edge-to-edge protrusion, with three millimetres of vertical opening between the upper and lower central incisors, which meant a much greater vertical opening between the molars and bicuspids because of the Curve of Spee. For reasons of economy the existing upper Hawley was converted into the upper member of a Clark Twin Block. The lower block extended posteriorly only as far as the first bicuspids.

Sagittal correction was achieved by September 1992, four months after the Twin Blocks were issued (Figure 7). This meant that there was no longer any overjet and that the molars, despite being apart, were in a Class I relation. It was now no longer possible to manipulate the mandible further posteriorly. The posterior parts of the upper blocks were ground away to enable molar and bicuspid eruption to occur (Figure 8). Nowadays, this would be done far more gradually, and an upper labial wire would no longer be part of the design because, in most cases like this one, the more the upper incisors are allowed to move labially, the better.

At this stage of his treatment the patient was instructed to wear his appliance only at night as this seemed sufficient to retain the sagittal correction while awaiting further posterior tooth eruption. Fixed appliances were fitted in November 1992. Altogether the Clark Twin Blocks were worn for six months.

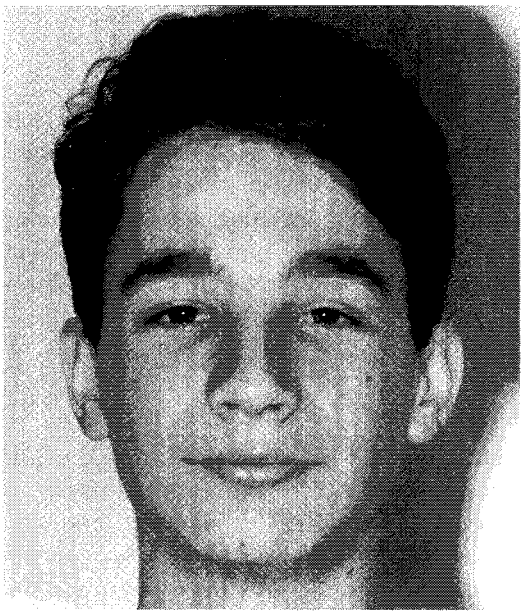
Discussion of Phase I treatment

Another lateral cephalograph was taken just prior to the start of the second phase of treatment. By transferring the aesthetic horizontal with reference to stable anatomical structures within the anterior cranial base, the aesthetic analysis can be repeated and what was achieved during the first phase of treatment can be seen. In Figure 9h, the aesthetic-analysis tracing at the end of the second row shows the soft tissue chin has come forward, but is still just on the wrong side of the line that defines whether or not the chin looks retrusive.

The limiting factor preventing the mandible being brought further forward well into the space between the lines delineating the too retrusive and too protrusive chin positions, is likely to have been the degree of proclination of the upper central incisors. Had the upper incisors been tipped further forward before the construction bite for the functional appliance was recorded, the mandible might have advanced more. The edge-to-edge anterior bite achieved by wearing the functional appliance is shown in Figure 9g; it seems to have been only a barely adequate mandibular advancement.

Nevertheless, comparing the pre-treatment profile (Figures 9b and 9d) with the profile after the functional appliance therapy (Figures 9f and 9h), a distinct improvement can be seen, as well as a reduction in the depth of the labio-mental fold. The patient appeared to be going through his pubertal growth spurt at the time he wore his functional appliance: his mother reported, for instance, that his voice was deepening. Whether or not the luck of good timing contributed: in the thirteen months between the pre-treatment September 1991 lateral cephalograph and the next taken in October 1992, the ANB angle reduced three degrees.

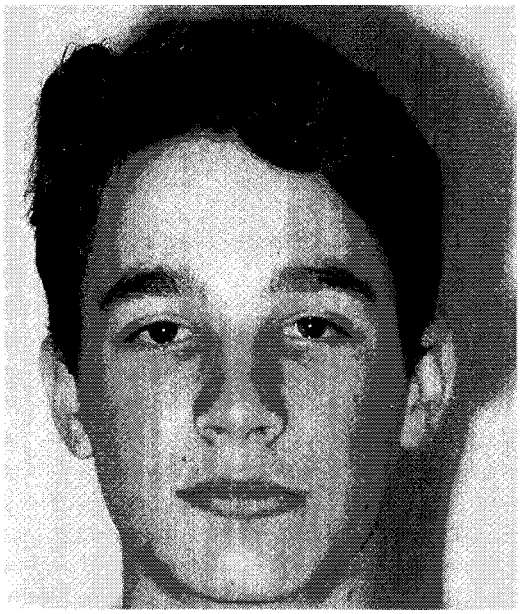
The upper lip was slightly retrusive before treatment and barely changed during Phase I treatment. This is the best that can be expected because functional appliances apply distal forces to maxillae.



9a



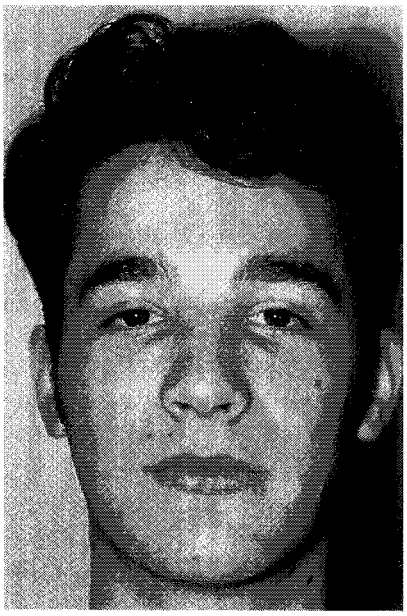
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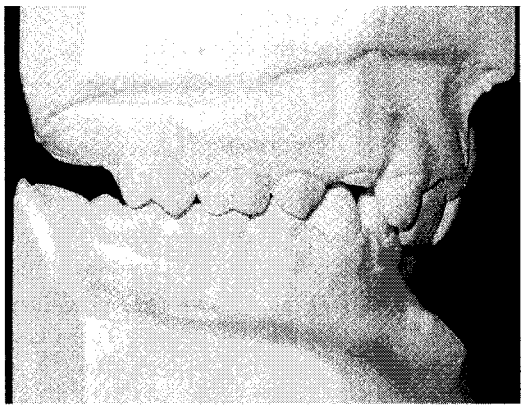
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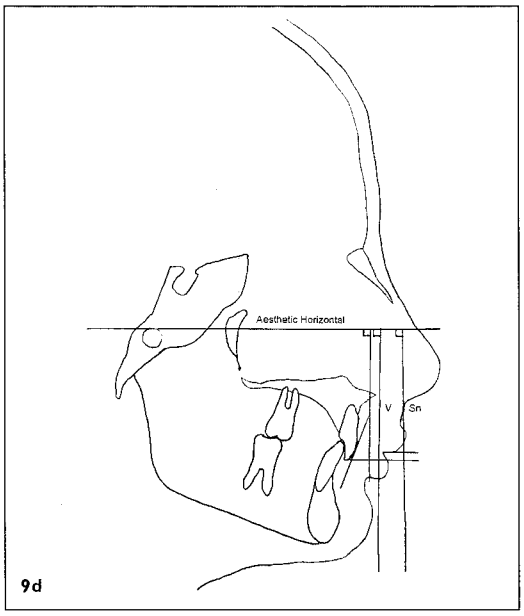
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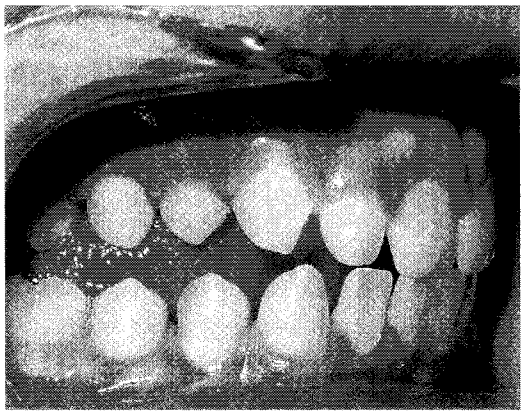
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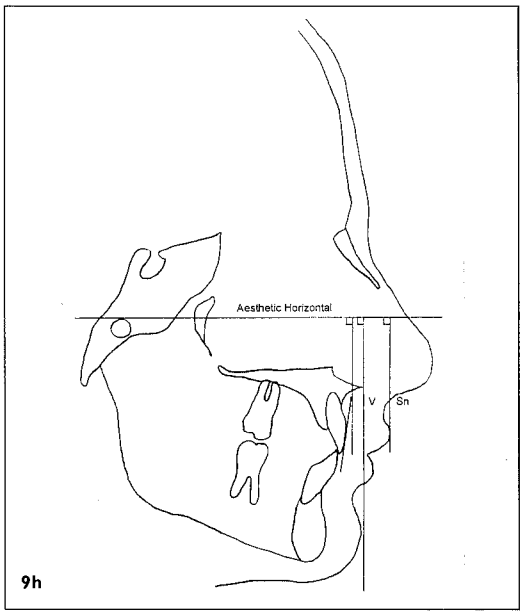
9c Figures 9a, b, c and d (top row). Full face, profile, study model and tracing of Bass Aesthetic Analysis before treatment (13.9.91).



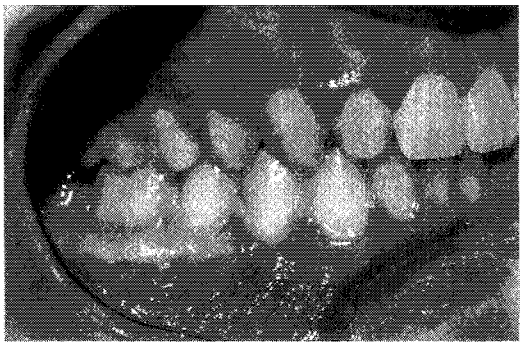
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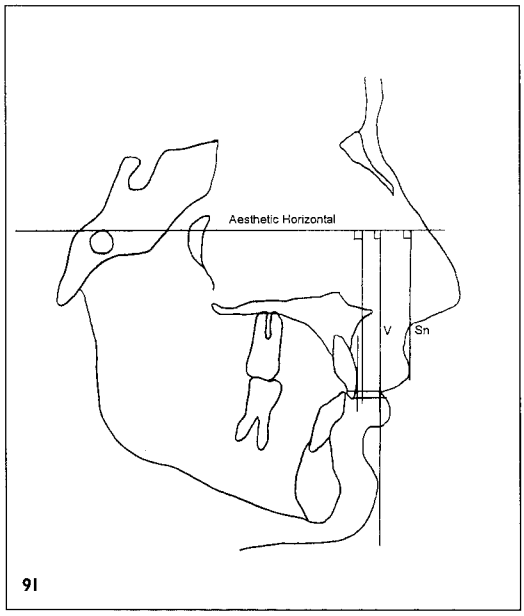
9g Figures 9e, f, g and h (middle row). After the first phase of functional appliance therapy (30.10.92).



9h



9k Figures 9i, j, k and l (third row). When fixed appliances were removed (11.7.95).



9l

The upper central incisors were tipped well forward of their original position but were still too far back; the line drawn tangent to the middle third of their labial surface shows just how much torque was still required to satisfy the ideals of the Bass Aesthetic Analysis.

(Note in Figures 9a-l that before treatment the profile showed insufficient chin projection; the Bass Aesthetic Analysis depicts this by showing the soft tissue chin behind the chin line. After the functional appliance therapy, the chin position looks better and is almost on the chin line, and remained there during the fixed appliance phase of treatment. The other important aesthetic feature to note is the position of the upper incisors; before treatment they were retruded. In Phase-I treatment they were proclined, but not enough for the labial surface to be on the incisor line. During Phase-II treatment they were torqued the required amount, but never came quite far enough forward bodily to be on the line.)

Before leaving the discussion of Phase I treatment and moving on to describe the second phase, a brief look at the two-phase versus one-phase treatment controversy seems appropriate. Looking at the profile change there is little doubt that this particular patient benefited from his six months of wearing a functional appliance in the late mixed dentition, and that this change was unlikely to have occurred without treatment. The recent study by Tulloch, Proffit and Phillips[3] found that there is a less than a 30 per cent chance of a favourable change in untreated Class II cases; this jumps to a 70 per cent to 80 per cent chance of favourable or highly favourable change with growth-modification treatment. But can this favourable change be achieved in a single phase of treatment, and is there any long term benefit?

Proffit[4] and Johnston[1] have suggested that functional appliances can accelerate mandibular growth so that it is obtained relatively more quickly. Johnston regards this as the functional appliance taking out a mortgage. He says the mortgage "is amortized by the subsequent growth of the condyle" and sees no evidence that functional appliances confer any long-term benefit on the pattern of mandibular growth. He further states that the changes "would be essentially the same as is commonly seen with a single stage of conventional fixed appliance therapy". By "conventional fixed appliance therapy" Johnston presumably means fixed Edgewise appliances with headgear for the Class II correction; but is a headgear appropriate when the problem is a mandibular deficiency? Tulloch, Phillips, Koch and Proffit[5] reported that, while both headgears and functional appliances can reduce the ANB angle in a Class II case, headgears restrict forward movement of the maxilla whereas functional appliances produce greater mandibular change.

Prior to treatment the SNA measurements indicated that this patient's maxilla was at the retrusive end of the normal range; and the SNB reading indicated a very retruded mandible. These findings are further supported by the aesthetic analysis. Therefore, the use of headgear would have been inappropriate.

What about relying on Class II intermaxillary elastics for the Class II correction? There is a seductive hypothesis that suggests there is a 'functional effect' (so called) from Begg ultra-light Class II intermaxillary elastics. In theory it is suggested the light traction used in Begg therapy is likely to be too light to cause anchorage loss and untoward dumping of lower incisors; however, it can (so the theory goes) stimulate differential jaw growth by activating the growth potential already present, but not yet expressed. This 'functional effect' may indeed be operating but it remains untested. Whether or not this patient's retrusive mandible would have improved to the extent it did if he had gone directly into fixed appliances without the first phase of functional appliance therapy, must remain a matter for conjecture; it is a worthy research project.

Phase II treatment

Fixed upper and lower Begg Appliances were fitted when the patient was almost fourteen and a half. A posterior open bite was still present but it was assumed that the anchor bends placed in the 0.016" stainless steel Wilcock premium-plus archwires would soon level the dental arches and thereby eliminate the posterior open bite. Many of the usual aims of Stage I Begg treatment — such as bite opening, and gaining a Class I molar relation — had already been achieved during the functional-appliance phase of treatment.

Torque forces were applied to the upper central incisors in February 1993. Torquing does not usually commence until Stage III but in this patient's case it was begun early in treatment, shortly after alignment was achieved, with the placement of an 0.014" Von der Heydt torque auxiliary (Figure 10).

Torque was started early because the upper central incisors were so retroclined before treatment that achieving enough torque was thought likely to be the principal factor determining the duration of active treatment. As it turned out, dealing with the second molars that either failed to erupt or erupted into cross-bite took up considerable time and effort and determined the length of the active treatment.

By July 1993, three of the second molars had begun to emerge into the mouth but both uppers were erupting into buccal cross-bite.

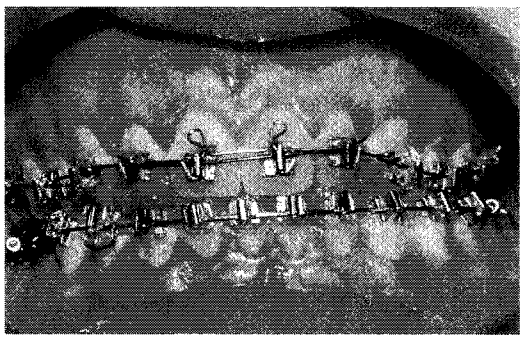


Figure 10. A Von der Heydt 0.014" auxilliary was added early in treatment to apply torque to the upper central incisors. To keep the forces light, it was cut distal to the upper lateral incisors.

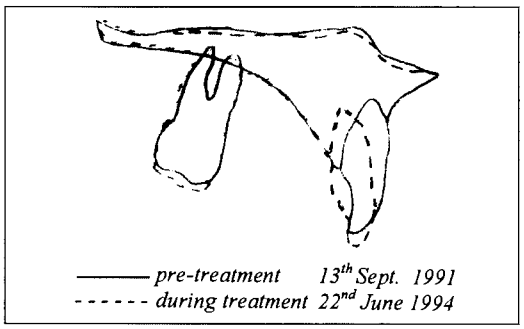


Figure 11. Superimposing a tracing of the palate taken in mid-treatment on to the pre-treatment palatal tracing using "best fit" enables the 16 degrees of true torque achieved so far to be seen.

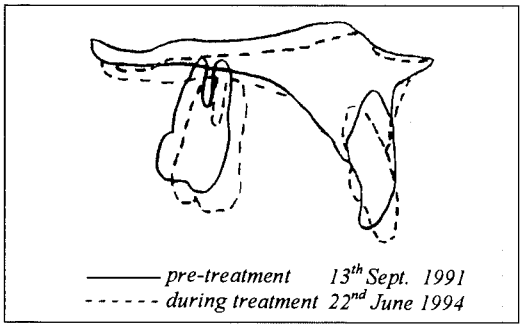


Figure 12. Repeating the exercise of comparing palatal tracings but this time superimposing on SN at S, enables the apparent torque to the upper central incisors to be seen. It measured 18.5°, a little more than the true torque because of the slight tipping of the palatal plane down at the back.

Banding all the second molars and having a continuous archwire would probably have been the best solution to correct the cross-bites, but this was not possible because there was no sign yet of the lower left second molar, and both upper second molars were still only partially erupted. Therefore, Begg brackets were bonded to the available enamel on the buccal surfaces of the upper second molars, and the upper archwire was extended into those brackets. In the lower arch it was possible to band the lower right second molar. and the patient was instructed to wear cross elastics from the upper Begg brackets to the lower second molar on the right and the first molar on the left.

The lower left second molar had still not appeared by May 1994 when the patient turned sixteen. He had always been slow getting new teeth but the suspicion of pathology causing delayed eruption was growing, especially since the other three second molars had now been present in the mouth for ten months. There was no known history of trauma to the lower left second molar area.

New records were taken in June 1994 for three main reasons: to check the amount of anterior torque already achieved; to satisfy the requirement of membership of the Australian Begg Orthodontic Society, which stipulates that updated records of members' nominated cases be tabled at annual meetings; and to determine reasons for the delayed eruption of the lower left second molar.

By superimposing the June 1994 palatal tracing on the pre-treatment tracing of the palate registering the best fit, it can be seen that, so far, sixteen degrees of true torque had been achieved. Repeating the exercise, but this time superimposing on SN at S, showed 18.5 degrees of apparent torque because the palatal plane had tipped down a little at the back (Figures 11 and 12).

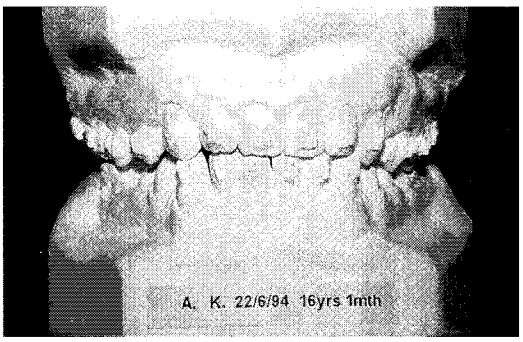
The study models showed that most treatment aims had been achieved and all that remained to be done prior to the completion of active treatment was detailing and, of course, dealing with the second molars (Figures 13a, b and c).

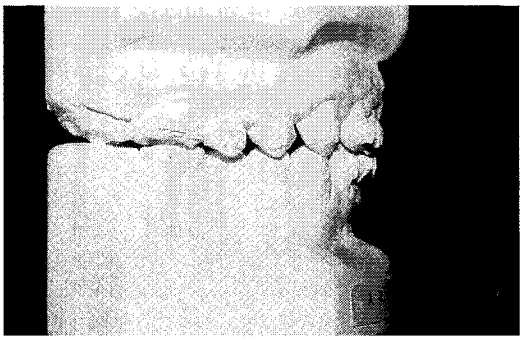
In August 1994 the patient was referred to an oral surgeon to have the crown of his unerupted left mandibular second molar exposed and a chain attached so that traction could be applied to move it up into occlusion. Looking at the pre-treatment panoramic radiograph (Figure 14), even with the benefit of hindsight, there was no indication that the lower left second molar would not erupt normally. The surgeon later reported he had excised "dense fibrous tissue and associated cystic elements from around the crown of 37".

The surgeon also sutured in place a buccal, apically-repositioned flap and bonded a gold chain to the mesial occlusal surface. Previously, he had asked if he could surgically remove the adjacent third molar at the same operation. It was felt, however, that, until there was obvious movement of the second molar in response to traction (thus proving it was not anchylosed), the wisdom tooth should be left in place as an 'insurance'.

By December, the left mandibular second molar had responded to traction and emerged enough to bond a bracket to its buccal surface. An 0.020" x 0.020" nickel-titanium continuous lower finishing archwire was then placed and engaged into this new bracket.

Apart from the molar attachments, which were still being used for the cross elastics, the lower fixed appliances were removed early in 1995 (Figures 16a, b and c). An interim second-bicuspid-to-second-bicuspid lower clear plastic







Figures 13a, b and c. Study models during treatment (22.6.94).

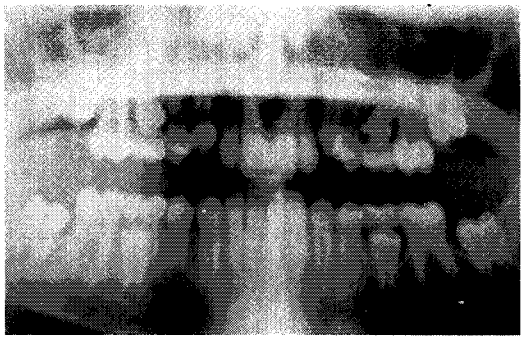


Figure 14. The pre-treatment panoramic radiograph.

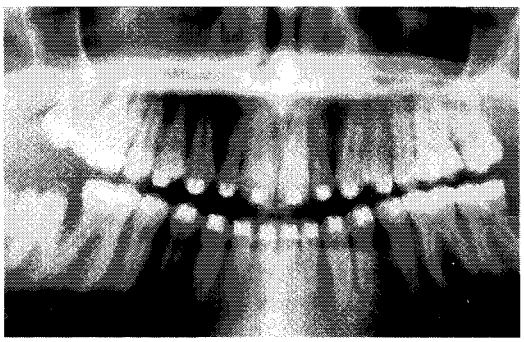
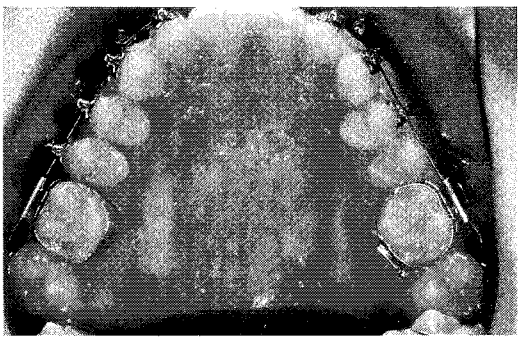
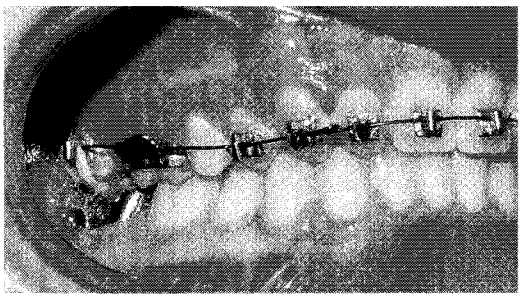


Figure 15. The panoramic radiograph taken during treatment to investigate why the lower left second molar had not erupted.







Figures 16a, b and c illustrate bonding and banding of second molars and use of cross elastics.

retainer was issued while the cross elastics were worn; not long afterwards the upper fixed appliances also were removed and a positioner was issued to hasten settling of the occlusion. It was worn for two months.

The bilateral buccal cross-bite of the second molars proved quite resistant to efforts to correct it. The patient continued the cross elastics, even in retention, and eventually his persistence was rewarded. His smile and the study models taken when all attachments were removed are shown in Figures 17, and 18a, b, c, d and e.

Retainers were worn full time for two months, and then reduced to nights only for four months and then stopped. By now the patient had finished school, was enrolled at university, and was finding it difficult to attend for appointments. This notwithstanding, post-retention records were taken in August 1996 (not shown). Figures 19a, b, c, d, e and f show the intra-oral and extra-oral photographs taken eighteen months post-retention, in September 1997.

Discussion of Phase II treatment

Fixed appliance treatment was prolonged because of the difficulties with the second molars but, the treatment's duration aside, the occlusal outcome was satisfactory.

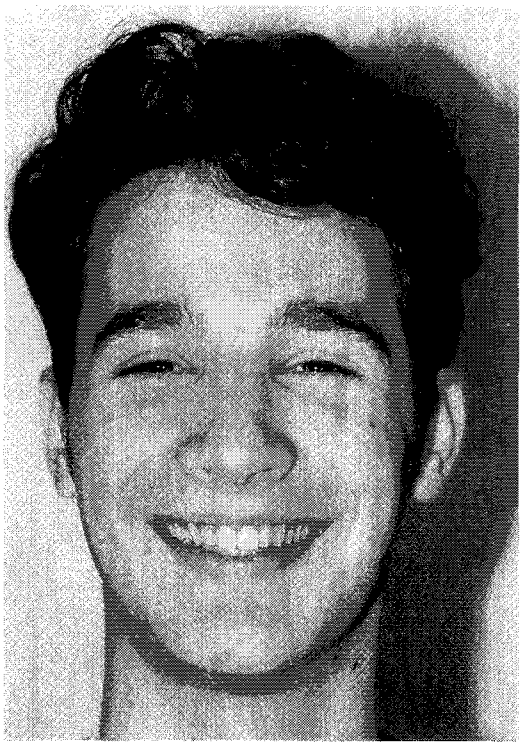


Figure 17. Bands-off smile.

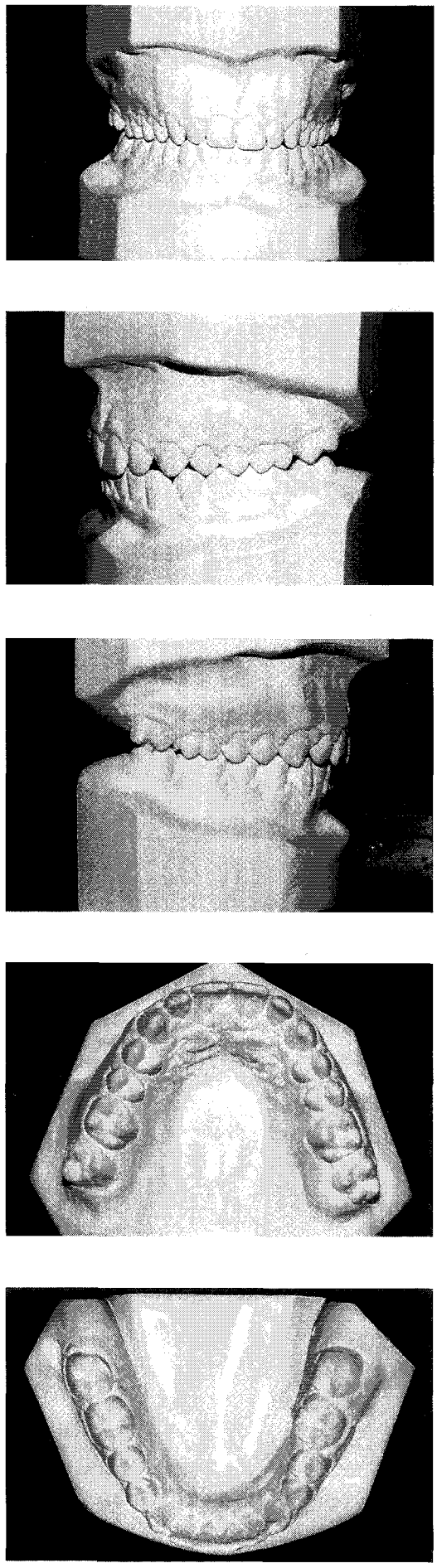
It is interesting to see how close the treatment came to fulfilling the Bass aesthetic ideals. An examination of the last of the three aesthetic-analysis tracings seen in Figure 9 shows the chin projection is still just on the wrong side of the borderline between ideal and retrusive, although it has improved considerably on the pre-treatment appearance.

The upper lip was almost ideally positioned prior to treatment, although slightly retruded, and this has not changed.

The upper central incisors have been torqued well but, according to the aesthetic analysis, they are bodily still too far back in the face.

Although the patient was happy with the result, if one is being critical it is probably true that a toothier smile would have been more aesthetic. How could this have been achieved? After all, protracting a maxilla in a teenager is not readily achieved without surgery. The answer may lie in the position of the mandible; perhaps, if it had been possible to advance the mandible more, so that the soft tissue chin point lay between the two lines rather than just behind the lower border, less Class II mechanics might have been necessary, and the maxilla may have grown forward more. Obviously, this is just speculation.

The cephalometric measurements (Table II) and the superimposition of tracings (Figures 20a and b) show the overall changes due to treatment and growth. The large facial vertical increase and the change in upper central incisor torque are particularly obvious features.



Figures 18a, b, c, d and e. Bands-off study models.













Figures 19a, b, c, d, e and f. Post-retention records.

Table I. Case Summary: Patient: A. K., aged thirteen.

Description of case:

Class II div. 2 with 110% deep overbite; retroclined upper and lower anterior teeth; mandibular retrusion; deep labiomental fold; rotated 12, 21, and 22; peg 12 and 22; missing 28 and 48; and dental age behind the chronological age and puberty.

Treatment:

1 Convert from Class II div 2 to div. 1 with a removable upper appliance.
2 Functional appliance (Clark Twin Block) treatment.
3 Begg appliance therapy without extractions.
4 Surgical exposure and bonding of a chain to 37, apically repositioned flap and excision of dense fibrous tissue and cystic lesion.
5 Traction to 37 and correction of its buccal cross-bite.
6 Retention and recommendation to have 12 and 22 built up with resin.

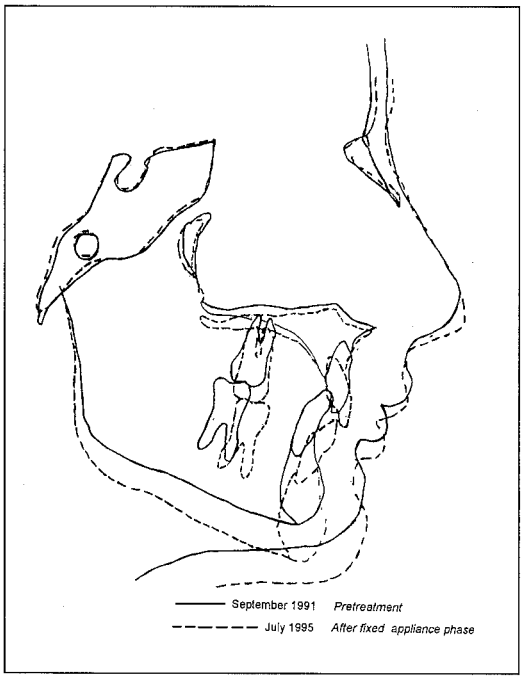
Duration:

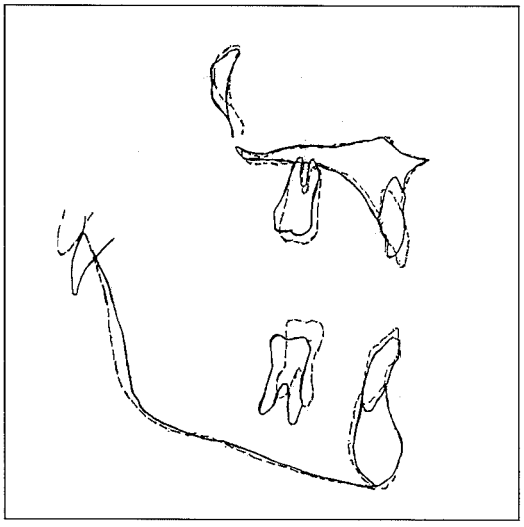
Two months to convert from Class II division 1 to division 2.

Six months with Clark Twin Blocks.

Thirty months of fixed appliances. Extended beyond the usual duration because of the failure of 37 to erupt.

A positioner for two months, followed by upper and lower retainers full time for two months and four months wearing them at night.





Figures 20a and b. Final cephalometric tracings and superimpositions.

Table II. Cephalometric measurements pre-treatment, during treatment and after.

	12 yr old averages	September 1991	October 1992	June 1994
SNA	81±3°	78°	78°	77°
SNB	78±3°	72°	75°	74.5°
ANB	3.7±2°	6°	3°	2.5°
SN-MP	33±5°	30.5°	31°	31.5°
Y Axis	67±3°	71°	72°	76°
U1-SN	103±6°	72°	85°	95.5°
L1-MP	96±7°	96.5°	102°	98°
L1-AP	24±5°	16°	24°	24°
L1-AP	1±3mm	–4mm	0mm	-1mm
U1-L1	128±11°	162°	141°	132°

Address for correspondence and reprints:

Morris Rapaport
23 Bellevue Road,
Bellevue Hill NSW 2023
Australia
E-mail: mrapapor@postbox.usyd.eud.au

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