

CLINICAL
SECTION

Contemporary treatment of a crowded Class II division 1 case

C. I. Lowe

University Dental Hospital of Manchester, UK

Abstract

Index words:

Twin Blocks, fixed appliances, premolar extractions

A 12-year-old Caucasian male presented with a severe Class II division 1 incisor relationship on a mild Skeletal II base with an average maxillary–mandibular planes angle and average lower facial height. Crowding was severe in the upper arch and moderate in the lower arch.

Treatment was commenced using Twin Block appliances, and followed by extractions in all four quadrants and fixed appliances. This case illustrates the versatility of the Twin Block appliance in the treatment of those cases exhibiting crowding.

Received 2 May 2002; accepted 5 November 2002

Introduction

A 12-year-old Caucasian male was referred by a local specialist orthodontist requesting that the patient was treated at Manchester Dental Hospital. The patient complained that his ‘upper teeth stuck out and were crooked’.

On examination he presented with a Class II division 1 incisor relationship on a mild Class II skeletal base. The Frankfort–mandibular planes angle was average as was his lower facial height. His lips were of average thickness and were ahead of Ricketts’ E-plane. They were incompetent at rest with the lower lip lying palatal to the upper incisors.

Intra-oral examination

The patient was in the permanent dentition. He presented with an overjet of 11 mm, and the overbite was increased and incomplete. The upper right first premolar was in a scissors bite and the molar and canine relationships were a full unit Class II on both sides. The upper arch crowding was severe with the left maxillary canine totally excluded from the arch and with a marked centreline shift to the left. In the lower arch the crowding was moderate and there was also a centreline shift to the left. His oral hygiene was good. There were only three small restorations in first permanent molars (Figure 2).

Radiographs

An orthopantomograph confirmed the presence of all teeth including the unerupted third molars (Figure 3). The lateral cephalometric radiograph (Figure 4) and analysis (Figure 5) confirmed the mild Class II skeletal pattern (ANB 5 degrees) and average lower facial height. The maxillary incisors were proclined at 118 degrees and the lower incisors were of average inclination at 91 degrees.

Problem list

1. Class II skeletal pattern.
2. Increased overjet.
3. Increased overbite.
4. Scissor bite upper right first premolar.
5. Crowding in both arches.
6. Centreline shift to the left in both arches.

Aetiology

1. Inherited skeletal pattern has led to the mild Class II skeletal pattern.
2. Lower lip trapping has contributed to the increased overjet.
3. Increased overbite due to unopposed vertical development of the labial segments.

4. The left canine is the last tooth to erupt in this area, with resultant buccal displacement and subsequent centreline shift to the left.
5. Dentoalveolar disproportion has exacerbated the crowding

Treatment plan

1. Fit Twin Blocks to correct the sagittal discrepancy and achieve Class I molars.
2. Review the need for extractions following functional therapy.
3. Pre-adjusted edgewise appliances to align arches, correct centrelines, and improve buccal segment occlusion.
4. Retain and monitor eruption of third molars.



Fig. 1 Pre-treatment photographs.

Treatment sequence

The first phase of treatment involved the use of Twin Blocks to attempt some growth modification (Figure 6). The Twin Blocks were of a standard design apart from the absence of a labial bow to the upper incisors. Whilst headgear tubes were incorporated in the design, it was not felt necessary to use headgear during treatment. The patient was extremely co-operative and the overjet reduced substantially within a period of 6 months (Figure 7).

A post-functional lateral cephalograms and analysis confirmed a reduction in ANB (Figure 8), and the malocclusion was re-appraised and a space analysis carried out. The cephalometric analysis demonstrated the changes typically seen following Twin Block treatment. The SNB angle increased with retroclination of the upper incisors and Proclination of the lower incisors.



Fig. 2 Pre-treatment intra oral photographs.



Fig. 3 Pre-treatment panoramic radiographs.



Fig. 4 Pre-treatment cephalometric radiographs.

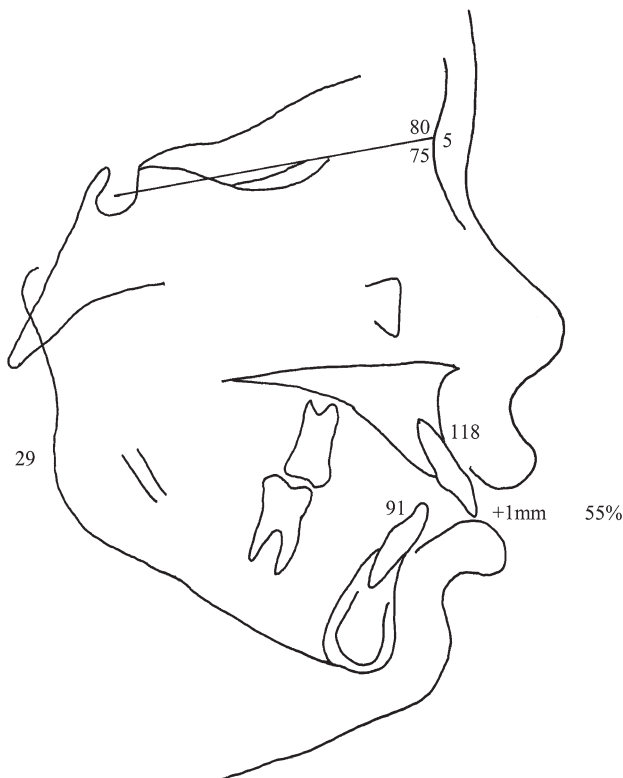


Fig. 5 Pre-treatment cephalometric tracing.

The decision was taken to extract the upper first premolars, the lower right second premolar, and the lower left first premolar. The lower right second premolar was chosen in preference to the first premolar because it was felt that little additional space was required to relieve crowding in this quadrant. An upper removable inclined bite plane was fitted to maintain the sagittal correction achieved with the Twin Blocks.

A lower MBT prescription pre-adjusted edgewise appliance was fitted and a standard archwire sequence of 0.016-inch nickel-titanium, 18/25-inch nickel-titanium, and 19/25-inch stainless steel was followed.

Unilateral right-sided lacebacks were used to encourage early correction of the centrelines (Figure 9). This worked well and the canines moved into a Class I relationship (Figure 10). Complete correction of the centrelines was achieved using power chain. Once the centrelines were correct and the arches were fully aligned upper and lower 19/25-inch posted stainless steel wires

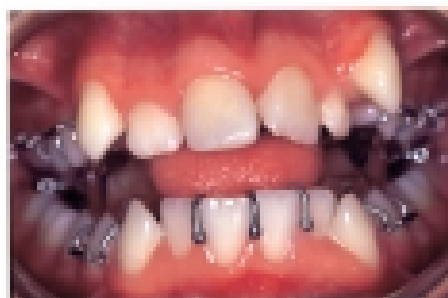
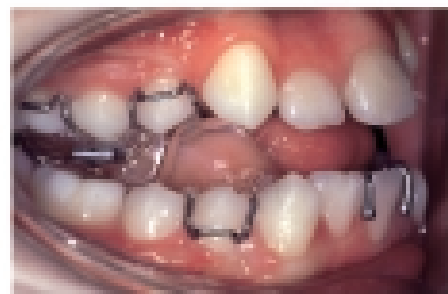


Fig. 6 Twin Block phase.

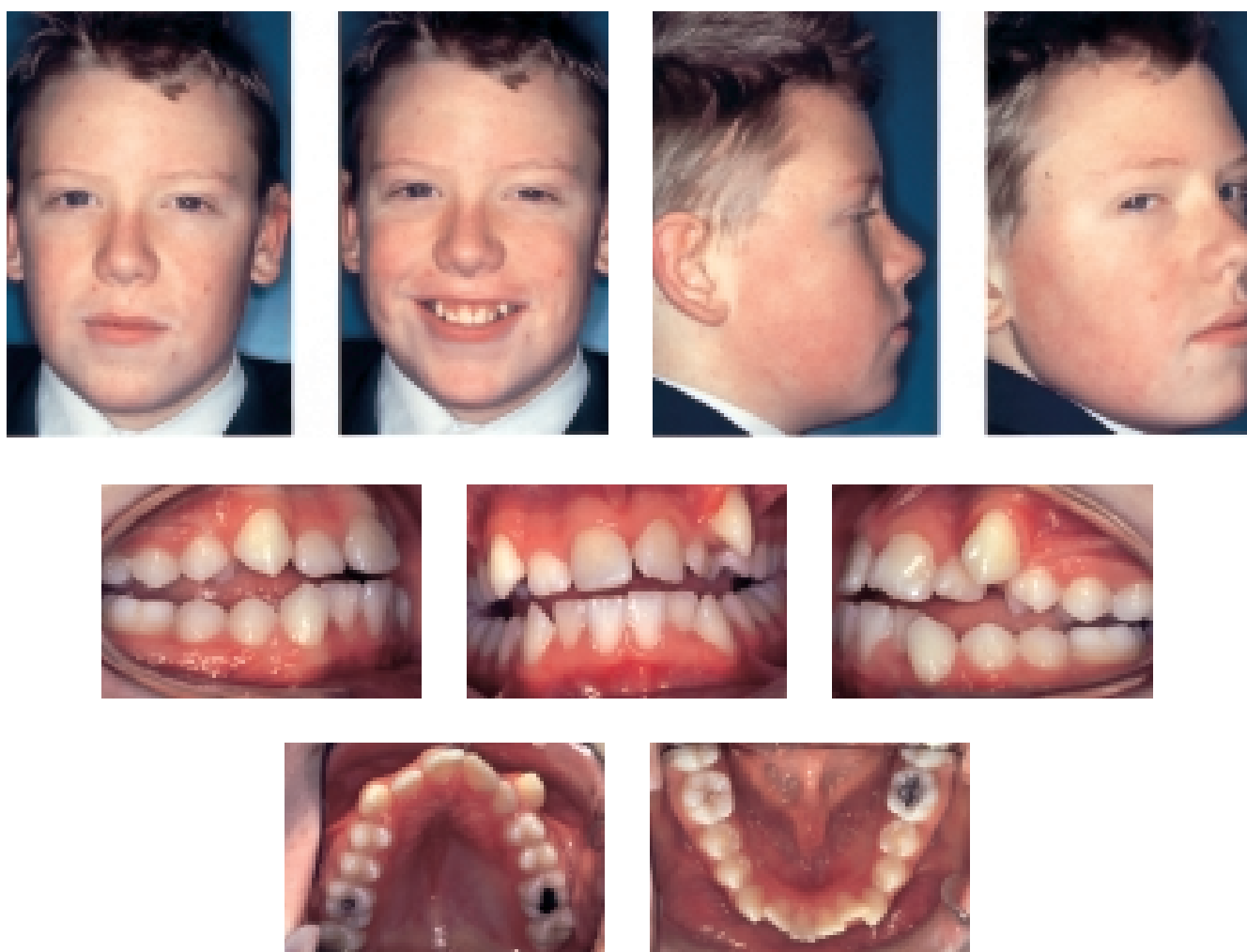


Fig. 7 Post-Twin Block treatment photographs.

were fitted. One month was allowed for the wires to express themselves, after which final space closure was achieved using nickel-titanium closing springs and Class II elastics (Figure 11).

Following debonding, upper and lower Essix retainers were used to maintain the results achieved.

Discussion of case

This case presented with a Class II division I incisor relationship on a mild Class II skeletal base. During the Twin Block phase the patient's skeletal pattern changed from Class II to Class I. The use of Twin Blocks efficiently reduced the overjet and changed a Class II buccal relationship to Class I. This converted a difficult case into one that was more readily manageable, providing that the extraction decisions were correct and that

anchorage was carefully controlled. The extraction decision was made to allow relief of crowding and also to facilitate correction of the centrelines. The standard archwire sequence enables a smooth and rapid progress to 19/25-inch stainless steel working wire providing that the wires are allowed to fully expand. Essix retainers were used as they are closely adapted to the dentition, are aesthetically pleasing, but still retain the achieved result.

Summary of case

The final result shows well-aligned arches with the overjet and overbite reduced successfully, and improved inter-digitation in the buccal segments (Figure 12). Cephalometric superimpositions reveal that sagittal correction was achieved by an increase in the SNB angle

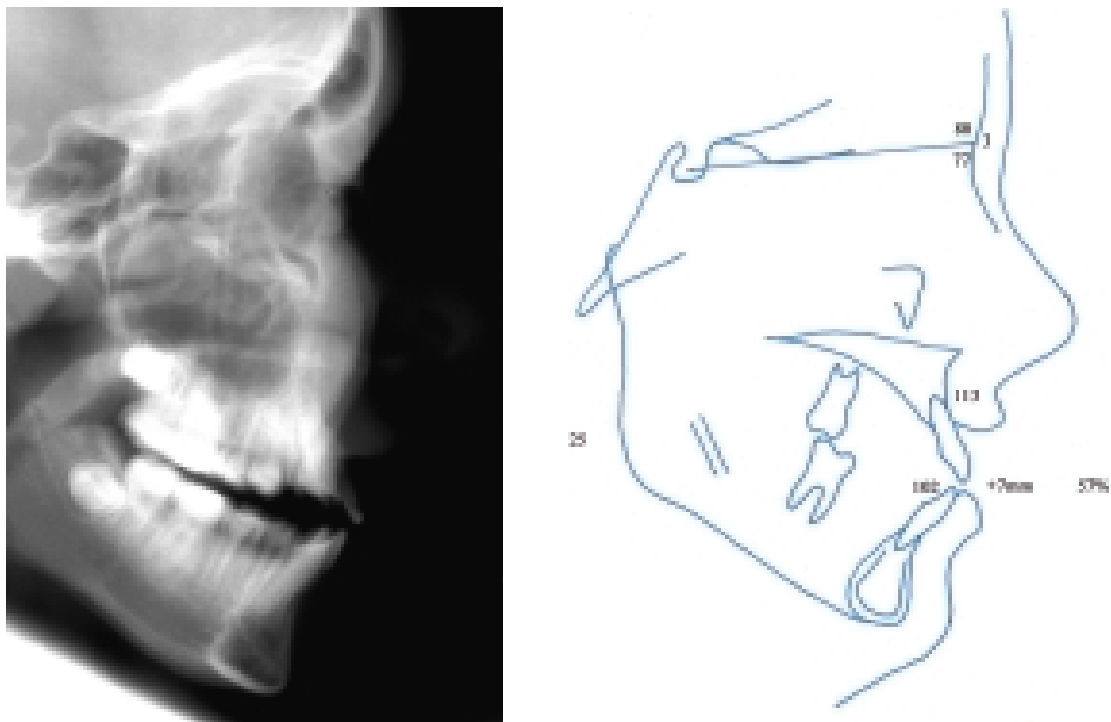


Fig. 8 Post-Twin Block treatment cephalometric radiograph and tracing.

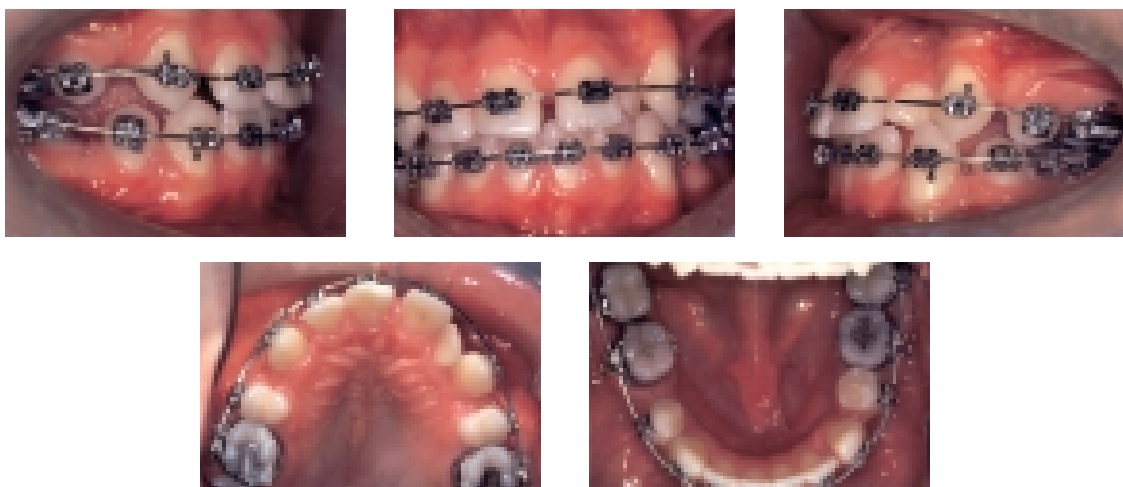


Fig. 9 Early fixed appliance treatment.

(Figure 13, Table 1). The maxillo-mandibular planes angle has reduced slightly. There has been considerable vertical growth of the mandible and a slight anterior growth rotation. The maxillary and mandibular incisors have retroclined with the inter-incisal angulation approaching normal (Table 1). Before treatment the IOTN was 5a with an aesthetic component score of 9. After treatment the IOTN and aesthetic component scores both reduced to 1. In addition there was a PAR

score reduction of 95% placing the patient in the 'greatly improved' category.

Conclusions

It was originally thought that those cases most suitable for functional appliance treatment were those with well-aligned dental arches and an underlying Class II skeletal pattern. The Twin Block appliance would certainly be a

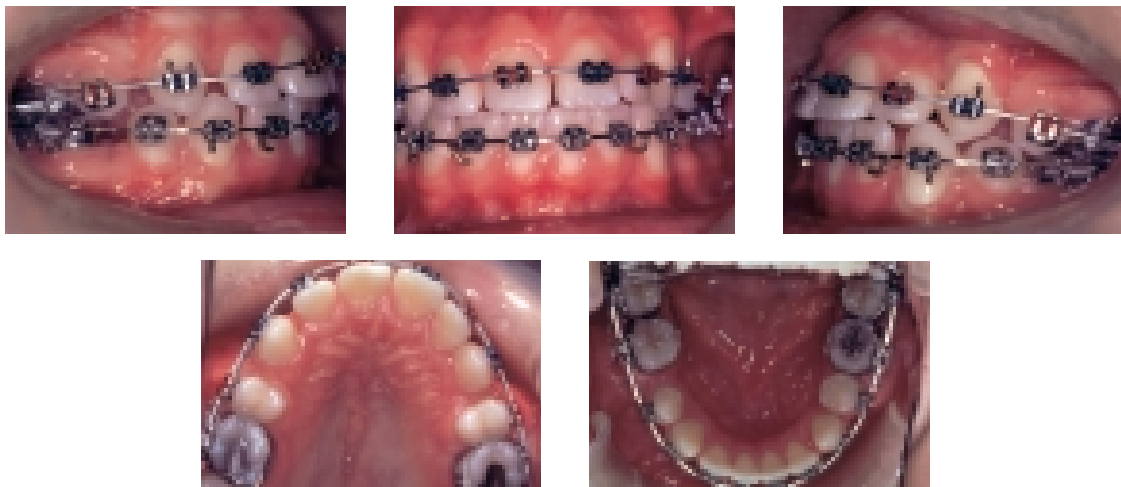


Fig. 10 End of alignment phase.

Table 1 Cephalometric changes

Variable	Pre-treatment	Post-functional phase	Post-treatment	Change
SNA	80°	80°	80°	0°
SNB	75°	77°	78°	+3°
ANB	5°	3°	2°	-3°
Upper incisors to maxillary plane	118°	113°	110°	-8°
Lower incisors to mandibular plane		102°	90°	-1°
Inter-incisal angle	123°	117°	134°	+11°
MM angle	29°	29°	25°	-4°
Face height ratio	55%	57%	57%	+2%
Lower incisor to APo	+1 mm	+7 mm	+3 mm	+2 mm
Lower lip to Ricketts' E plane	+4 mm	-2 mm	-2 mm	-6 mm



Fig. 11 Space closing phase.



Fig. 12 Post-treatment records.

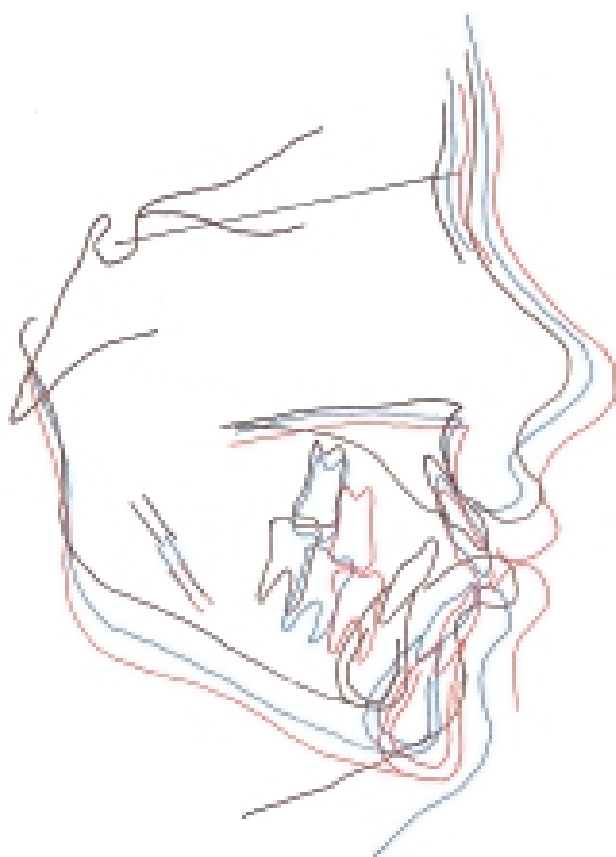


Fig. 13 Cephalometric superimpositions.

valuable tool for these cases. Importantly, even in cases with a marked degree of crowding, Twin Blocks are often beneficial. They are well tolerated by patients and can be worn 24 hours a day; since the mandible is not fixed in position, may even be worn when eating. This

freedom of movement also means that normal speech returns more readily than with other designs of functional appliance. Whilst the division of the Twin Block into two separate appliances is the secret of their success it also has a down side. Bite registration must ensure the technician constructs appliances with a sufficient amount of bite opening. Manufacture of the appliances with blocks that are too shallow enables the patient to bite more posteriorly, which will inevitable result in failure of the treatment.

As well as Class II division 1 cases it is a straightforward procedure to treat Class II division 2 cases using Twin Blocks.¹ The modifications suggested provide a simple way of proclining the upper incisors, thereby converting a Class II division 2 malocclusion into a Class II division 1 malocclusion, which is then amenable to correction by the Twin Blocks.

This case report clearly illustrates how versatile the Twin Block appliance is, when used in conjunction with fixed appliances, for treatment of even the most severely crowded arches.

Acknowledgments

I would like to thank my supervisors Kevin O'Brien and Jonathan Sandler for their help with this case.

References

1. Dyer FMV, McKeown HF, Sandler PJ. The modified Twin Block appliance in the treatment of Class II division 2 malocclusions. *J. Orthod* 2001; 28: 271–80.