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CASE REPORT

Correction of Skeletal Class II Malocclusion using Functional-Fixed Appliance Therapy

[1]Ashok Surana, [2]Surajit Chakrabarty, [3]Siddhartha Dhar

ABSTRACT

Single-phase treatment started during late mixed dentition using functional followed by fixed appliance therapy has proven to be the most effective approach to achieve correction of Class II malocclusion. This case report demonstrates the use of this treatment approach in an 11-year-old girl with skeletal and dental Class II malocclusion, large overjet, deep overbite, increased incisor exposure and a gummy smile. She was given a functional appliance for 1 year which was immediately followed by fixed mechanotherapy for final finishing and detailing of the occlusion. The magnitude of skeletal and dental correction achieved, along with the dramatic improvement in facial appearance of the patient, provides a strong case for establishing the efficacy of this treatment modality.

Keywords: Functional appliance, Twin block, Intrusion arch.

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INTRODUCTION

Angle Class II division 1 malocclusion is one of the most commonly encountered scenarios in clinical orthodontics. This is often caused by an underlying discrepancy in the growth of the jaws, with the majority being shown to have a component of mandibular deficiency.[1] Functional appliances compel the patient to function with the lower jaw forward and could stimulate mandibular growth, thereby correcting a Class II problem.[2] Functional appliance treatment followed by finishing with a fixed appliance is a well established method for the management of growing Class II division 1 patients, and can often be the most efficient route to an ideal outcome.

This case report illustrates the efficient use of the Twin block in correcting skeletal Class II malocclusion, the advantages offered by the MBT system in treating cases following a functional appliance, use of a Connecticut Intrusion Arch to reduce incisal exposure and improve a gummy smile; and finally the paramount importance of diligence in finishing a case to perfection, to ensure long-term stability.

Diagnosis and Etiology

The patient was an 11-year-old girl who reported with the chief complaint of protruding upper front teeth. On extraoral examination she was found to have facial frontal symmetry, convex profile, acute nasolabial angle, incompetent lips and a gummy smile (Fig. 1). Intraoral examination showed late mixed dentition status with bilateral Class II molar, canine relationships and a mesiodens in the upper arch. In addition, she had an overjet of 14 mm and an overbite of 6 mm (Fig. 2). Standard panoramic and lateral radiographic views were obtained (Fig. 3). The case was diagnosed as a Class II skeletal malocclusion with mandibular deficiency and maxillary dental proclination.

Treatment Objectives

1. Reduction of lip incompetence and profile convexity.
2. Correction of molar and canine relationships.
3. Achievement of normal overjet and overbite.

Treatment Plan

As the patient had Class II skeletal and dental relationships, increased overjet and overbite, and was in the late mixed dentition period, growth modification was planned using functional appliance therapy. This was to be followed up with

Fig. 1: Pretreatment extraoral photographs

[1]Head, [2]Associate Profesor, [3]Senior Lecturer
[1-3]Department of Orthodontics, Guru Nanak Institute of Dental Sciences and Research, Kolkata, West Bengal, India

Corresponding Author: Ashok Surana, Head, Department of Orthodontics, Guru Nanak Institute of Dental Sciences and Research Kolkata, West Bengal, India, e-mail: life_line_dental@yahoo.co.in

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Fig. 2: Pretreatment intraoral photographs

Fig. 3: Pretreatment radiographs

a phase of fixed appliance therapy for final detailing of the occlusion.

Treatment Progress

Following the extraction of the mesiodens, twin blocks were fabricated for the patient. The design of the appliance ensured optimum patient operation. After a 12-month period of wear, significant improvement in profile convexity and lip relationship, along with correction of molar and canine relationships as well as reduction in overjet and overbite were achieved (Figs 4 to 6).

This was followed by final detailing with 0.022" pre-adjusted edgewise MBT appliances. The wire sequence followed was 0.014" HANT, 0.019 × 0.025" HANT, 0.019 × 0.025" SS, followed by an intrusion arch in the maxilla made from 0.019 × 0.025" CNA wire (Fig. 7). Reduction in gingival exposure on smile resulted from active incisor intrusion.

Fig. 4: Postfunctional extraoral photographs

Fig. 5: Postfunctional intraoral photographs

Fig. 6: Postfunctional cephalogram

Fig. 7: Connecticut intrusion arch

Final settling of the occlusion was achieved using 0.014" SS wires and settling elastics. The case was debonded after 22 months of active treatment with fixed appliances, followed by placement of upper and lower fixed retainers (Figs 8 to 10). The results were found to remain stable 3 years posttreatment (Figs 11 and 12).

Table 1 compares the cephalometric findings pre-treatment, posttreatment and at 3 years in retention. Superimposition reveals the underlying skeletal and dental changes that have taken place (Fig. 13).

DISCUSSION

Clark's Twin block is a functional appliance which effectively modifies the occlusal inclined plane to induce favorably directed occlusal forces by causing a functional mandibular displacement.[3] It is esthetic, allows masticatory function and

Fig. 8: Post-treatment extraoral photographs

Fig. 9: Post-treatment intraoral photographs

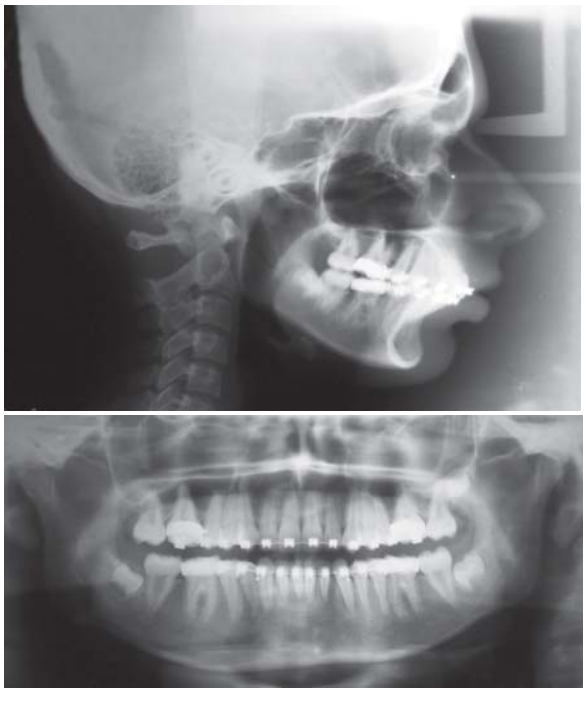

Fig. 10: Post-treatment radiographs

Fig. 11: Extraoral photographs 3 years post-treatment

Fig. 12: Intraoral photographs 3 years post-treatment

Table 1: Comparison of pre- and post-treatment parameters

Parameters	*Pretreatment*	*Post-treatment*	*Retention (3 years)*
SNA	90°	89°	89°
SNB	79°	81°	82°
ANB	11°	8°	7°
SN-GoGn	27°	26°	28°
IMPA	98°	103°	103°
Mx length	91 mm	91 mm	91 mm
Md length	99 mm	112 mm	115 mm
Facial axis (McNamara)	0°	0°	0°
N perpendicular Pog	21 mm	9 mm	9 mm
Nasolabial angle	105°	120°	123°

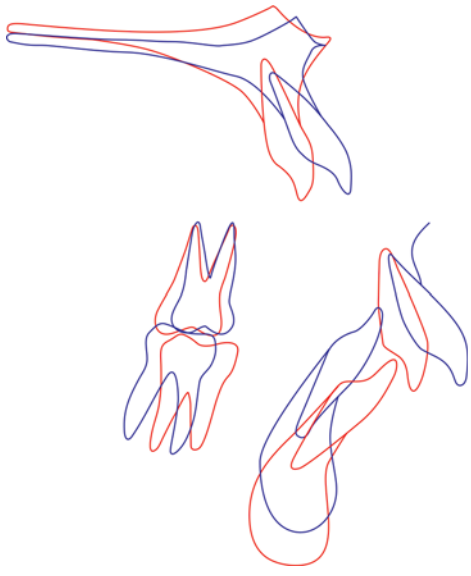

Fig. 13: Cephalometric superimpositions

has the advantage of full-time wear.[4,5] Several studies have documented the ability of the twin block to induce significant skeletal as well as dentoalveolar changes, which, in combination, bring about correction of the Class II relationship.[6-12]

The earlier approach to Class II correction involved two phases of therapy—a functional appliance phase in the early mixed dentition followed by an interim period of no active treatment for around 2 to 3 years while the permanent teeth erupted. Fixed appliances were placed once all premolars had erupted.

While this modality of treatment conferred early clinical and psychological benefits to the patient,[13,14] it had the disadvantages of longer treatment time, greater overall cost and patient burnout in later stages of treatment.[15]

Late treatment with the twin block starting during or slightly after the onset of the peak in mandibular growth appears to be

more effective than early treatment, as it induces more favorable mandibular skeletal modifications.[16]

The current trend of treating in a single phase, starting at the late mixed dentition ensures maximum patient cooperation at an age when the patient is becoming increasingly conscious of his/her appearance and actively participates in the process. This ensures consistent results with the functional appliance. The subsequent phase of fixed appliances rapidly provides the fine detailing and settling of the occlusion so necessary to ensure stability of the correction.

CONCLUSION

The ingredients required for producing good results in skeletal malocclusions include correct timing to utilize growth, choice of the right appliance, patient motivation, in-depth knowledge and efficient use of biomechanical principles and extraction and patience in finishing and settling. All these have combined to produce the excellent and stable results seen in this case.

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