Functional Appliance Therapy: A Case Report
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Abstract:
Various treatment approaches are available for management of class II malocclusion. Functional jaw orthopaedics in growing individuals can result in a broad beautiful smile, an excellent functional occlusion and noticeably improvement in profile. Following is a case report of a patient with twin block appliance in early permanent dentition period. Significant results can be obtained with proper case selection and patient compliance.

Key words: Class II malocclusion, Functional appliance, Twin block appliance

Introduction:
Functional appliances are those which produce both skeletal and dental changes through force generated by muscles.¹ In 1977, functional appliance therapy evolved with the development of twin block appliance by Dr. William Clark, representing significant transition from one piece appliance to twin appliance that promotes normal function.² The goal of twin block therapy was to produce a technique that could increase the growth response to functional mandibular protrusion by using an appliance system that is simple, comfortable and aesthetically acceptable to patients.³

The occlusal inclined plane is the fundamental functional mechanism of the natural dentition. Occlusal forces that are transmitted through the dentition provide a constant proprioceptive stimulus to influence the rate of growth and the trabecular structure of the supporting bone.³,⁴ As Twin blocks are bite-blocks that effectively modify the occlusal inclined plane to induce favourably directed occlusal forces by causing a functional mandibular displacement, they had been chosen as the mode of treatment in the case mentioned.

Case Report:
A 11-year-old pre-adolescent female came to the department with a complaint of forwardly placed upper front teeth. On extra-oral examination, the patient was mesoprosopic facial form with convex facial profile. The nasolabial angle was acute and the chin recessive with incompetent lips with an interlabial gap of 5 mm, and horizontal growth pattern (Image I). The clinical FMA was low. She had positive VTO on advancement of the mandible to edge to edge bite (Image II & III). On functional examination, perioral muscle activity was normal. Incisor exposure on smile was 7mm. On intra-oral examination (Image IV), the patient was in the early permanent dentition, it showed Angle’s class II molar relation, class II canine relation bilaterally, Bellard’s class II Div I incisor relationship and overjet of 9mm, and lower dental midline shifted to right by 2mm with the facial midline (Image V)

The overbite was increased to 5 mm (70% Deep bite). The case was diagnosed as Class II skeletal malocclusion with mandibular deficiency and maxillary dental proclination. The lateral cephalometric findings (Image VI) were an increased ANB (5°) with normal SNA
Image I: Pre-treatment photograph

Image II: Pre-treatment profile

Image III: Positive VTO

Image IV: Pre-treatment intra-oral photographs

Image V: Orthopantomogram

Image VI: Comparison of the pre and post-treatment profile

Image VII: Comparison of the pre and post-treatment cephalograms
angle and SNB and SND was reduced indicating a normal maxilla and retrognathic mandible. The Wits appraisal (+4 mm) confirmed that the patient had a Class II skeletal pattern. The SN-mandibular plane angle and the lower facial proportions were reduced. Lower incisors were normally angulated while the upper incisors were proclined. According to Tanner and White, skeletal maturation Index 5,6 (Image VII) was G stage which indicated peak pubertal growth spurt. According to MacNamara, most of the class II Div I malocclusion was due to retrognathic mandible where functional appliances are most effective especially during growth period 7.

Treatment objective:
1. Reduction of profile convexity and lip incompetence.
2. Achieve skeletal class I by growth modification with functional appliance.
3. Achieve Angle’s class I molar, class I Canine and Incisor relation.

Treatment plan:
As the patient had skeletal and dental Class II relationship in growing phase (cervical vertebrae maturation indicators), growth modification was planned using functional appliance followed by fixed orthodontic appliance for final detailing of occlusion.

Treatment progress:
Twin block was fabricated for the patient (Image VIII). To prevent further proclination of lower incisors, acrylic capping was done. After a 10 months period of wear, there was significant improvement in profile and lip competency (Image VI). Significant correction in molar and the canine relation was obtained along with significant reduction in overjet and overbite (Image IX, X)

Image X: post twin block intra-oral images

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<tr>
<th>Parameter</th>
<th>Pre-treatment</th>
<th>Post-treatment</th>
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<tbody>
<tr>
<td>SNA</td>
<td>81°</td>
<td>81°</td>
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<tr>
<td>SNB</td>
<td>76°</td>
<td>79°</td>
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### Discussion:

Skeletal class II malocclusion may be due to maxillary prognathism, mandibular retrognathism or combination of both. Hence, proper understanding of etiology and identifying differential diagnosis is helpful to select treatment planning whether functional, orthodontic or surgical. Lower incisor proclination is an important side effect of twin block appliance treatment. In this case, the lower incisor acrylic capping was done to reduce the proclination of lower incisors. Open bite seen immediately after twin block therapy will be only transient and can be settled by the passive eruption of molars or comprehensively by the Phase II therapy. The total duration of phase 1 treatment was 10 months being growth modification using Twin block. Several studies have documented the ability of Twin block to produce significant skeletal and dentoalveolar changes which in combination correct Class II malocclusion.

Here, comparison of pre-treatment and post-treatment lateral cephalogram (Image VII) showed SNA remains unchanged, SNB increased by 3° and there is decrease in ANB angle by 3°. Inclination of maxillary remains same and mandibular incisors were proclined by 5°. Length of the mandible is increased by 3 mm (Table I).

### Conclusion:

In the pursuit of ideals in orthodontics, facial balance and harmony are equally important in aesthetic and occlusal perfection. We cannot afford to ignore the importance of functional jaw orthopaedic technique in achieving these goals by growth guidance during the formative years of facial and dental development. But it should not be expected that all patients who undergo functional appliance therapy will show an increased mandibular growth compared to norms for their age. Some patients grow at a rate less than the norm, while others exceed the normal rate of growth with or without functional appliance therapy.

### References:

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