

## Soft Tissue Effects of Twin Block Appliance and Face-Bow on Early Treatment of Severe Class II Division 1 Malocclusion

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**Abstract:** *Class II division 1 patients are characterized by increased horizontal overjet between maxillary and mandibular incisors, lower lip is trapped behind protruded upper incisors and unfavorable convex facial profile, thus affecting patient's self-esteem and decrease their face attractiveness. The treatment modalities of any orofacial skeletal problem can be achieved by the growth modification, dental camouflage and/or orthognathic surgery. The action of the functional appliances during growth age is rearrangement and altering the direction of muscles' force that influences the function and the position of the mandible whereas the force will be transmitted to the basal bone and dentition. In this study a sample of twelve patients who presented to Orthodontic Department clinic in faculty of dentistry, Mansoura University. All selected patients had skeletal class II division 1 malocclusion due to mandibular deficiency with more than ten mm over-jet. They were treated by Twin Block functional appliance and face-bow. Treatment continued for almost a year. Facial profile better changes has occurred after treatment.*

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Date of Submission: 20-12-2018

Date of acceptance: 06-01-2019  
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### I. Introduction

Skeletal Class II malocclusion due to mandibular retrusion is the most common skeletal Class II relationship in the Egyptian orthodontic practice.(1) Orthodontic treatment aims largely to correct dental irregularities, while if there is a major skeletal discrepancy, orthodontics must be accompanied by dentofacial orthopedics treatment in growing patients or orthognathic surgery in adults to achieve a pleasing facial profile by correcting relationship of dentoskeletal subunits.(2). To growing patient with a skeletal class II malocclusion of mandibular retrognathism, generally, the treatment plan of choice is

restricting the maxilla and advancing the growth of the mandible. This could be obtained by functional appliance and Face-bow altogether.(3)Twin-block is a functional appliance designed by Clark in 1977; it is composed of two bite-blocks that cause a functional mandibular forward displacement with using occlusal inclined plane. Upper and lower bite blocks are constructed for full time wear. All functional forces including the forces of mastication are applied to the dentition which is a great advantage of twin block appliance. In comparison to other functional appliances, Twin Block allows movement forward and in lateral excursions more comfortably without interfering normal function. In this study, an extra oral orthopedic force was added by face bow to support the action of Twin block by restraining the maxillary growth and allowing the mandible to catch up with it. Indication of such treatment are maxillary prognathism, mandibular retrognathism, and high vertical growth patterns.(4)

## **II. Material And Methods**

After sample size calculation, the estimated sample size was 12 patients. The initial sample of the present study started with twelve patients with mean of age  $9.8 \pm 1.70$  years. Patients were selected from the Orthodontic Department outpatient clinic of Faculty of Dentistry, University of Mansoura.

### **Inclusion Criteria:**

- Mean of age  $9.8 \pm 1.70$  years
- skeletal Class II division 1
- overjet was more than 10 mm.

### **Exclusion Criteria**

- No orthodontic treatment has been done before.
- Bad oral hygiene.

Two of the twelve patients were excluded due to personal circumstances. Therefore, Ten patients were included in the final sample of this study.

### **Informed consent:**

All terms of informed consents were explained to all patient and parents. After that all selected subjects'parents were asked to sign the informed consents before startingtreatment.

### **Records:**

1-Intraoral photos included right, left, frontal photographes of the patient's teeth in a maximum intercuspation, and, Separate upper and lower occlusal views were taken. Another occlusal view was also taken while the patient in maximum occlusion to show the horizontal overjet and the upper and lower incisor relationship. Extraoral views included frontal and profile photos of the patient face were also taken. Figure.1

## 2- Lateral cephalometric x-ray films

**Appliance Construction** started with a rubber base impression and a wax bite registered with the mandible forwarded 5mm from the usual distal occlusion. The cast is put into an articulator using the registered wax bite for appliance construction. The Twin block consisted of two removable parts, upper and lower components (figure.1). The upper part was modified by adding activator tubes at the premolar region to engage face bow. Adams clasps were used to retain the upper appliance. For more retention of the appliance, ball-ended clasps in the labial or buccal parts were added. To compensate for a functional protrusion of the mandible from its retraced position, a midline expansion screw provides compensatory lateral expansion of the maxilla. Labial bows are included to control labio-lingual tipping of the upper incisors. Retention is often obtained in the lower arch using interdental ball ended clasps in the lower anterior region in addition to buccal segments clasps. After construction of the twin block appliance, a high pull head gear and extra oral face bow was used in all patients together with the twin block appliance engaged into activator tubes. The force of the face bow was 400-500g/side to gain an orthopedic effect in restraining maxillary growth.(8) The patient was instructed to put on TB appliance for 24 hours/day and face-bow from 12-14 hours. Another wax bite was taken when the mandible reaches the full activation of the first one, this process may be repeated in over-jets more than 11 mm till the full overjet is corrected.



**Figure 1. Twin Block Appliance**

**Soft Tissue Measurements:** Naso-labial Angle, Lower lip to E plane and Upper lip to E plane, were measured from Pre- And Post-treatment cephalometric x-ray.

### **Statistical analysis**

Data were entered and analyzed using SPSS software for windows (version 21), Graph Pad prism for windows (version 6.01) and Boxplot graphs were created by STATA/MP software (version 14.0) for windows (32-bit).

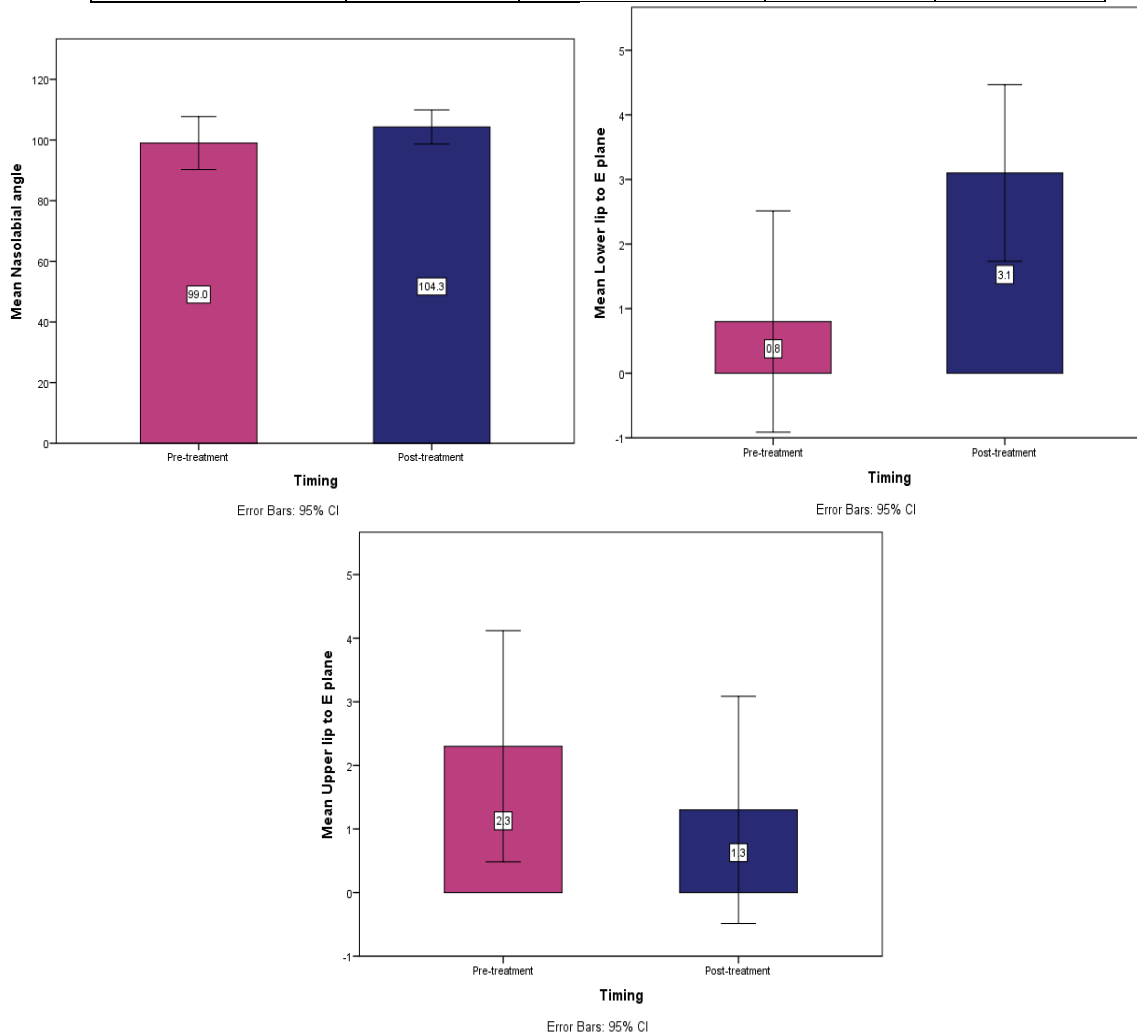
### **III. Result**

Outcomes of the soft tissue variables of pre- and post-treatment are presented in table (1) and figure (2). The lower lip to E plane was found statistically significant. Although

non statistically significant change has occurred in the naso-labial angle but this increase is considered clinically significant.

**Table (1): Soft tissue measurements changes before and after treatment.**

Parameter	Pre-treatment	Post-treatment	Statistic	P
Naso-labial angle	99 ± 12.2	104.3 ± 7.9	t = -1.869	0.095
Lower lip to E plane	0.80 ± 2.4	3.1 ± 1.9	t = -4.641	<b>0.001</b>
Upper lip to E plane	2.3 ± 2.5	1.3 ± 2.5	t = 1.936	0.085



#### IV. Discussion

Soft tissues changes reflected those changes in the underlying hard tissues. So, functional appliances besides improving the skeletal measurements, also improved the soft tissue measurements.. Facial appearances and attractiveness showed a significant improvement within 4 or 6 months of beginning treatment by Twin block and extraoral force owing to musculereprogramming in the new position and uninterrupted wear, even at the time of eating. Rapid soft tissue adaptation happened due to improved occlusal relationship. An effective anterior oral seal and soft-tissue compensation occurred to support the primary

functions of mastication and swallowing (5). The present study showed significant changes in the lower lip to E plane. This is due to the forward position of the mandible after treatment. This outcomes were similar to Clark(5), , Baysal and Uysal(6), O'Brien et al(7), Lee et al.(8) While Kim et(9) concluded that treatment with twin block appliance produces favorable soft tissue improvement only in patients who were horizontal grower and had decreased lower incisors angulation.

### V. Conclusion

The current study revealed that the combination of Twin block appliance with extra-oral traction force (face-bow) was an effective appliance in the treatment of growing patients with Class II division 1 relationship by producing skeletal, dent-alveolar changes that profoundly enhance soft-tissue profile and all face (figure.3).



**Figure.3** Extra-oral photograph of a patient before and after treatment

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Safa A. Eltabey. “Soft Tissue Effects of Twin Block Appliance and Face-Bow on Early Treatment of Severe Class II Division 1 Malocclusion.”. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, vol. 18, no. 1, 2019, pp 74-77.