

## TWIN BLOCK: A DUAL FUNCTIONING APPLIANCE- A REPORT OF TWO CASES

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### ABSTRACT:

A number of treatment approaches are available for the management of developing skeletal and dental Class II malocclusion. The objective of the dentofacial orthopedic is to promote harmonious facial growth by changing the functional muscle environment around the developing dentition. The principle of functional appliance therapy is to reposition a retrusive mandible to a forward position by constructing an appliance that brings a protrusive bite when appliance is placed in mouth. Treatment of dental malocclusion can be done at any stage ie in the early or late mixed dentition or even in the permanent dentition. These cases were reported to the department of pedodontics, Himachal Dental College, Sunder Nagar, H.P. with chief complaints of proclined upper front teeth. One of them was in the mixed dentition period where as the other one was in the permanent dentition. Both of them were treated with twin block appliance and the results were excellent in terms of skeletal and dental correction. Early treatment was indicated to give the child more favorable skeletal growth or to redirect the growth pattern of the jaws in the mixed dentition period.

**Key words:** mixed denititon, class II malocclusion, functional appliance therapy, twin block appliance



### INTRODUCTION:

Managing developing dentition and occlusion and its effects on wellbeing of children and adolescent has been the prime objective of pediatric dentistry. During the transition stage of dental development there are great opportunities to guide the growth toward favorable direction and intercept malocclusions at its incipient stage. Early diagnosis and successful treatment of developing malocclusions can have long-term benefits for skeletal malocclusion

and can avoid severe trauma of surgical intervention on later stage. Also, correction of dental malocclusion during adolescent years will improve his esthetics, function and thereby confidence among peer groups.

The 'functional matrix' of Melvin Moss <sup>[1-3]</sup> is a contemporary evaluation supporting the premise that function modifies anatomy. Malocclusion is frequently associated with unfavorable occlusal contacts (fig. 1 and 5, 6) and aberrant muscle behavior (fig 5) which result in

negative proprioceptive stimulus to normal growth and development. The pedodontist should diagnose the possible unfavorable muscle function as well as occlusal interference in the early mixed dentition period and guide them in favorable direction for proper growth and development of jaws and teeth.

According to Dr. James McNamara, mandibular retrusion is the most common feature of class II division 1 malocclusion in growing children.<sup>[4]</sup> Functional appliances are commonly used for the management of mandibular retrognathia in growing subjects <sup>[5]</sup> to redirect the growth pattern in favorable direction. Interceptive treatment is frequently indicated in mixed dentition to restore normal function and correct arch relationships by means of functional therapy.

Various treatment modalities are available for treating class II malocclusion including functional appliances ranging from conventional activator given by Andresean , monobloc used by Pierre Robin to twin block developed by William J. Clark of Fife, Scotland.<sup>2</sup> However, the older appliances of activator and monobloc are bulky, not comfortable for the patient, interfere with speech and cannot be used as full time appliance. Twin block lends itself to the advantage that it is simple, designed for full time wear and is comfortable than monobloc and activator.

Treatment with twin block can be broadly divided into 3 phases; active stage varying from 6-9 months and support phase

ranging from 3- 6 months followed by retention phase of 9 months.<sup>[6,7]</sup> This treatment modalities can be altered according to the need of the patients as well as dictated by the growth and development of the jaws and dentition.

## CASE DETAIL:

### CASE 1

A 9 and a half year old girl reported to the Department of Pedodontics and Preventive Dentistry with chief complaint of proclined upper front teeth. On extra oral examination patient had mesoprosopic facial form and convex facial profile. She exhibited acute nasolabial angle, with protrusive and strained upper lip and accentuated mentolabial sulcus. The patient had positive VTO on advancement of mandible to edge to edge bite.

Intra oral examination revealed late mixed dentition period with end on molar relationship (fig.1) and with constricted maxillary arch and high palatal vault. The maxillary teeth were severely proclined exhibiting overjet of 10 mm and deep bite.

### TREATMENT PLAN

In this case, we expanded constricted maxilla with a removable expansion screw appliance before sagittal and transverse correction of arches was done with twin block therapy. The bite registration and construction of the twin block appliance was done according to the instruction given by William Clark. In order to utilize the remaining pre-pubertal growth spurt,

we inserted the twin block appliance as soon as possible as the child was a female patient.

### **POST TREATMENT EVALUATION OF CEPHALOGRAM**

Pre and post treatment cephalogram of case 1 was traced and superimposed with SN plane as a reference plane. Differences between pre and post treatment measurements were analyzed and tabulated (Table 1).

### **CASE 2:**

A 14 year old girl reported to the Department of Pedodontics and Preventive Dentistry with chief complaint of irregular alignment of upper front teeth. On extra oral examination, the patient had mesoprosopic facial form and straight facial profile. She exhibited acute nasolabial angle, with protrusive and strained upper lip and hyperactive mentalis muscle (figure 5). The patient had positive VTO on advancement of mandible to edge to edge bite.

Intra oral examination revealed permanent dentition with class II molar relationship. The patient had proclined upper lateral incisors and retroinclined central incisor with deep bite. There was narrow maxillary arch with deep palatal vault. Upper and lower midlines were coincident.

### **TREATMENT PLAN:**

In this case, we planned to correct the retroinclined central incisors with the help of a Z spring appliance so that all incisors

were brought in alignment and bite registration is not interfered unlike Clark's recommendation who insisted incorporation of Z spring in the twin block appliance ( fig. 7,8). After the alignment of maxillary incisors, the overjet was increased upto 12mm and the bite was also opened (fig. 8). The next step will follow as usual as a class II div 1 malocclusion treated with twin block appliance. The pre and post-treatment cephalometric evaluation is shown in table 2.

### **DISCUSSION:**

The prime objective of twin block therapy is to infer growth related treatment to the patient and to establish harmony between soft tissue and hard tissue of the oral cavity. Several studies revealed that Angle class II division 1 malocclusion has a component where mandible is deficient<sup>[4]</sup> due to disto-occlusion by cusp. With incorporation of posterior bite blocks in twin block appliance this cuspal interference is eliminated, thereby allowing the mandible to grow in favorable direction. At the same time, by forcing the patient to function with lower jaw forward, growth of the mandible could be stimulated (inclined plane in the bite blocks) and correcting class II skeletal malocclusion.<sup>[8]</sup> Twin block effectively modifies the occlusal inclined planes causing functional mandibular displacement forward, thereby inducing favorable occlusal forces. These blocks are designed for full time wear and harness functional forces including forces

of mastication and are comfortable to the patient.

The orthopedic treatment of deficient mandible is recommended before pubertal growth spurt and preferably in pre-pubertal growth spurt.<sup>[9]</sup> This type of treatment in children can be achieved well if the treatment is started in the early mixed dentition period. The understanding of biologic phenomenon of growth lends itself to the explanation that greatest clinical benefits of functional appliances are seen in actively growing patients.

#### **Skeletal changes: case 1**

ANB angle has decreased from 6° to 3° as the mandible was postured forwardly by the twin-block appliance which induces the forward growth of mandible. In this present case, fortunately the maxilla was normal at 81° but twin block also has got distal component of force which arrest the growth of maxilla (headgear effect) when it is prognathic This finding is also supported by the various authors.<sup>[10,11,12,13]</sup>

Effective mandibular length which is dictated by linear measurement from condylion to menton has shown significant increase from 71 mm to 75 mm. The increase of this length is also supported by various studies.<sup>[17]</sup>

#### **Dentoalveolar changes : case 1**

The mean reduction in proclination of upper incisors by 14° is seen through change in upper incisor- SN plane angle

and the linear reduction from 10 mm to 4 mm was seen.

The contact of the labial bow on the upper incisors presumably together with the associated lip musculature resulted in final position of the upper incisors. William Clark recommended not to incorporate labial bow in the twin block appliance therapy in the early stages of skeletal correction because retracted maxillary incisors may interfere with skeletal correction. Since our patient was having minor skeletal discrepancy and major dental proclination we incorporated the labial bow from the beginning to correct the incisors proclination immediately. This is an expected treatment outcome of functional appliance therapy due to their Class-II Traction effect.<sup>[12,14,15]</sup>

Highly significant decrease in the degree of overjet was observed. The overjet correction was mostly achieved by retraction of maxillary incisors and a little bit by proclination of mandibular incisors( IMPA). This is supported by results shown by various authors.<sup>[12,13]</sup>

The interincisal angle increased significantly by 7° following Twin Block treatment. This change is attributed mainly to upper incisor retroclination achieved during study and also greater inhibition of lower incisor proclination and is in accordance as found by Illing *et al.*<sup>[12]</sup>

**Case 2:** This case was more interesting so far treatment outcome is concerned. The patient was in her adolescent stage and was highly concerned about her look. In

the early stage of her growth and development, there was interference of growth of mandible because of class II division 2 malocclusion. Since the child was older and her growth spurt was over, our objective was to correct the dental malocclusion (fig. 5-9) mostly and skeletal change was as a secondary one.

The pretreatment SNA increased from 79° to 80° after central incisors were brought in alignment with the help of z spring appliance. When the maxillary central incisors were brought in alignment with lateral incisors, there was severe increase of the overjet (fig 8). To retract maxillary anterior teeth in this patient, twin block therapy was justified and the overjet brought to almost normal value (fig 10). [6, 14, 15] SNB angle was almost similar throughout the treatment phase as the child was in adolescent stage. The skeletal change was negligible in this second case as the growth spurt in this girl was almost complete. The ANB angle was 2° after completion of the treatment which is supposed to be normal value.

The axial inclination of the maxillary central incisor was 99° at the beginning of the treatment and was increased when the maxillary central incisors were brought in alignment with maxillary lateral incisors with the help of z-spring appliance. At the end of treatment, the maxillary central incisors were brought at

106° which was almost normal value and the look of the child improved considerably. The interincisal angle was 143° at the beginning of the treatment which was decreased to 125° at the end of twin block therapy.<sup>[12]</sup> The dentoalveolar change after 1 ½ years of twin block therapy was satisfactory, indicating retraction of maxillary incisors which is popularly known as “Traction effect” [12,14,15,16] of twin block therapy. This was necessary not only for esthetic purpose but also to prevent traumatic dental injuries.

### CONCLUSION:

Twin block is a dual functioning appliance; if properly fabricated and used in children, a pedodontist can change the skeletal abnormalities and modify the growth pattern of his patient at its growth spurt. It is equally effective for correction of dento-alveolar malocclusion in adolescent children.

The appliance is not bulky, comfortable to the patients, can be worn full time and during school hours which makes the appliance more effective than other functional appliances. In these present cases, we achieved significant dental correction of malocclusions as well as little bit skeletal changes which were beneficial to the patient.

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**TABLES:**

Table 1: showing pre and post cephalometric values of Shama ( case 1)

	Pre treatment	Post treatment
SNA	81°	81°
SNB	75°	77°
ANB	6°	3°
FMA	28°	29°
FMIA	62°	58°
IMPA	90°	93°
Y axis	62°	64°
Upper incisors – NA ( ° ; mm)	44° ; 10mm	30° ; 4mm
Lower incisors- NB	15° ; 5mm	30° ; 4mm
Interincisal angle	117°	124°
Saddle angle	135°	13°
Articulare angle	149°	135°
Gonial angle	123°	125°
Upper incisors – SN	125°	110°

TABLE 2: showing pre and post operative cephalometric values of Samridhi ( case 2)

	Pre treatment	Post treatment
SNA	79°	80°
SNB	78°	78°
ANB	1°	2°
FMA	24°	24°
FMIA	61°	60°
IMPA	95°	96°
Y axis	68°	59°
Upper incisors – NA ( ° ; mm)	20°	25°
Lower incisors- NB	22°	27°
Interincisal angle	143°	125°
Upper incisors – SN	99°	106

**FIGURES:**



Figure 1: pre operative intra oral view of malocclusion



Figure 2: post operative intra oral view of corrected malocclusion



Figure 3: support phase of twin block therapy

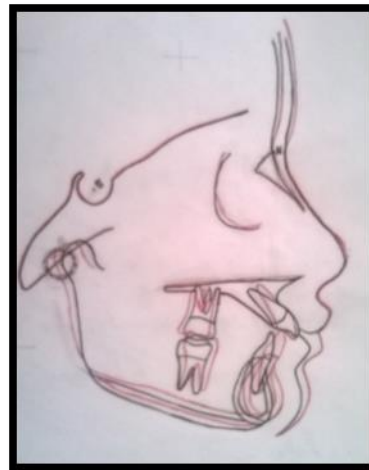


Figure 4: superimposition of the cephalometric tracing of Shama ( case 1)



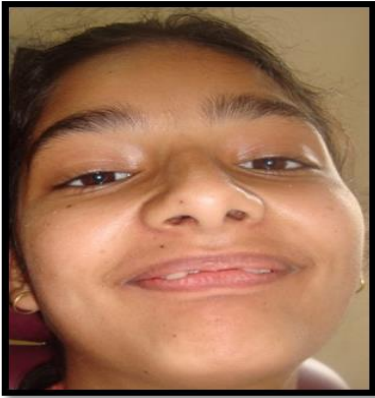


Figure 5: pre operative extra oral view of Samridhi ( case 2)



Figure 8: incisor alignment with z spring and accentuated overjet

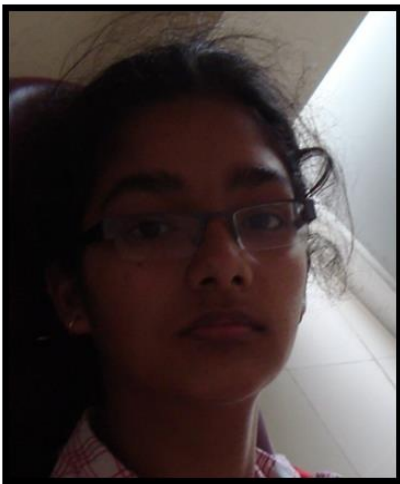


Figure 6: post operative extra oral view of Samridhi ( case 2)



Figure 9: intra oral view of twin block appliance



Figure 7: preoperative intra oral view of malocclusion with Z spring appliance



Figure 10: intra oral view of post operative corrected malocclusion

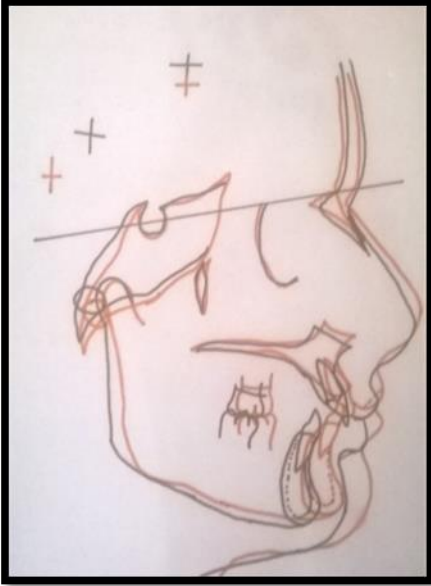


Figure 11: superimposition of cephalometric tracing of Samridhi ( case 2)