

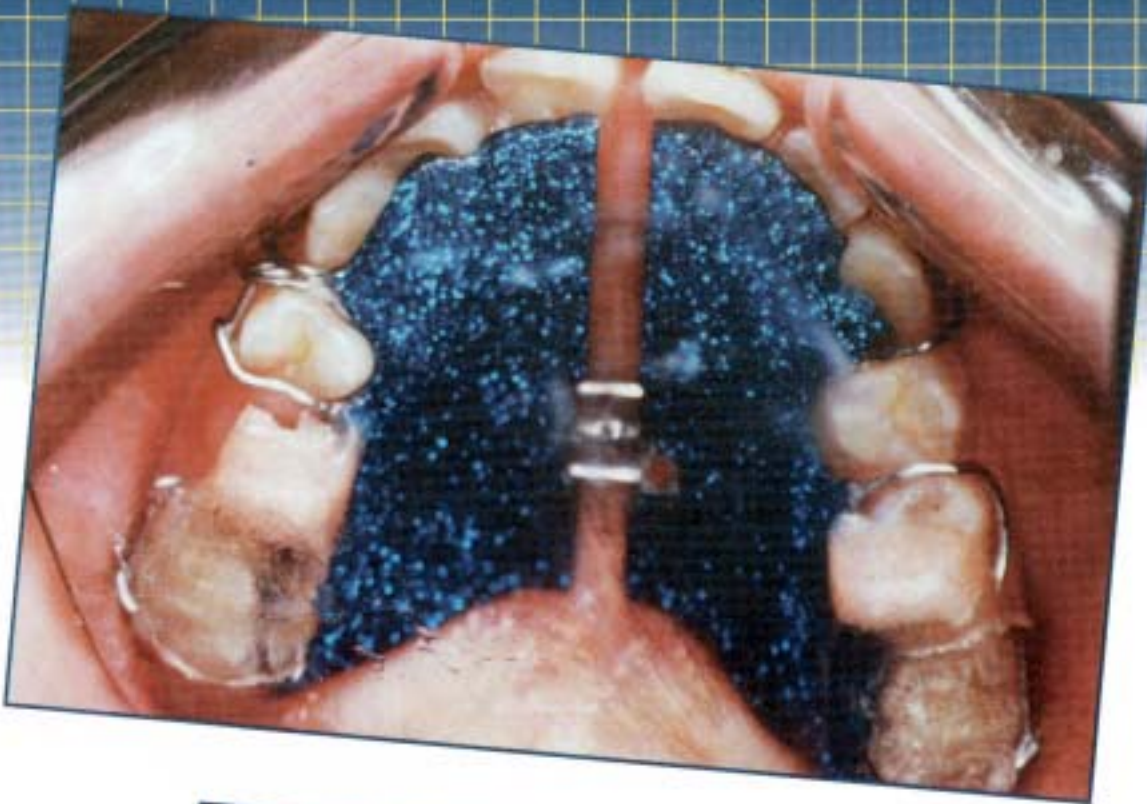
CASE REPORT:

THE TWIN BLOCK APPLIANCE

by Dr. Brock Rondeau

INTRODUCTION

In order to treat patients in the 90's orthodontic practitioners, including general dentists, pediatric dentists and orthodontists, must have a knowledge of orthopedics, orthodontics and TMJ. The earlier treatment is instituted, the more positively you can affect not only the patient's profile, but also the health of the TMJ. Orthodontic cases must be treated to stable joint relationships so the emphasis must be on condylar position rather than just proper interdigitation of teeth. My intention here is not to downplay the importance of a proper occlusion although it is incorrect if clinicians only pay attention to the occlusion to the detriment of skeletal and functional problems. If patients have perfect Class I occlusions at the end of treatment but suffer for the rest of their lives with head and neck pain because the condyle is posteriorly displaced, this can hardly be considered a successfully treated orthodontic case. It has been my clinical experience along with numerous other clinicians that when orthopedic appliances are utilized, this routinely results in a reduction in the signs and symptoms of TMJ dysfunction.



*Above, Figure 1—Occlusal
View, Upper Block -
January 1994*



*Right, Figure 2—Occlusal
View, Lower Block -
January 1994*

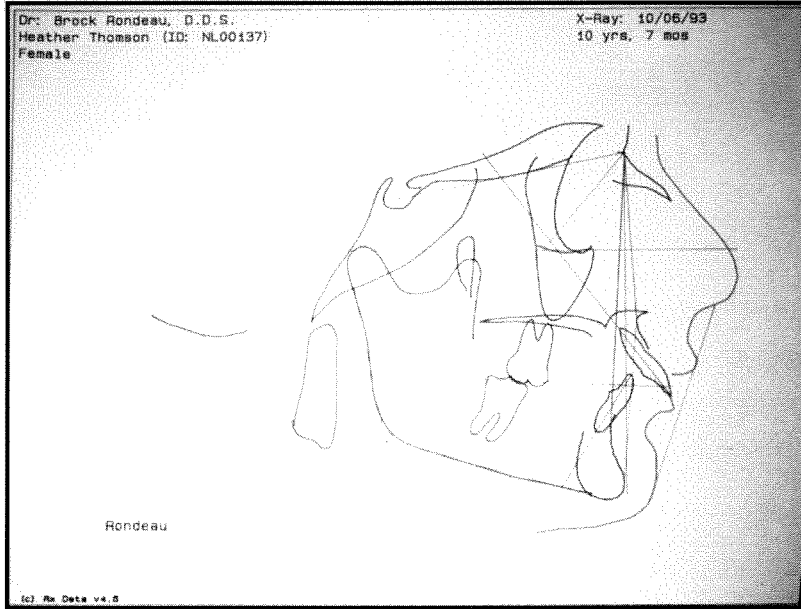
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Right, Figure 3—Right Lateral—January 1994

Below, Figure 4—Upper Block—Midline Screw Open 4mm.—February 1994



CASE REPORT:



Above, Figure 5—Ceph Tracing—June 1993
Below, Figure 6—Ceph Analysis—June 1993

Rondeau Analysis Report			
Doctor	: Brock Rondeau, D.D.S.		
Patient	: Heather Thomson		
Age	: 10 years, 7 months		
Sex	: Female		
X-Ray Date	: 10/06/93		
Summary	:		
Version	: v4.5		
Measurement Name		Normal Value	Actual

Profile			
S Line	MX Lip	+2mm	0.5
	MD Lip	+2mm	-1.7
Skeletal			
SNA		82.0-91.0	82.2
SNB		70.0-80.0	75.2
ANB		12.0-11.0	7.0
NSGoGn		2.0-11.0	25.8
Pq-NB		17-25	5.2
NAP		2.0-10.0	8.5
N-ANS		60.0-70.0	52.5
ANS-M		60.0-70.0	61.3
Wits		0.0-1.0	-6.9
N perp A		90.0-100.0	93.4
N perp Pq		90.0-100.0	-1.1
MX Length		80.0-100.0	93.1
MD Length		80.0-100.0	116.2
MX-MD Diff		10.0-20.0	23.2

TWIN BLOCK APPLIANCE

Female, Age: 10 years, 8 months

Profile: Straight

Medical History: Mild Case Asthma

TMJ Symptoms (October 1993):
Tension Headaches, Migraine Headaches, Stiff Neck Muscles, Dizziness, Stiffness in Ears, Pain Behind Eyes, Buzzing Noise in Ears, Pain Right TMJ, TMJ Medication (Tylenol)

TMJ Signs (October 1993):
Deviation to Left, Several Sensitive Muscles on Palpation

Functional Problems:
Mouthbreather, Poor Lip Seal, Tight Mentalis

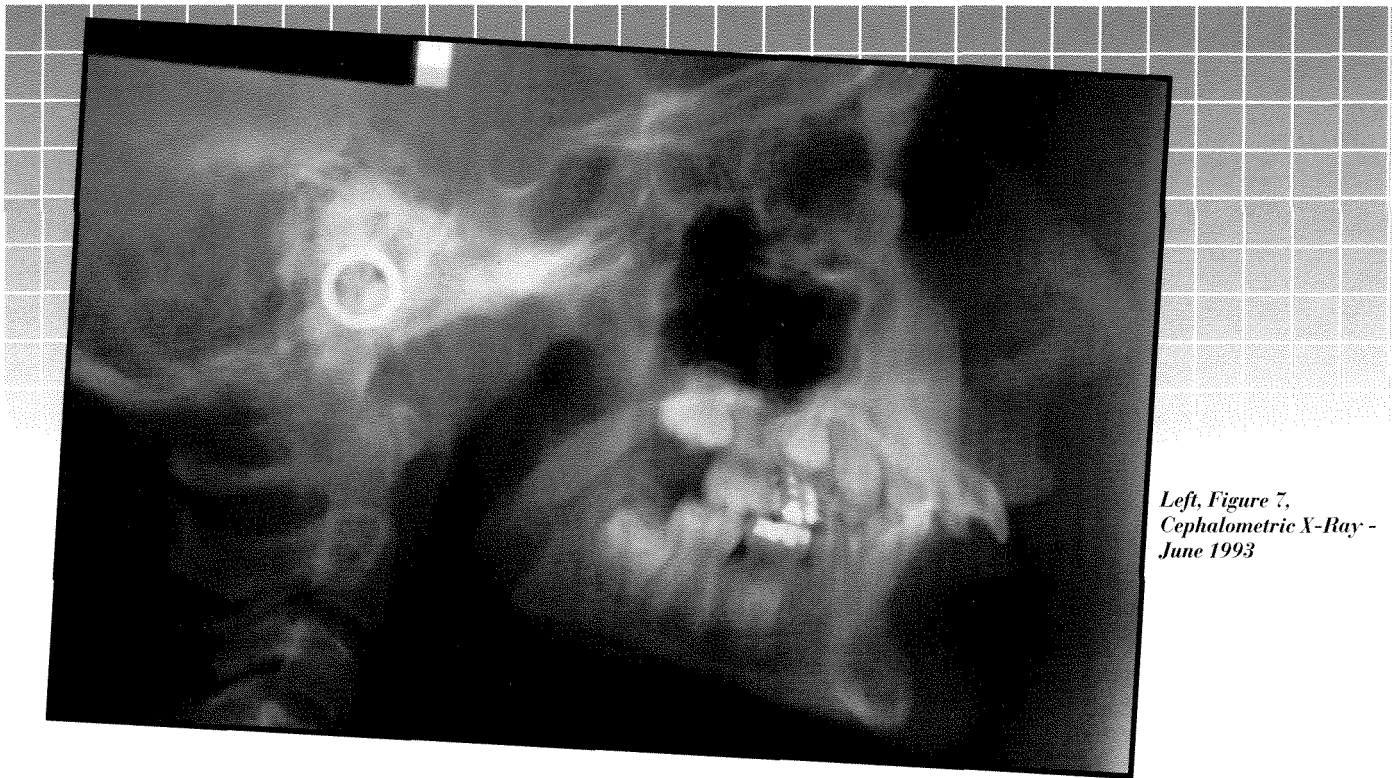
Skeletal Problems:
Class II Skeletal, Normal Maxilla, Retrognathic Mandible, Skeletal Closed, Constricted Maxillary Arch

Dental Problems:
Overjet 15mm., Overbite 6mm., Deep Curve of Spee, 2mm. Anterior Spaces, Maxillary Anteriors Flared, Class II Molar, Class II Cuspid

Treatment Plan:
Phase 1 Twin Block
Phase 2 Rick-A-Nator
Phase 3 Straight Wire

TMJ Symptoms (July 1994):
Headaches Eliminated, Ear Problems Eliminated, No Pain Right TMJ, No Pain Around Eyes, Less Shoulder Pain, Pain Medication Not Necessary

TMJ Signs (July 1994):
No Deviation, Less Muscle Sensitivity



*Left, Figure 7,
Cephalometric X-Ray -
June 1993*

The Twin Block is an ideal appliance for significantly improving the patient's profile as well as the health of the TMJ. This appliance is primarily a removable functional appliance used to advance the mandible, correct the overjet and to allow the eruption of the lower molars to help alleviate the overbite. This subsequent increase in posterior vertical dimension as well as the advancement of the mandible results in a healthier TMJ because it allows the condyle to assume a position in the glenoid fossa which is more downward and forward.

Our objective in orthodontic treatment is to place the condyle as close to the position described by the noted TMJ authority, Dr. Harold Gelb, known as the Gelb 4/7 position.

DESCRIPTION OF APPLIANCE

The Twin Block Appliance is basically two bite blocks (twin blocks), upper and lower, with inclined planes that interlock at 70°. The two twin blocks are designed to interlock in such a

manner that the mandible is held in a more protrusive position. The final position of the mandible depends on how much advancement is obtained when taking the construction bite. The technique for taking this construction bite will be discussed later. The Twin Block Appliance is comfortable to wear and is to be worn full-time, especially when eating. It is to be removed after eating for cleaning to prevent gum disease and tooth decay. The appliance is to be essentially worn 24 hours and only removed for cleaning, contact sports and swimming.

DIAGNOSIS CLASS II MALOCCLUSION

The two prominent orthodontic clinicians and researchers, McNamara and Moyers, made the startling revelation that 80% of Class II malocclusions have retrognathic mandibles. McNamara has further stated that less than 5% of the maxillas are truly prognathic. In light of these facts, ortho-

dontic clinicians must employ an orthopedic approach to solving these skeletal and dental malocclusions. The Twin Block is an excellent appliance to help solve the problems of mandibular and vertical deficiencies. The twin blocks that interlock at 70° do an excellent job of holding the mandible forward and thereby eliminate the overjet.

The Twin Block is the appliance of choice in patients in mixed dentition when the problem is a severe overjet due to a retrognathic mandible. Many Class II malocclusions are also over-closed vertically with short lower face heights. The Twin Block allows for the skeletal correction of this problem by the eruption of the lower posterior teeth, actively or passively.

PATIENT FRIENDLY

The main advantage of the Twin Block is that the patient acceptance rate is high. Patient cooperation, according to Graber (1975) is the

Right, Figure 8,
Cephalometric X-Ray -
March 1994



“Achilles Heel” of early treatment. Regardless of what appliance the clinician prefers, the treatment’s success depends on what appliance the patient prefers. Of all the functional appliances I have utilized, including the Bionator, Frankel, Orthopedic Corrector, Bio-Finisher, Herbst, and Rick-A-Nator, the Twin Block is by far the one that is best tolerated by the patient.

The main reason that patients prefer the Twin Block to the other functional appliances mentioned is that it is easy to speak with the Twin Block. Patients are extremely self-conscious about their speech and will not wear an appliance that negatively affects their speech. Secondly, patients prefer the Twin Block to other appliances because it can be worn while eating. Therefore, it is worn almost 24 hours and only taken out for cleaning, contact sports and swimming. The fact that the appliance is worn almost full-time enhances patient cooperation and hence a successful treatment.

PARTS OF UPPER BITE BLOCK

1. Clark Delta Clasps or Adam’s Clasps are used for retention and are attached at the upper first bicuspid and upper first molars. Clasps are placed on the first primary molars and first permanent molars in early mixed dentition.
2. Interdental Clasps, 1mm. ball-ended, are sometimes used for additional retention on the upper incisors.
3. Midline screw is used for lateral expansion of the maxillary arch to accommodate an advancing mandibular arch. Midline screw is used when minimal expansion of maxillary arch is required (4mm.).
4. Labial bow is used to detorque maxillary incisors if incisors are flared.
5. Anterior sagittal screw may be used to move retroclined central incisors forward.

6. Upper bite block:

Covers 2nd bicuspid, 1st molar, 2nd molar

Angled 70° from mesial of 2nd bicuspid

Interlocks with lower bite block

The upper bite block must be at least 6mm. thick. To correct the overbite, the upper bite block will be trimmed to allow for the eruption of the lower first molars. If the upper bite block is not at least 6mm. thick when it is trimmed, it will not be able to maintain adequate interlocking wedges to obtain the antero-posterior correction of the arch relationship, i.e., the correction of the overjet by the advancement of the mandible. Sometimes in cases of mouth-breathers, the upper bite block will be 7mm. thick to prevent the mandible from going distally at nighttime while the patient is sleeping.

If patients have perfect Class I occlusions at the end of treatment but suffer for the rest of their lives with head and neck pain because the condyle is posteriorly displaced, this can hardly be considered a successfully treated orthodontic case.

PARTS OF LOWER BITE BLOCK

1. Clark Delta Clasps or Adam's Clasps on lower 1st bicuspid in late mixed dentition. Clasps are placed on the lower first primary molars in early mixed dentition.
2. Interdental clasps, 1mm. ball-ended, are sometimes used for additional retention on lower incisors.
3. Midline screw is used to upright the lower posterior teeth including the bicuspid and molars if these teeth are lingually inclined. During the activation of the midline screw, extend the acrylic distally to contact the lingual of the molars. Once the molars have been uprighted, this lingual acrylic should be removed to allow these molars to erupt either passively (mixed dentition) or actively (permanent dentition) with vertical elastics.

ACTIVE PHASE

The Twin Block is worn during the active phase of treatment for 7 to 9 months. The interlocking posteriorly inclined planes of the upper and lower bite blocks encourage the mandible to come forward and allow for the correction of the overjet. The advancement of the mandible also corrects the Class II skeletal problem and significantly improves the profile. During the active phase there is a partial cor-

rection of the vertical problem. In the mixed dentition stage, in cases with normal skeletal vertical or skeletal closed with deep overbites, it is desirable to remove approximately 1 1/2mm. of acrylic from the upper bite block to allow for the eruption of the lower first permanent molars. In mixed dentition, these lower molars will erupt passively. In permanent dentition, it is necessary to attach vertical elastics to actively erupt the lower molars. Elastics (1/8" 3 1/2 oz. Chipmunk) are placed from hooks located on the clasps on the upper first molars directly above the buccal hooks on the lower first molars. The active phase of Twin Block treatment is completed when the overjet and overbite are normal, the maxillary and mandibular incisors are in contact, and the mandibular first molars have erupted into occlusion with the maxillary first molars.

SUPPORT PHASE

The appliance of choice for the support phase is a Rick-A-Nator which consists of two molar bands attached to an anteriorly inclined plane via two .040 connector wires. This inclined plane is partially tooth borne and partially tissue borne and extends from the lingual of the upper right cuspid to the upper left cuspid as well as contacting the anterior part of the palate. Every time the patient swallows, they are instruct-

ed to do so in such a manner that the lower incisors occlude anterior to the inclined plane which helps to keep the mandible in the desired protrusive position.

The Rick-A-Nator is constructed so that there is no acrylic in the area of the bicuspid which are then free to erupt either passively or actively with vertical elastics. In early mixed dentition the bicuspid erupt passively, but in the late mixed dentition or permanent dentition, it is preferable to speed up the eruption process with vertical elastics (1/8" 3 1/2 oz. Chipmunk). The overbite is corrected by the eruption of the mandibular posterior teeth and subsequent mandibular alveolar processes which results in an increase in the posterior vertical dimension. A significant advantage of the Rick-A-Nator is that it may be worn in combination with the straight wire appliance which significantly reduces the treatment time.

The main purpose of the support phase, which usually lasts approximately 6 to 9 months, is to maintain the forward position of the mandible that was achieved with the Twin Block and the correction of the overbite. It is vital that the total treatment time for the active phase with the Twin Block and the support phase with the Rick-A-Nator be a minimum of 15 to 18 months to allow for permanent muscular, skeletal and dental changes to be accomplished.

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*Right, Figure 9—Baseline
Rick-A-Nator, July 1994*

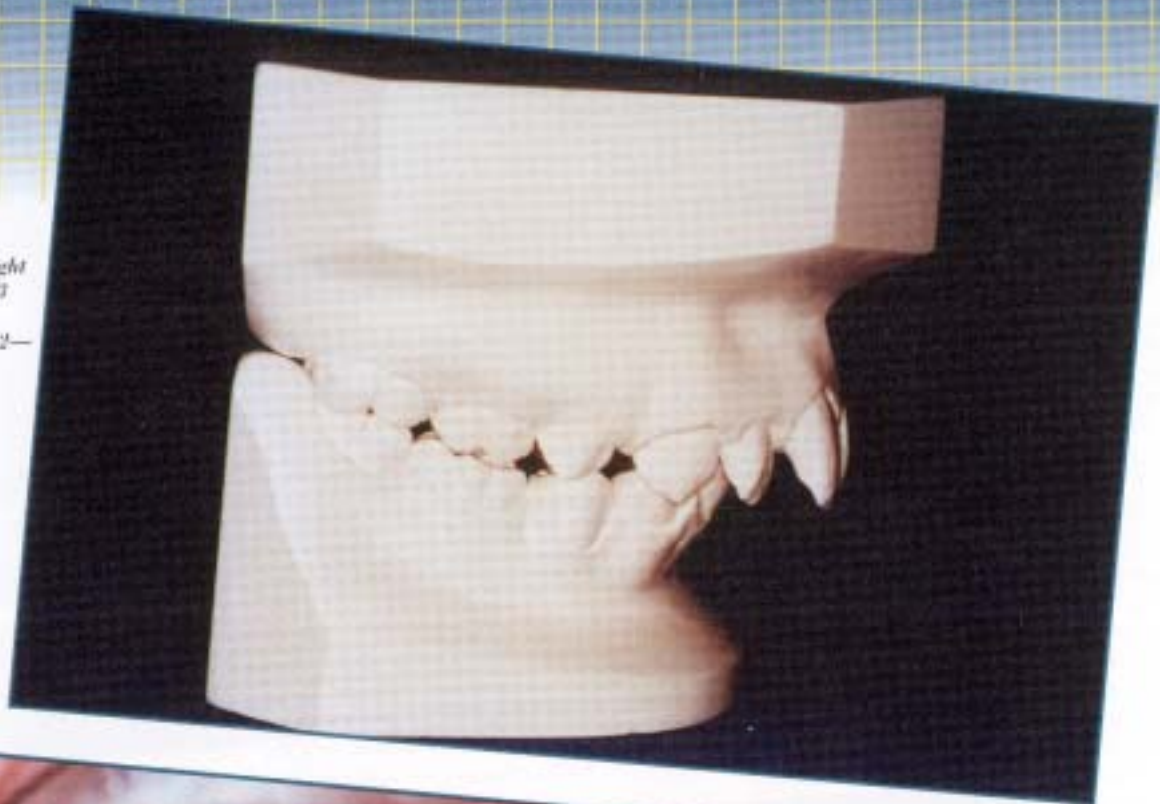
*Below right, Figure 10—
Left Lateral Rick-A-Nator,
July 1994*



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Right, Figure 11—Right Lateral, October 1993

Below right, Figure 12—Right Lateral, July 1994



CASE REPORT:



*Figure 13—Initial Profile—
October 1993*



*Figure 14—Profile after
8 months Twin Block—
July 1994*

Apart from making a proper diagnosis regarding the utilization of the appropriate orthopedic appliance for a given clinical situation, the construction bite is the most important part of the procedure. . . . The success of the orthopedic treatment depends directly on the quality of the study models as well as the construction bite.

[EDITOR'S NOTE: For further information on the Rick-A-Nator Appliance, please refer to the article in *The Functional Orthodontist*, July-August 1990.]

TECHNIQUE OF CONSTRUCTION BITE FOR TWIN BLOCK

1. Have patient bite in centric occlusion.
2. Using red marker, mark lines on upper and lower incisors to act as a guide (teeth in centric occlusion).
3. Have patient open wide and move mandible straight forward using a hand mirror to ensure that the lines on the incisors are aligned.
4. Spaces between the premolars approximately 6mm. to allow for adequate interlocking of the upper and lower bite blocks.
5. Construction bite taken approximately end to end (no space between upper and lower incisors) in cases with excessive deep overbites. (Ensure space between premolar is 6mm.)
7. Advance mandible 4 to 6mm. depending on degree of overjet, position of the condyle in the glenoid fossa and tolerance level of patient.

- a) Vertical growers or adult patients advance 4mm.
 - b) Horizontal growers or mixed dentitions advance 6mm.
8. Twin Block is constructed according to the bite registration which is sent by the clinician to the lab.

MATERIALS SUITABLE FOR CONSTRUCTION BITE

Red Baseplate Wax

The red baseplate wax must be softened uniformly in a water bath (139°F). Cut a notch out of wax wafer at the anterior so you can see the red marks on the teeth when the patient occludes into the wax. Prior to the insertion of the wax, have the patient practice closing into the desired position using a hand mirror. After the patient bites into the wax for 1 minute, remove the wax bite registration and chill the wax in cold water.

Polysiloxane

Using the red lines on the upper and lower incisors as a guide, have the patient, while looking in the hand mirror, move the mandible forward to the desired position. Place composite filling material between the teeth when the incisors are in the correct position as discussed previously. A composite

template is fabricated when the composite filling material is light cured. This template serves two main purposes. First, it ensures that the position chosen by the clinician for the construction bite is ideal. Secondly, it makes it easier to take the construction bite with the polysiloxane and more accurate since the patient cannot move the mandible from the desired position. Once the template has been placed, inject the polysiloxane material between the upper and lower teeth. Send the template, polysiloxane bite registration, and upper and lower study models to the lab for the fabrication of the Twin Block.

IMPORTANCE OF CONSTRUCTION BITE

Apart from making a proper diagnosis regarding the utilization of the appropriate orthopedic appliance for a given clinical situation, the construction bite is the most important part of the procedure. Labs constantly are faced with clinicians sending them inadequate construction bites. Since the success of the orthopedic treatment depends directly on the quality of the study models as well as the construction bite, I would urge all clinicians to spend more time in this area.



Left, Figure 15, Left Lateral, October 1993

INDICATIONS FOR THE TWIN BLOCK APPLIANCE

1. Class II, Division 1 Malocclusion, No Crowding

The Twin Block is the appliance of choice in Class II malocclusions with moderate to severe overjets (5mm. or more). In 80% of Class II malocclusions, the maxilla is positioned correctly in the sagittal plane and the mandible is retrusive. The Twin Block is the ideal appliance to orthopedically reposition the mandible forward to its correct position. Prior to the advancement of the mandible, the maxillary arch must be ideally prepared both transversely and sagittally. If there is not enough room for all the permanent teeth on the maxillary arch, clinicians must decide whether this is an arch width or arch length problem. Prior to the Twin Block, these arch preparation appliances must be

used to properly develop the maxillary arch. Another important factor is that the maxillary incisors must be torqued correctly prior to the Twin Block. This appliance is only indicated for Class II malocclusions with retrusive mandibles and is contra-indicated for Class I or Class III malocclusions.

2. Proper Arch Form

The key to successful treatment with functional appliances is the proper preparation of the maxillary arch. Prior to the utilization of the Twin Block or any other functional jaw repositioning appliance, have the patient who presents with a Class II molar relationship posture the lower jaw forward until you have a Class I molar relationship. Check to see if the posterior teeth are in buccal crossbite. If such a crossbite exists, then the maxilla must be developed transversely either prior to or with the Twin Block Appliance.

- a) *Slight Constriction of Maxilla:* Place a midline screw in the upper bite block if the maxilla needs to be developed 3 to 4mm.
- b) *Severe Constriction of Maxilla:*
 - i) *Schwarz Appliance*—Removable orthodontic appliance ideal for deciduous or mixed dentition when the maxilla needs to be developed 5 to 8mm.
 - ii) *Banded Hyrax Appliance*—Fixed orthodontic appliance ideal for permanent dentition or severely constricted arches of poor cooperators when the maxilla needs to be developed 10mm. Ideal for mixed dentition or early permanent dentition.

If the mandible is repositioned forward into buccal crossbite, the case will not be stable. Therefore, prior to the repositioning, the maxilla must be properly developed trans-

Right, Figure 16—Left Lateral Rick-A-Nator, July 1994



versely to receive the mandible in its proper advanced position.

3. Maxillary Arch Length

Prior to the advancement of the mandible, the maxilla must be developed properly sagittally. Arch lengthening appliances that are sometimes utilized prior to the Twin Block include:

- a) *Anterior Sagittal*—Removable orthopedic appliance utilized mainly in mixed dentition in Class II, division 2 malocclusions to torque lingually displaced maxillary central incisors.
- b) *Posterior Sagittal*—Removable orthopedic appliance used mainly in mixed dentition to distalize maxillary first molars.
- c) *Pendulum Appliance*—Fixed orthodontic appliance utilized mainly in permanent dentition to distalize maxillary first and second molars. For more details on the Pendulum Appliance, please

refer to my article published in **The Functional Orthodontist**, January-February, 1994.

4. Mandibular Arch Length

Prior to the advancement of the mandible, sometimes arch lengthening appliances are utilized on the lower arch.

- a) *Posterior Sagittal*—Removable orthopedic appliance used mainly in mixed dentition to distalize first molars. more effective if utilized prior to the eruption of the second molars.
- b) *Lip Bumper*—Orthopedic appliance used mainly in the mixed dentition to upright and distalize first molars.

5. Proper Torque Maxillary Incisors

- a) If the maxillary incisors are flared, they must be detorqued either with a Schwarz Appliance with a labial bow prior to the

Twin Block or with a labial bow added to the upper block of the Twin Block Appliance. If the mandible was advanced end to end with the Twin Block when the maxillary incisors were flared, this could result in a Class III malocclusion with an anterior crossbite after the incisors were later detorqued with straight wire. Therefore, it is imperative that the maxillary incisors be torqued ideally prior to the advancement of the mandible.

- b) If the maxillary incisors are too vertical, they must be torqued with an Anterior Sagittal Appliance or with a utility arch (.019 x .025 TMA) or reverse curves (.019 x .025 TMA). If the mandible was advanced to an end to end position with vertical or lingually inclined incisors, this could result in an overjet still being present and a Class II malocclusion after the incisors were properly torqued with straight

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wire. Therefore, prior to any mandibular repositioning appliance like the Twin Block, it is important to ensure that the maxillary incisors are properly torqued.

6. Proper Torque Mandibular Incisors

One of the main problems with all functional appliances that encourage the advancement of the mandible is their tendency to cause flaring of the lower incisors. Therefore, prior to the use of any functional appliance, including the Twin Block, the lower incisors must be detorqued if they are flared. This can be accomplished with a lower labial bow added to the lower block, appropriately activated. Also the acrylic on the lingual of the lower incisors must be relieved to make room for the lingual movement of the incisors.

7. Ideal Age Mixed Dentition

a) The ideal age to use the Twin Block is from 8 to 11 years as this is the age when the level of cooperation is the highest. That is not to say that you cannot use the appliance on patients older than age 11, but most clinicians find the level of cooperation is much higher between ages 8 and 11 rather than ages 12 to 16 years. Remember with functional

appliances, patient acceptance of the appliance is the key to successful treatment.

b) Orthodontic researchers, including McNamara, Harvold, and Woodside, following their monkey studies, concluded that the ideal time to utilize functional appliances is when the patient is actively growing in the mixed dentition or early permanent dentition. It is during this period that the condylar changes occurred. Therefore, we should utilize the Twin Block during the active growth period for optimum results.

c) Most Class II malocclusions have constricted maxillary arches and retrognathic mandibles with deep overbites. A large proportion of these patients have significant signs and symptoms of TMJ dysfunction. Most have condyles which are posteriorly or superiorly displaced with resultant compression of the nerves and blood vessels in the bilaminar zone distal to the condyle. The sooner treatment is instituted, the faster the patient's symptoms will subside. Ideally, treatment should be instituted in the mixed dentition stage in order to minimize the damage done by the posteriorly displaced condyle.

8. Class II Skeletal Normal Maxilla, Retrognathic Mandible

Skeletal problems are best corrected with orthopedic appliances and should be corrected as early as possible in treatment. The Twin Block is the appliance of choice to advance the mandible to its correct position and correct the Class II skeletal to Class I skeletal. If the patient has a prognathic maxilla and the mandible in the correct position (sagittally), this is not a case for the Twin Block. Any mandibular advancement could result in a bimaxillary protrusion which is unacceptable.

9. Improved Profile When Mandible Advanced

If the profile is not improved with the wearing of the Twin Block, then the use of this appliance is more than likely contra-indicated. The patients are motivated to wear the Twin Block when their appearance is significantly improved when the mandible comes forward.

10. No Excess Vertical Problems

Ideal for patients who have short lower face heights, average lower face heights, horizontal growers, low angle cases, or counter-clockwise growers. When the upper bite block is trimmed to allow the eruption of the lower posterior teeth and alveolar processes, this results in an

The earlier treatment is instituted, the more positively you can affect not only the patient's profile, but also the health of the TMJ. Orthodontic cases must be treated to stable joint relationships so the emphasis must be on condylar position rather than just proper interdigitation of teeth. My intention here is not to downplay the importance of a proper occlusion

increase in lower face height. Therefore, the Twin Bloc is used ideally in patients who do not have excess vertical problems.

11. Normal Airways

The Twin Block is more effective in patients who are nasal breathers and have normal airways. Any problems involving nasal obstruction or other related airway problems including allergies, swollen tonsils or adenoids, should be corrected first before Twin Block treatment.

AUTHOR'S NOTE: *Part II of this Twin Block article will be presented in the next issue of The Functional Orthodontist and will include the adjustments of the Twin Block on a monthly basis, relining of the upper bite block, contra-indications for Twin Block usage, discussion about Phase I Orthopedics, Phase 2 Orthodontics, Importance of TMJ Exam, and a copy of the Monthly TMJ Update Form used to monitor the health of the TMJ.*



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