

# Twin Block Appliance

## PART II



*[EDITOR'S NOTE: Prior to reading this article, it is suggested to refer to The Functional Orthodontist, March-April 1995 issue, "Twin Block Appliance—Part I" which includes a description of the appliance, diagnosis of Class II malocclusion, parts of the upper bite block, parts of the lower bite block, active phase, support phase involving the Rick-A-Nator Appliance, technique for construction bite, and indications for the Twin block Appliance. This Part II article on the Twin Block will include the adjustments of the Twin Block on a monthly basis, relining of the upper bite block, contra-indications for Twin Block usage, alternative methods of treatment for Class II malocclusions, and a discussion about Phase 1 Orthopedics and Phase 2 Orthodontics.]*

*by Dr. Brock Rondeau*

**T**he Twin Block Appliance is the ideal orthopedic appliance to correct skeletal

Class II malocclusions. According to McNamara and Moyers 80% of all Class II malocclusions have the maxilla positioned normally in a sagittal plane and the mandible is located retrognathically. These are skeletal or orthopedic problems. If there is a skeletal discrepancy between the maxilla and the mandible, this must be addressed in mixed dentition while the patient is still actively growing and prior to the eruption of all the permanent teeth.

The Twin Block Appliance is basically two bite blocks (twin blocks), upper and lower, with inclined planes that interlock at 70 degrees. The two blocks are designed to interlock in such a manner that the mandible is held in a more desirable protrusive position. It is comfortable to wear, well tolerated by the patient and can be worn 24 hours per day, especially when eating which ensures superior clinical results. The Twin Block orthopedically repositions the mandible forward in 7 to 9 months of active treatment. This appliance can improve large 7-13 mm overjets within a nine month period. Without question, this is the best orthopedic appliance at correcting large skeletal discrepancies between the maxilla and mandible in mixed dentition when the problem is a deficient mandible.

## ALTERNATIVE METHODS OF TREATMENT FOR CLASS II MALOCCLUSIONS

### 1. Maxillary Retraction

One of the most common methods to correct Class II malocclusions taught in orthodontic schools across North America is the retraction of the maxilla by extraoral forces utilizing cervical facebow headgear with or without bicuspid extractions. This frequently causes a downward and backward rotation of the maxillary plane as well as a downward and backward rotation of the mandible. This distalizing extraoral force that is applied to the maxilla causes a retraction of the maxilla which matches the position of the retrusive mandible. This approach does not encourage the mandible, which is retrusive, to reach its full genetic potential. There are three main problems with this method of treatment.

- a) Flat Profile: If the maxilla is in the normal position and is retracted with cervical facebow headgear, this subsequent distal movement of the maxillary anteriors and alveolar bone results in less than a favorable soft tissue profile with the resultant dish in look with the nose appearing more prominent.
- b) Retrognathic Profile: This patient starts out at the beginning of treatment with a retrognathic profile and nothing is done to correct the underlying skeletal discrepancy and

then subsequently ends up with the same retrognathic profile. If the maxilla has been significantly retracted, the patient may in fact look worse since the maxilla and the mandible are now retrognathic.

- c) TM Dysfunction: If the patient presents with TM Dysfunction which is evident by the TMJ Health History, evaluation of the range of motion, and palpation of the muscles of the head and neck, then it is imperative that no retraction of the maxilla be instituted. Any further retraction of the maxilla which would then prevent the mandible from moving forward to its proper position could actually make the existing TM Dysfunction problem worse or at best keep it the same. One objective in orthodontics is to have our patients at the end of treatment have healthy TMJs and have no significant signs or symptoms of TM Dysfunction. Prior to any orthodontic or orthopedic treatment, transcranial x-rays or tomograms should be taken to alert the clinician as to the position of the condyle. If the condyle is posteriorly or superiorly and posteriorly displaced, then it is critical that during the treatment some anterior repositioning appliance be applied to move the condyle to a position which is more downward and forward.

Maxillary retraction involving the extraction of first bicuspids or cervical facebow headgear is a viable technique in the following clinical situations:

- Protrusive maxilla.
- Severe crowding maxillary arch resulting in a protrusive maxilla.
- The retraction of the maxilla will not adversely effect the support of the maxillary lip.
- The patient does not present with any signs or symptoms of TM Dysfunction.
- The patient has a Class II skeletal malocclusion with a prognathic maxilla and a normal mandible.

Most clinicians who are trained orthopedically find this maxillary retraction technique to be viable in less than 5% of their Class II patients.

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# Case Report

## Twin Block Appliances

Female, Age 10 years, 7 months—Profile Retrognathic

**TMJ Symptoms (March 1995):** headaches, itchy in ears, buzzing noises in ears, several sensitive muscles upon palpation

**TMJ Signs (March 1995):** grinds teeth at night, clicking (both sides), deviation left on opening, problems sleeping

**Functional Problems:** mouth-breather, poor lip seal, tight mentalis, lip sucking habit

**Skeletal Problems:** Class II skeletal, normal maxilla, retrognathic mandible, constricted maxillary arch, short lower face height

**Dental Problems:** overjet 7 mm, overbite 5 mm, Class II molar, Class II cuspid, deep Curve of Spee, crowded lower incisors

**Treatment Plan:** Phase 1—Twin Block, Rick-A-Nator; Phase 2—Straightwire

**TMJ Symptoms (July 1995):** no headaches, ears normal (no sounds), slight muscle soreness

**TMJ Signs (July 1995):** no clicking, no deviation on opening, sleeping soundly



Pre-treatment Profile—February 1995



Pre-treatment Frontal View—February 1995



Pre-treatment, February 1995—Left Lateral View



Pre-treatment, February 1995—Frontal View



Construction Bite Twin Block—February 1995



Construction Bite Twin Block—Base Plate Wax, Golf Tee



Insert Twin Block—Left Lateral View—March 1995



Insert Twin Block—Frontal View—March 1995



Occlusal View—Upper Bite Block—April 1995





*Occlusal View—Lower Bite Block—April 1995*



*Beline Twin Block—Left Lateral View—June 1995*

Condition	Interpretor	
	% Enthusiasm	Left Right
NORMAL EMPINGENDYLE RELATION		
Quiet	95	95
Endorse Click	—	—
DISK MOVEMENT		
DISPLACED DISK WITH REDUCTION		
without DAD	—	—
with DAD	—	—
DISPLACED DISK WITHOUT REDUCTION		
Quiet	0	0
with Vibration	—	—
with DAD	—	—
DEGENERATIVE JOINT DISEASE		
Early	—	—
Advanced	—	—

*Joint Vibration Analysis—May 1995—Normal TMJ—Disc Recaptured*



*Pre-treatment—Left Lateral—Overjet 7 mm—February 1995*



*Progress—Left Lateral—Overjet 1 mm—July 1995*



*Beline Rick-A-Nator—Triad material—October 1995*



*Beline Rick-A-Nator—Triad material—October 1995*



*Frontal View—Rick-A-Nator—October 1995*



*Right Lateral View—Rick-A-Nator—October 1995*



*Left Lateral View—Rick-A-Nator—October 1995*



*Improved Profile—January 1996*



*Improved Smile—January 1996*



*Occlusal View—Rick-A-Nator Refined—October 1995*

## 2. Surgical Correction

Another method of treating Class II skeletal malocclusions is to wait until the patient has completed growth at approximately age 17 or 18 and then to surgically advance the mandible. Orthodontic treatment will be necessary prior to and following the surgery to detail the occlusion. Surgery is a complex and expensive as well as risky procedure with a potential for relapse. One significant disadvantage of surgery is the long term effects on the TMJ is unpredictable with many patients experiencing an increase in signs and symptoms of TM Dysfunction following surgery. This is an option which is common in permanent dentition; however, it would seem to be much less attractive when compared with the use of the Twin Block Appliance which accomplishes the same result non-surgically in mixed dentition as well as permanent dentition.

## 3. Dentoalveolar Compensation

This method is to try and solve the skeletal discrepancy with orthodontic wires only. The skeletal discrepancy which is the difference between the normally positioned maxilla and the retrognathic mandible, is not dealt with at all. In similar Class II skeletal cases, the lower anteriors are flared and the upper anteriors are over retracted to vertical or lingual crown torque. The Class II skeletal problem remains untreated.

The advantage of the Twin Block Appliance is that it is ideal in treating the underlying skeletal problem non-surgically in the mixed dentition prior to the eruption of the permanent teeth.

## CONTRA-INDICATIONS TWIN BLOCK APPLIANCE

### 1. Class II Malocclusion with a Prognathic Maxilla and Mandible in Normal Position

The use of the Twin Block in this clinical situation could result in a bimaxillary protrusion. To check this clinically, have the patient who has a large overjet, bite forward into an end to end position (incisors in contact). This profile in this case would appear bimax. The Twin Block would be contra-indicated.

### 2. Twin Block is Contra-indicated for use in Class I and Class III Malocclusions

## 3. Skeletal Open Bite or Vertical Grower

The Twin Block Appliance is ideally suited for patients who have normal growth patterns and who are essentially horizontal growers. Patients who present with long lower face heights and who are essentially vertical growers pose special problems. The Twin Block will try to change the direction of growth from vertical to more horizontal, but this is very time consuming and slow. Two special considerations for vertical growers include:

- a) Mandible must be advanced in smaller increments than with horizontal growers. Vertical Growers—Advance Mandible 4 mm; Horizontal Growers—Advance Mandible 6 mm

*The advantage of the Twin Block Appliance is that it is ideal in treating underlying skeletal problem non-surgically in the mixed dentition prior to the eruption of the permanent teeth.*

- b) Cannot allow the eruption of lower molars with vertical growth pattern. The lab must be instructed to have the upper bite block in contact with the occlusal surfaces of the lower posteriors including the first and second permanent molars to prevent their eruption and subsequent increase in the vertical problem. No grinding of the upper bite block which prevents the eruption of the lower molars. This helps control the unfavorable vertical growth pattern.

## 4. Dental Open Bite

- a) Dental open bite due to a functional problem such as a tongue thrust or

thumb habit requires a functional solution such as a tongue or thumb crib inserted in the anterior part of the appliance to prevent this habit.

- b) Dental open bite due to an excess vertical growth pattern must be dealt with by not allowing any eruption of the lower posterior teeth. No grinding of the acrylic of the upper bite block which must be in contact with the occlusal surface of the lower molars to prevent their eruption.

## 5. Constricted Maxillary Arch

The majority of Class II skeletal malocclusions in the mixed dentition have constricted maxillary arches. This problem must be solved first prior to the use of the Twin Block Appliance. The maxillary arch must be wide enough to allow proper anterior repositioning of the mandible without causing a posterior crossbite. Prior to treatment, advance the mandible end to end. If the posterior segments are in crossbite, then it will be necessary to expand the maxillary arch.

- a) Slight Constriction of the Maxilla: Place a midline screw in the upper bite block if the maxilla needs to be developed 4-5 mm.
- b) Severe Constriction of the Maxilla:
  - i) Schwarz Appliance—Removable orthodontic appliance ideal for deciduous or mixed dentition when the maxilla needs to be developed 6-8 mm;
  - 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 10 mm. Ideal for mixed dentition or early permanent dentition.

## 6. Constricted Mandibular Arch

Although this is a rare occurrence compared to the frequency of maxillary arch constrictions, it nevertheless does occur. If the lower posterior teeth are severely torqued lingually, then they may need to be uprighted prior to Twin Block treatment.

- a) Slight Lingual Torquing: Midline screw lower bite block with distal extension of acrylic contacting the lingual of the lower first and second permanent molars. When the lower midline screw is activated,

these teeth are uprighted. After the uprighting if you want the lower molars to erupt, then these lingual flanges are removed from the appliance.

b) *Severe Lingual Torquing*

Midline screw activated in Mandibular Bowbeer Appliance. This appliance was developed by Dr. Grant Bowbeer (orthodontist) and is ideal for the uprighting of severely inclined lower posterior teeth. Ideally this should be done in order to establish proper mandibular arch form prior to the utilization of the Twin Block Appliance.

**7. Class II, division 2**

Must transform Class II, division 2 crowded cases into Class II, division 1 non-crowded cases prior to the utilization of the Twin Block. Frequently these cases need arch development as well as torquing of the maxillary anteriors.

a) *Mixed Dentition*

Anterior Sagittal Appliance sometimes used to widen upper arch and to torque maxillary incisors that are lingually inclined.

b) *Permanent Dentition*

Maxillary Banded or Bonded Hyrax to widen the upper arch. Utility arch or straightwire appliance is used to torque maxillary incisors which are lingually inclined.

**8. Airway or Breathing Problems**

Any airway or breathing problems must be corrected first prior to Twin Block treatment. Any problems involving nasal obstructions, swollen adenoids, and infected tonsils must be referred to an E.N.T. Specialist prior to treatment. Any airway or breathing problem will limit the patient's ability to wear the Twin Block and therefore reduce the chance of success.

**9. Flared Maxillary Incisors**

If the maxillary incisors are flared, ideally they must be detorqued with a labial bow or with the straightwire appliance prior to the use of the Twin Block Appliance. In order to know how far to advance the mandible, it is necessary to have a perfectly positioned maxilla. The maxilla should be the proper width and the maxillary incisors must be torqued correctly (cephalometrically normal). Then the mandible repositioned anteriorly with

the Twin Block to that exact position.

a) *Slight Flaring Maxillary Incisors*

Solution: Labial bow upper bite block of Twin Block

b) *Severe Flaring Maxillary Incisors*

Solution: Maxillary incisors must be detorqued prior to the utilization of the Twin Block either with a Maxillary Schwarz Appliance with a labial bow or with a straightwire appliance.

**10. Vertical Maxillary Incisors**

If the maxillary incisors are too vertical, this must be corrected prior to the use of the Twin Block. Unless the proper torque is established prior to the advancement of the mandible, proper Class I cuspid and Class I molar relationship cannot be achieved. Mixed Dentition—Maxillary Anterior Sagittal Appliance; Permanent Dentition—Utility Arch

**11. Flared Lower Incisors**

One of the main problems inherent in all jaw repositioning or functional appliances is their tendency to flare 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.

a) *Slight Flaring Lower Incisors*

Solution: Labial bow mandibular bite block of Twin Block Appliance

b) *Severe Flaring Lower Incisors*

Solution: Lower incisors must be detorqued prior to the utilization of the Twin Block Appliance.

**Removable Appliance**—Lower Schwarz Appliance with Labial Bow; **Fixed Appliance**—Straightwire appliance with power chain and possible ARS (Air Rotor Stripping) to make space in the posterior to facilitate the detorquing of the lower incisors.

## STAGE 1 ACTIVE PHASE 7-9 MONTHS

### ADJUSTMENTS OF TWIN BLOCK APPLIANCE

#### 1. *Insert Twin Block Appliance*

Adjust the Clark Delta Clasps or Adam's Clasps if necessary to increase retention. Appliance must fit tightly without discomfort if you want maximum cooperation and wear time from the patient. Check for and relieve any sore spots due to impingement on the gingiva by the acrylic. The area which is sometimes involved is the lingual of the lower anteriors. If the appliance has a labial bow due to protruding incisors, this should not be in contact with the labial surface of the upper incisors. Our intention is always to develop the maxillary arch with the midline screw of the upper block prior to detorquing the maxillary incisors with the labial bow. Therefore, we keep the labial bow away from the incisors until after the expansion has been completed.

Insert the upper and lower bite blocks (Twin Blocks) and ask the patient to occlude in such a manner that the inclinal planes advance the mandible to a more protrusive position. This new protrusive mandibular position must be comfortable for the patient to ensure maximum wear time of the appliance. If the patient indicates that the mandible is too far forward, then it can be easily distalized by removing 2-3 mm of acrylic from the anterior incline of the upper block.

This will allow the mandible to move distally. This procedure is usually not necessary if care is taken during the construction bite not to advance the mandible excessively. For horizontal growers in mixed dentition it is recommended that the mandible be advanced with the construction bite 6 mm. Patients who are vertical growers in permanent dentition should be advanced 4 mm. When these guidelines are followed, the inclined planes of the upper bite block at the initial appointment rarely have to be adjusted.

When the patient is biting forward in the inclined plane of the upper and lower bite blocks, confirm that the facial appearance is significantly

*Patients who are vertical growers in permanent dentition should be advanced 4 mm. When these guidelines are followed, the inclined planes of the upper bite block at the initial appointment rarely have to be adjusted.*

improved. Stress this point to the patient. Everyone wants an improved appearance and this is an important factor in patient motivation. Inform the patient that initially while the profile is certainly improved, the muscles frequently appear strained in the beginning of treatment. This will gradually disappear as the muscles relax within the first few months. The patient is instructed to wear the Twin Block at all times, especially when eating. The appliance is only to be removed for cleaning, contact sports, or swimming. The patient is given instructions on how to properly clean the appliance. We recommend scrubbing the appliance with a hard nail

brush to remove all the plaque and food particles. The patient is given a hard brush as well as a colored plastic case for the appliance and instructed to keep the Twin Block in the case when it is not in the mouth. They are instructed not to adjust the appliance and to return to the office in one week. If they develop any sore spots or have any problems, they are instructed to call the office immediately. Rarely do we have any problems either at the time of the insertion of the appliance or for the first week of wear time of the appliance.

#### 2. *Second Visit—One Week Later*

The patient should be wearing the Twin Block comfortably and eating with the appliance. They should be biting forward in the protrusive position with no discomfort. If the patient is having problems posturing forward comfortably, then consider reducing the activation by trimming the anterior incline of the upper bite block. This 2-3 mm reduction will allow the mandible to retrude slightly. Usually this is not necessary as most patients with recessive mandibles feel better when the mandible is positioned forward.

To help with motivation, mention to the patient that there is improved muscle balance when the Twin Block is worn 24 hours per day. Also, with the mandible in the new protrusive position, their profile and overall appearance is vastly improved.

If maxillary expansion is required, instruct the patient how to adjust the midline screw.

a) Upper bite block adjustments involve one turn per week (each turn equals 1/4 mm). Turn the key (activate the screw) the same direction as the arrow on the appliance. Patients and parents are instructed as to how to activate the midline screw. Both are handed the appliance and the key and asked to turn the midline screw under supervision to ensure that everyone thoroughly understands the procedure.

The expansion of the upper midline screw is indicated when the upper arch is constricted but the lower arch is normal. If the upper arch is constricted 4-5 mm, it is recommended that the midline screw on the upper bite block be utilized. If the upper arch is constricted 6-11 mm, an arch development appli-



ance such as a removable Schwarz Appliance or a fixed banded Hyrax Appliance should be utilized prior to the Twin Block. Due to the interlocking of the inclined planes of the upper and lower bite blocks, it is not advisable to expand the upper bite block more than 5 mm if no corresponding adjustments are made to the lower bite block.

- b) When the upper and lower bite blocks are expanded simultaneously, then the appliance may be activated twice per week. This is utilized when both upper and lower arches are constricted and the clinician wants to develop both arches. Ideally, the lower posterior teeth

should be lingually inclined for this arch development to be the most effective and stable. In these cases the lower block must extend to the lingual of the lower molars to facilitate the uprighing.

One of the main problems with the use of any functional appliance is their tendency to flare the lower incisors. Prior to the adjustment of the midline screw on the lower bite block, make a note of the inclination of the lower incisors. If the lower incisors are flared, then relieve the acrylic on the lingual of the lower anterior teeth prior to the activation of the midline screw. If the lower incisors are lingually inclined, as in the case of most Class II, division 2

cases, then leave the acrylic on the lingual of the lower anteriors. The activation of the midline screw will help torque the lower anteriors to a more favorable position.

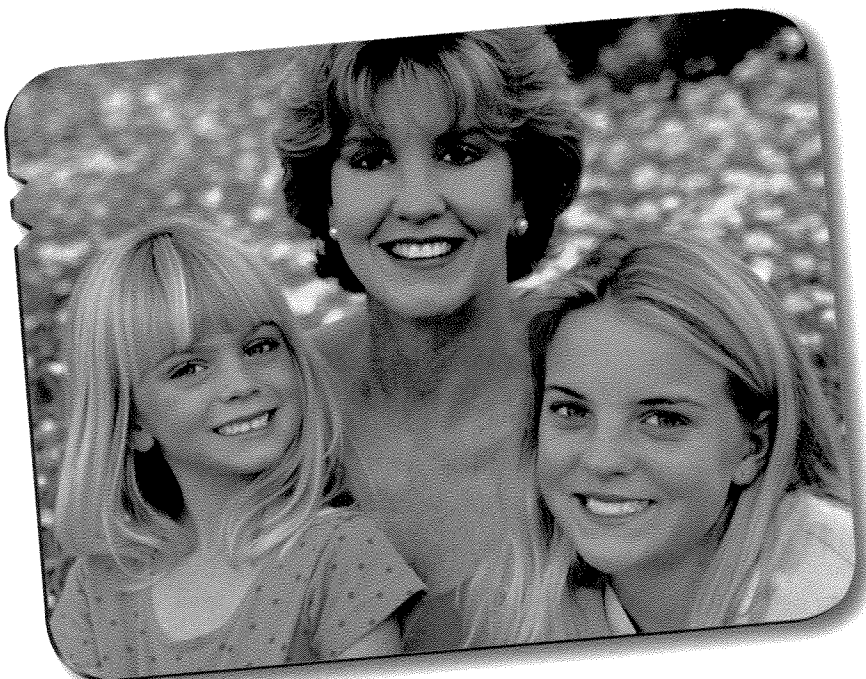
If the midline screw is being activated on either the upper or lower bite block, keep the labial bow 1 mm away from the labial surface of the anterior teeth. Otherwise you may inadvertently detorque the anterior teeth.

Most Class II malocclusions present with a deep overbite. In these cases, to help correct the deep overbite problem, the upper bite block is trimmed approximately 1-2 mm from the lower molars to facilitate their eruption. The eruption of the lower molars will allow for an orthopedic correction of the deep overbite.

At each appointment the clinician must adjust the Clark Delta Clasps or the Adam's Clasps to ensure that the appliance fits properly. Also check to see if the appliance is fitting comfortably with no sore spots evident. This will ensure maximum cooperation from the patient in terms of wear time of the appliance which ultimately results in a successful treatment.

The patient is given an orthodontic progress report and asked to record the number of hours the appliance is worn and when the midline screw is activated. Inform the patient that we will be checking this progress report each month. We want the patient to be aware that we are concerned with his progress at each appointment. This helps motivate the patient and greatly enhances the degree of cooperation. At each visit check the oral hygiene of the patient and the relative cleanliness of the appliance.

The patient is instructed to wear the appliance full time, especially while eating except during cleaning of the appliance, contact sports, or swimming. If there is a problem with wear time of the appliance, the clinician may want to attach the lower bite block permanently to the teeth for 2 to 3 weeks until cooperation improves. The lower bite block may be attached either with glass ionomer cement or bonding. In the case of bonding, the clasps on the lower first bicusps are secured to the tooth by adding some composite to the clasps and light curing the clasps to the teeth. After 2 to 3 weeks, most patients will be comfortable with the appliance but unhappy with the fact that they cannot remove the appliance to clean it after meals. If



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the patient will agree to be more cooperative, the lower appliance is then removed and the patient is instructed to wear the appliance full time, as per previous instructions. Most patients who have had the lower bite block attached for 2 to 3 weeks become excellent cooperators so the procedure will not be repeated. If you do anticipate a problem with cooperation, the lower bite block should be permanently attached as mentioned above for the first few weeks to ensure successful treatment.

If the patient had any TMD signs or symptoms prior to treatment, ask them if these have been partially relieved since the wearing of the Twin Block Appliance. In most cases, when the mandible is advanced and there is an increase in posterior vertical dimension (due to the acrylic bite blocks), the signs and symptoms of TM dysfunction are significantly reduced. If there is such a reduction, then this is an important motivational factor and should be mentioned to patients as well as parents.

### 3. Third Visit One Month Later

At each visit the clinician must monitor and motivate. The progress must be monitored carefully. Measure and record the overjet. If the Twin Block has been worn 24 hours per day, there will be a reduction in overjet by at least 2 mm after the first month of wear time. Measure and record the overbite. The overbite correction will be more gradual than the overjet correction since the sagittal change is always first and more dramatic than the vertical change will all functional appliances including the Twin Block.

Measure the opening of the midline screw and record. If the midline screws are being adjusted twice weekly in both upper and lower bite blocks, then the midline screws should be open 2 mm after the first month. If the midline screw is only being adjusted once per week, then the screw should be open 1 mm. As always, when the midline screws are being adjusted, the anterior labial bow must be adjusted away from the labial surface of the anterior teeth.

In the case of deep overbite, continue to trim 1-2 mm of acrylic from the upper bite block to allow eruption of the lower molars as discussed previously. Clasp on bite blocks must be adjusted to ensure adequate retention and check for sore spots. The area that

sometimes is irritated is lingual to the lower cuspids and bicuspid. Check this area carefully for any evidence of tissue irritation which must then be relieved by removing part of the acrylic from the lower bite block.

Ask the patient to show you the progress report. Check to see the number of hours of wear time and the sequence of adjustments of the midline screws. Record this information in the patient's chart each month as well as the status of the oral hygiene and cleanliness of the appliance.

*In most cases, when the mandible is advanced and there is an increase in posterior vertical dimension (due to the acrylic bite blocks), the signs and symptoms of TM dysfunction are significantly reduced. If there is such a reduction...this is an important motivational factor and should be mentioned to patients as well as parents.*

After one month, improved facial balance should be evident. When the patient wears the Twin Block 24 hours per day, and if there are no airway problems with normal nasal breathing, then the facial appearance and muscle balance is much improved. Ask the patient again if there has been a reduction in the signs and symptoms of TM dysfunction since the insertion of the Twin Block and record the findings. To help motivate the patient to wear the Twin Block, it is vitally important to mention the improved facial appearance and profile.

### 4. Fourth Visit One Month Later

At this time there should be a significant decrease in the overjet. The mandible should have advanced at least 4 mm if the Twin Block was worn full time. Measure and record the overjet in the patient's chart. If the patient had a large overjet at the beginning of treatment, it might be possible to activate the appliance by adding acrylic to the anterior incline of the upper bite block and thereby advance the mandible further forward. Ask the patient if their Twin Block is comfortable and if they feel comfortable having the mandible moved 2-3 mm farther forward. Most patients who have been wearing the appliance faithfully will have no objection to having the mandible advanced farther. Light cured material such as Triad may be used to advance the mandible. The anterior incline of the upper block is used rather than the posterior incline of the lower block so that the addition of acrylic (Triad material) will not interfere with the eruption of the lower molar.

### END PHASE 1 ACTIVE PHASE

The active phase of Twin Block treatment is usually finished in 7-9 months. Treatment is completed earlier with good cooperators and horizontal growers in mixed dentition. Treatment takes longer with mouth-breathers who do not keep the blocks together when sleeping, poor cooperators or vertical growers in permanent dentition. For the active phase to be completed, the following must occur:

- Overjet is normal with the incisors in contact when the patient occludes in centric occlusion.
- Overbite is partially corrected with the eruption of the lower first molars which are contacting the upper first molars when the patient occludes in centric occlusion.
- There is an open bite in the area of the bicuspid due to the intrusive forces of the bite blocks during treatment.
- Class I skeletal has been achieved with the maxilla and mandible ideally positioned. At the beginning of treatment, the patient had a skeletal Class II malocclusion with a normal maxilla and a retrognathic mandible.
- Original Class II molar relationship has been corrected to Class I molar.

## Technique for Adding Triad to Upper Bite Block

The upper bite block is relined in the mouth for the best results with Triad. Have the patient move the lower jaw straight forward 2-3 mm. You do not want the mandible to deviate to the right or to the left. This could induce a TMJ problem which is not desirable. Mark the teeth with a red wax marker with the mandible in the proper position. Give the patient a hand mirror so they can close repeatedly in that position. Remove the upper bite block from the mouth with the lower bite block remaining intact. Roughen the surface of the anterior incline of the upper bite block with an acrylic bur. Add Triad bonding agent and light cure for 20 seconds on each side. Add Triad ivory colored material 3 mm thick to the anterior incline of the upper bite block. Have the patient close into the predetermined position as per the red wax marker lines on the anterior teeth. When you are satisfied with the new advanced position of the mandible in relation to the maxilla, light cure the Triad material for 40 seconds on each side. Remove the upper bite block and put in Triad light curing oven for 6 minutes. Remove and trim the upper bite block, remove any excess material, and insert. Check for any discomfort or rough edges. Insert the upper bite block and when properly positioned with the lower bite block, reconfirm that this is a comfortable position for the patient.

Measure and record the overbite on the patient's chart. In an effort to encourage the lower first molars to erupt, it is advisable in permanent dentition to bracket or band the lower molars and erupt these teeth with vertical elastics. The elastics are 1/8" 3 1/2 oz. Chipmunk elastics (Ormco) and run from the hook on the molar tube to a hook on the clasp above. Clinicians who anticipate using these elastics must instruct the lab to add these hooks to the upper clasps on the first molars at the time the Twin Block is being fabricated.

At each appointment the Clark Delta Clasps or Adam's Clasps must be adjusted so the Twin Block will fit securely in the mouth at all times, especially when eating. If vertical elastics are to be utilized, then the upper bite block must fit very tightly or it will become dislodged as a result of the vertical forces applied by the elastics.

Usually in mixed dentition it is not necessary to use vertical elastics to help the lower molars erupt. In mixed dentition these lower molars will erupt passively and very quickly into the correct position. In mixed dentition without elastics or in permanent dentition with vertical elastics, the overbite can be corrected within 4 months if the patient wears the Twin Block faithfully as instructed.

Continue to reduce the overbite by trimming the upper bite block occlusal-distally 1-2 mm to allow the lower molars to erupt. At this stage, an open bite exists in the bicuspid region due to the pressure of the bite blocks. Remember, while it is important to trim the upper bite block to allow eruption of the lower posterior teeth, it is also important to maintain adequate interlocking wedges to allow for the correction of the overjet by the advancement of the mandible.

At this stage of treatment, clinicians must be aware of dual bites. If the patient is wearing the appliance 24 hours

a day and is still growing, then rarely will they have a dual bite. If the treatment is proceeding well, the patient will bite consistently forward even when the Twin Block has been removed and will be unable to bite back to their original overjet situation without pain. When it hurts the patient to move their jaws back, you know the Twin Block treatment is working.

To ensure that the grinding of the upper bite block during the correction of the overbite will not interfere with the all important interlocking wedges, the following is suggested:

- The upper and lower bite blocks must be at least 6 mm high. This will allow adequate thickness of acrylic so that despite the removal of some acrylic to allow the eruption of the lower molars, there will still be adequate thickness for the inclined planes to allow for mandibular advancement and correction of the overjet.
- The posterior inclined plane of the lower bite block should end distally two-thirds of the way back on the second bicuspid in permanent dentition or the second primary molar in mixed dentition. This ensures that no acrylic from the lower bite block will contact the mesial or occlusal surface of the lower molar which would interfere with its eruption. This also allows the interlocking wedges (inclined planes) to be in contact despite the grinding of the acrylic on the upper bite block to allow the lower molars to erupt.

To prevent an overbite from becoming an anterior open bite, please observe the eruption of the second molars. To prevent their eruption, the acrylic must be extended to cover these teeth and prevent their eruption. If the second molars do over-erupt and cause an anterior open bite, then the appliance must be removed and the case allowed to relapse. Anything that happens quickly in orthodontics, such as a tooth that rapidly extrudes, will also relapse quickly if subjected to occlusal forces. Remove the Twin Block for one month and the second molars will intrude. Then insert the Twin Block again after acrylic is added to the upper bite block to prevent the open bite problem.

Continue to monitor the arch development of the maxillary arch. Ensure that the arch is expanded to the proper width that will accommodate the advancement of the mandible for the correction of the Class II skeletal problem. Be careful not to expand excessively into a buccal crossbite.

Once the desired expansion or development of the upper and lower arches has been achieved, the labial bows can be activated. The labial bow will help detorque the maxillary and mandibular anteriors and give the arches a more desired ovoid shape. The labial bow, when activated and in contact with the anterior teeth, will also help increase the retention of the appliance. The lower labial bow is helpful in preventing the flaring of the lower anteriors which is seen so commonly with all functional appliances, including the Twin Block.

## STAGE 2 SUPPORT PHASE 6-9 MONTHS

### *Objective*

In order to maintain the mandible in the advanced position, it will be necessary to utilize an appliance that will encourage the mandible to stay forward while allowing for the eruption of the bicuspid. This appliance must also maintain the corrected incisor and molar relationship. There are two appliances that can be utilized for this purpose.

- a) *Daytime Appliance*—This removable orthodontic appliance can be fabricated with Adam's Clasps on the first permanent molars for retention and have an incisal ramp to assist at keeping the mandible forward.
- b) *Rick-A-Nator Appliance*—This fixed orthodontic appliance is the treatment of choice since it is fixed and virtually guarantees patient cooperation and treatment success. The Rick-A-Nator consists of two molar bands attached to an anteriorly inclined plane via two .040 connector wires. Every time the

patient swallows, they are instructed to do so in such a manner that the lower incisors occlude anterior to the inclined plane which helps keep the mandible in the desired protrusive position. To increase patient acceptance, the anterior guide plane (incisal ramp) is fabricated as short as possible (3-4 mm) so it will not interfere with patients' speech. Since there are no occlusal forces generated on the bicuspid when the bite is held open with the anterior guide plane, this allows the bicuspid to erupt either passively or actively with vertical elastics. In early mixed dentition, the bicuspid erupts passively but in permanent dentition, it is preferable to speed up the eruptive process with vertical elastics (1/8" 3 1/2 oz. Chipmunk). It is recommended that the Rick-A-Nator be cemented (fixed) and worn 24 hours per day to prevent relapse at this critical stage.

### **MIXED DENTITION RICK-A-NATOR COMPOSITE BUILDUPS**

In the mixed dentition phase, it is important to support the posterior

occlusion which is vital to the stability of the case as well as the health of the TMJ. In the early mixed dentition, the first and second primary molars will not erupt unless there is no permanent successor. One of the main problems with the use of the Rick-A-Nator in mixed dentition is that the patient has difficulty chewing due to the lack of posterior occlusion. Since the primary molars will not erupt, the treatment of choice is to build them up with composite to provide some posterior occlusion and support for the TMJ. This posterior support helps keep the condyles more downward and forward which is a much more ideal position in the glenoid fossa. The anterior biteplate should be relined with Triad when the Rick-A-Nator is inserted following the completion of the active phase. Then the primary molars are built up with composite to help in combination with the incisal ramp to keep the mandible in an ideal relationship with the maxilla (normal overjet and overbite). The buildup of the primary molars will help support the posterior occlusion which assists the patient in chewing properly and supports the newly erupted first permanent molars.

In late mixed dentition following the



relining of the incisal ramp with Triad, the second primary molars are built up with composite to the ideal level of occlusion. The first bicuspid are then free to erupt to the newly established level of occlusion. After a few months, the patient will have a total of six teeth in contact supporting the posterior vertical dimension. As mentioned previously, this is vitally important to the stability of the case as well as the maintenance of proper condylar position.

## PERMANENT DENTITION RICK-A-NATOR 2

One of the main advantages of the Rick-A-Nator is that it may be worn in combination with the straightwire appliance, which significantly reduces the treatment time. The main purpose of the Rick-A-Nator is to maintain the forward position of the mandible that was achieved with the Twin Block. Also, the Rick-A-Nator is the ideal appliance to help achieve vertical correction. It is advisable in permanent dentition to use vertical elastics to help erupt the bicuspid (1/8" 3 1/2 oz. Chipmunk). If the second molars have erupted, the posterior occlusion and the TMJ must be supported with acrylic pads on the second molars. The purpose of these pads on the Rick-A-Nator 2 is to provide a tripod effect so that the condyle is supported by the incisal ramp in the anterior and the acrylic pads on the second molars. The posterior pads prevent the disc from being displaced anteriorly and medially when the vertical elastics are attached to help erupt the bicuspid.

## SUMMARY

The main purpose of the Twin Block is to advance the mandible and to correct moderate to severe overjets. When the first molars are encouraged to erupt, the Twin Block also results in a partial correction of the overbite. The Rick-A-Nator or Rick-A-Nator 2 Appliances are utilized to hold the mandible in a forward position and also to help erupt the bicuspid to complete the orthopedic 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.

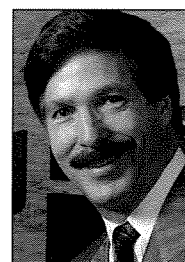
## TWO PHASE TREATMENT

The time has come for orthodontists, pediatric dentists and general dentists to start discussing and treating orthopedic problems in the mixed dentition. Two leading orthodontic researchers, Dr. Donald Woodside, Toronto, Ontario and Dr. James McNamara, Ann Arbor, Michigan, working extensively with adolescent monkeys and functional jaw repositioning appliances, reported that condylar changes only occurred when the monkeys were actively growing. If the research clearly demonstrates that the clinician will obtain the ultimate response while the patient is actively growing, one wonders why the majority of patients are left untreated in the mixed dentition. The term "supervised neglect" seems appropriate!

Too many North American orthodontic practitioners have geared their practices to treatment in the permanent dentition. This perception has been substantiated by Dr. Peter Sinclair in the January 1993 issue of *The Journal of Clinical Orthodontics* when he stated that the orthodontists interviewed said they used functional appliances in 5-10% of their cases.

In Europe and Latin America, the use of orthopedic appliances to treat skeletal problems in mixed dentition is much more prevalent. If the orthodontists in North America do not wish to treat these patients in mixed dentition, then I submit that the generalists and pediatric dentists have a responsibility to increase their knowledge of orthopedics and to treat them.

Clearly any orthopedic problem such as a constricted maxillary arch, retrognathic mandible, or deep overbite is much easier to treat in the mixed dentition. When treatment is instituted early, 80% of the malocclusion can be treated with orthopedic appliances and the remaining 20% solved with the straightwire appliance (fixed braces). This two phase treatment approach ensures that in excess of 95% of our mixed dentition cases can be treated non-extraction and non-surgically. The bottom line is that if we want the best treatment for our younger patients, we must treat orthopedic problems such as transverse, sagittal, vertical or functional problems in mixed dentition prior to the eruption of the permanent teeth.



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