

## Class II malocclusion in mixed dentition

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*The primary goal of early treatment is to correct the existing muscular, skeletal and dental imbalances before the eruption of the permanent teeth. When early treatment is instituted, 80% of the malocclusion can be treated with orthopedic appliances and the remaining 20% solved with the straight wire appliances. This approach ensures that in excess of 95% of the cases can be treated non-extraction and non-surgically.*

### INTRODUCTION

**T**he mixed dentition stage is the most neglected area in orthodontics, as the majority of orthodontic practitioners have been trained to concentrate their efforts on patients in the permanent dentition. It has been estimated that approximately 70% of patients in the mixed dentition could benefit from some form of orthodontic or orthopedic (functional) treatment. Many generalists, pedodontists and parents have been frustrated with the response of some orthodontists upon observing the problems, i.e., "No treatment is indicated at this time, the patient is too young, the malocclusion will be observed and treated when the permanent teeth erupt." For practitioners trained with a preventive philosophy, this approach seems very irrational when statistics prove that these malocclusions left untreated continue to worsen with time.<sup>1,2</sup>

Two leading orthodontic researchers, Woodside<sup>3,4</sup> and McNamara<sup>5,6</sup> working extensively with adolescent monkeys and functional jaw repositioning appliances, reported that the condylar changes occurred when the monkeys were actively growing. If the research clearly demonstrates that the clinician will obtain the greatest response while the patient is still actively growing, one wonders why the majority of patients are left untreated in the mixed dentition. The term "supervised neglect" seems appropriate! With all the emphasis today on increased awareness of health problems, it seems incomprehensible to me that our children are not receiving proper treatment.

The sad truth is that most orthodontists have geared their practices to treatment in the permanent dentition. This perception has been substantiated by

Sinclair when he states that the orthodontists interviewed said they used functional appliances in 5 to 10% of their cases. If this is so, then I respectfully submit that the generalists and pediatric dentists have a responsibility to increase their knowledge of orthodontics and orthopedics and become the treatment specialists of the mixed dentition. It clearly appears that if the generalists and pediatric dentists do not intervene in the mixed dentition, then the likelihood of extraction of permanent teeth and surgical orthodontics will increase. The primary goal of early treatment is to correct the existing muscular, skeletal and dental imbalances so that the need for extraction of permanent teeth is minimized.

### CLASS II DIVISION I MALOCCLUSION

The most important factor in the treatment of the Class II Division I malocclusion is proper maxillary arch form which, in turn, will encourage normal function. The tongue must have adequate room in which to function. Several studies have shown that if there is not adequate room for the tongue, the teeth and bone will move and increase the severity of the malocclusion. The goal of every clinician must be to have a well rounded, properly developed maxillary arch, both transversely and sagittally. This will encourage normal muscle function, including proper nasal breathing, good lip seal, normal tongue function and normal swallow patterns.

One of the main problems with the Class II Division I malocclusion is the loss of the maxillary arch width, which may occur from several factors, including thumbsucking, tongue thrusting, incorrect swallowing, mouth breathing, airway problems and poor lip seal.

The tongue drops down and does not exert its normal lateral pressure against the alveolus from the lingual and the classic result is a decrease in the width of the maxillary arch. This sometimes results in labial

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flaring of the maxillary anteriors and a more narrow, v-shaped maxillary arch. Three types of malocclusions can arise from this situation: 1. Constriction maxillary arch - constriction mandibular arch, 2. Constriction maxillary arch - normal mandibular arch, 3. Constriction maxillary arch - retrognathic mandible.

### **Constriction maxillary arch - constriction mandibular arch**

As the maxillary arch becomes slowly constricted, the functional occlusion may result in a similar constriction of the mandibular arch as the lower teeth move lingually, intercusating with the inclined planes of the upper teeth. These arch constrictions cause crowding in both arches resulting in the lack of adequate space for all the permanent teeth. The proponents of the conventional philosophy of treatment usually treat this problem by the extraction of permanent teeth, usually the first bicuspid. This results in the maxillary arch being permanently 16 mm smaller. The functional philosophy of treatment prefers to first try and solve the functional problems, including the airway problems, improve the nasal breathing and restore normal lip seal and normal swallowing patterns, including tongue function.

After the functional problems have been addressed, the next logical step would be with the use of functional (orthopedic) appliances to develop the arches to their original proper shape and size. Once these arches have been developed transversely and sagittally, there is now adequate room for the eruption of all the permanent teeth.

### **Constriction maxillary arch - normal mandibular arch**

When the maxillary arch constricts and the mandibular arch remains a normal size, the result is a posterior crossbite, which may or may not cause facial asymmetry. If this situation is allowed to continue, it affects the TMJ negatively as one condyle becomes anteriorly displaced and the other posteriorly displaced. If this condition persists, then the condyle which is anteriorly displaced lengthens and the posteriorly displaced condyle becomes flattened and shortens. Thus the two condyles are different in size and this may lead to more permanent facial asymmetry. It is best to correct this condition as early as possible.

It is not unusual to place a maxillary Schwarz Plate with posterior occlusal pads in patients ages 4 to 5 years in an effort to minimize the damage done to the condyles. When the maxilla is developed to its proper shape and size using functional orthopedic appliances like the Schwarz Plate, the posterior crossbite is eliminated and the condyles can assume their correct position in the glenoid fossa. It is important to realize that most posterior crossbites, even though they appear to be unilateral, are actually a bilateral problem. Therefore, it is important to use a transverse development appliance like a Schwarz Plate which develops the entire maxillary arch.

This type of treatment usually results in the elimination of the facial asymmetry and the correction of the skeletal midline problem when the mandible is able to assume its correct position in relation to the maxilla and correct condyle-fossa relationship.

If there is a dental midline problem, this would be corrected later with the straight wire appliance after all the remaining permanent teeth have erupted.

### **Constriction maxillary arch - retrognathic mandible**

The final scenario occurs when the maxillary arch becomes constricted and the mandible is held in a retruded position by the muscles because it can intercusate more completely with the narrow posterior upper arch. This retruded mandibular position results in the condyles being posteriorly and superiorly displaced, with a resultant increase in the signs and symptoms of TMJ.

Question: If the mandible is in a retruded position from the constricted maxillary arch, what is the best solution to the problem?

The conventional philosophy suggests that we should extract the maxillary first bicuspid and retract the maxillary teeth to solve this overjet problem. This approach appears to be completely illogical. If the problem is a constricted upper arch how are you solving this by the extraction of two first permanent maxillary bicuspid which is only going to make the maxillary arch permanently 16 mm smaller?

If the maxilla is determined to be in a normal position and the mandible is retruded, why would anyone think that the extraction of two maxillary first bicuspid and the subsequent retraction of the maxillary anterior teeth, be the best solution to this problem? Surely now you would be faced with a retruded maxilla and a retruded mandible, a retrognathic and flat facial profile, and a narrow smile from the loss of teeth and constricted arches.

The other problem for the patient is, that if the condyles were posteriorly displaced when the mandible went retrognathic due to the constriction of the maxillary arch, how is the mandible to now come forward to help reduce the TMJ signs and symptoms as a result of the posteriorly displaced condyle? Once the maxillary anteriors have been retracted, there is no chance to improve the head and neck pain problems that sometimes arise from this type of treatment.

The treatment of choice is to clearly solve the functional problems including airways, etc., and then to develop the maxillary arch to its proper shape and size transversely and sagittally. Then once we have established a normal arch form and the maxillary incisors have been normalized, the mandible is advanced to its original forward position utilizing functional orthopedic appliances. The appliances of choice are the Twin Block and the Rick-A-Nator.

These functional appliances advance the mandible and allow for the eruption of the posterior teeth and alveolar processes, which effectively move the condyles down and forward to a more physiological position in the glenoid fossa. This results in a decrease in the signs and symptoms of TMJ and is certainly the treatment of choice. If the original malocclusion was caused by a constriction of the maxillary arch and the mandible becoming retruded, then it would seem logical that to treat the case you would just reverse the process. In other words, develop the maxilla back to its normal shape and size and then encourage the mandible to come forward to its original position with orthopedic appliances.

Other reasons for the early utilization of functional appliances for the treatment of Class II malocclusion in the mixed dentition include:

- The proper development of the maxillary and mandibular arches, which creates adequate space for all the permanent teeth, thereby minimizing the need for extractions.
- Cases with flared maxillary incisors and large overjets must be treated early to prevent these incisors from being damaged in an accident.
- Utilization of jaw repositioning appliances (functional appliances) to advance the mandible to significantly improve facial esthetics including the profile.
- The earlier the patient is treated, the less permanent damage is done to the condyles. Condyles can be posteriorly displaced from incisal interference as in Class II Division 2 malocclusions, constricted maxillary arches which hold the mandible in a retruded position. The loss of posterior vertical dimension when the posterior teeth and posterior alveolar processes become depressed can also result in condyles being superiorly and/or posteriorly displaced.

It has been well documented that condyles which are superiorly and posteriorly displaced can cause impingement on the nerves and blood vessels in this area and cause headaches, neckaches, earaches, and problems around the eyes. Posteriorly displaced condyles can also undergo degenerative changes including osteoarthritis and a flattening, and in severe cases an irregular or a beaking appearance.<sup>8</sup>

These posteriorly displaced condyles can also cause the muscles of the head and neck to overwork through continuous contractions which results in increased muscle soreness and in some severe cases, the formation of trigger points.

This muscle soreness and trigger points should be palpated by the clinician and recorded on the patient's chart. Orthodontic practitioners must palpate these muscles on a regular basis to ensure that the treatment plan being utilized is affecting the TMJ in a positive manner. When there is a reduction in muscle soreness and trigger points, the patient is telling you that your treatment is progressing in the right direction.

Conversely, if there is an increase in muscle soreness and symptoms, then perhaps it is time to consider another treatment option. My clinical experience has convinced me that my patients have fewer trigger points and healthier TMJ's when treated with the functional approach. This means developing the arches with orthopedic appliances, elimination of the airway problems, advancing the mandible with orthopedic appliances, and developing the posterior vertical dimension with the eruption of the posterior teeth which positively affects the TMJ.

The bottom line is that if patients are treated in the mixed dentition with functional appliances, there will be a significant reduction in the signs and symptoms of TMJ, less damage done to the condyles and much happier and healthier patients.

### **PROPER ARCH FORM ENCOURAGES PROPER FUNCTION**

The rationale is that you must have proper arch form in order to encourage normal function. If the maxillary anteriors are flared, this impedes the establishment of proper lip seal. Poor lip seal can in turn lead to mouth breathing, incorrect swallowing, tongue habits, etc. Therefore, it is in the patient's best interest to try and have this problem corrected as early as possible, preferably in the mixed dentition. If the problem is flared anteriors with a slight overjet, then a maxillary Schwarz Appliance with a labial bow might be sufficient to develop the maxillary arch transversely and to round out the anterior part of the arch form with the labial bow. This would also normalize the position of the maxillary anteriors and re-establish normal function which will enhance the possibility of normal function including proper lip seal and normal swallow patterns.

In cases where there is a large overjet due to flared maxillary incisors and a retrognathic mandible, then Phase 1 Schwarz Appliance with an anterior labial bow would be followed by Phase 2 functional jaw orthopedic treatment to encourage the advancement of the mandible using a Twin Block Appliance. The development of the constricted maxillary arch will help expand the airway and help improve the likelihood of normal nasal breathing as well as making more room for the tongue which will encourage proper tongue function and proper swallowing.

It cannot be emphasized enough, that the patient needs normal function for orthodontic stability. Obviously, the use of functional appliances which properly prepares the maxillary arch both transversely and sagittally, plays a major role in the success of your orthodontic cases.

### **AIRWAY PROBLEMS**

Airway problems lead to poor function of the tongue and lips as well as a constricted maxillary arch

as discussed previously. Therefore, to only be concerned with the form of the arch and not to address the problem of the airways, is foolhardy at best. The correction of airway problems must be done as early as the problem is diagnosed and should be solved in cooperation and consultation with the Family Physician and Ear, Nose and Throat Specialist.

Research has shown that studies done by Harvold,<sup>2,11</sup> Woodside<sup>12</sup> and others,<sup>13,14</sup> that airway problems left untreated can frequently cause a worsening of the malocclusion often leading to an increase in the dental and, more seriously, the skeletal open bite. Proper function must be attained as soon as possible, including the encouragement of nasal breathing, proper swallowing, proper lip seal and correct tongue position. Normal function also encourages the normal development and a much more stable maxillary arch. Because of the close proximity of the nasal airway to the hard palate, when the maxilla is developed to its proper transverse dimension, improved nasal breathing frequently occurs.

### Summary of Treatment of Choice Airway Problems

- Referral to Ear, Nose, and Throat Specialist
- Treatment of allergies and possible referral to an Allergist.
- Surgical removal of adenoids
- Maxillary expansion appliances
  - \* Slow palatal expander: Removable Schwarz Appliances, and Fixed Nitanium Palatal Expander
  - \* Rapid palatal expander: Fixed Banded Hyrax, and Fixed Bonded Hyrax

The question arises, "Is it not better to utilize a functional appliance in the mixed dentition to encourage the advancement of the mandible to its correct position rather than to wait until a later date when the mandible will have to be surgically advanced?"

The following is a summary of the difference between the treatment of Class II malocclusion utilizing what is known as the Conventional or Retractive Technique and the Functional approach to treatment.

### RATIONALE FOR CONVENTIONAL TREATMENT

- Primarily bicuspid extraction.
- Lower arch is the key. *Position of lower incisor critical.*
- Overjet is due to a protruded maxilla. Solution would be the retraction of the maxillary anteriors following either bicuspid extraction or distalization of the molars.
- Crowding is from oversized teeth for the size of the jaw. Solution would be the extraction of bicuspids or distalization of the maxillary molars utilizing cervical facebow headgear, Wilson distalizing arch, posterior sagittal, Cetlin appliance, or the "new" Pendulum Appliance.
- Excessive overbite is due to over-erupted incisors. Solution would be to intrude the incisors with fixed

mechanics utilizing utility arches or reverse curves in the archwires.

- Align the teeth on the lower arch.
- Move the upper teeth distally to intercusate with the teeth on the lower arch.
- Proponents of this retractive technique believe that no relationship exists between orthodontics and TMJ.
- Orthodontic treatment cannot solve an existing TMJ problem.
- Patient's profile remains retrognathic, often appears flattened and indeed becomes more concave with age.
- Narrow smile (constricted maxillary arch).

### RATIONALE FOR FUNCTIONAL TREATMENT

- Non-extraction.
- *Upper arch is the key.* The maxillary arch must be developed to its proper shape and size transversely and sagittally in an effort to:
  - \* Accommodate all the permanent teeth.
  - \* Allow the mandible to come forward to its proper position and correct the Class II skeletal relationship to Class I skeletal.

#### *Preparation of Maxillary Arch:*

- \* Constricted arch: Use slow palatal expander, e.g., Schwarz Plate or for greater expansion use rapid palatal expander bonded Hyrax or banded Hyrax appliance.
- \* Class II Div 2: Use an anterior sagittal removable appliance or a fixed appliance like the utility arch with straight wire brackets.
- \* Flared Maxillary Anteriors: Detorque with the labial bow Schwarz Plate or detorque using the fixed straight wire brackets and a power chain to close the spaces.
- \* Crowded Maxillary Anteriors: Align with Straight Wire appliance.

The importance of the proper preparation of the maxillary arch cannot be overestimated in the treatment of Class II malocclusions.

- Overjet is due to a retruded mandible. Solution would be to advance the mandible with a functional (orthopedic) appliance.
- Dental crowding is from constricted dental arches. Solution would be to develop the dental arches transversely and sagittally to accommodate all the permanent teeth.
- Excessive overbite is from overclosed vertical dimension. This problem is easily diagnosed by the presence of bruxism and numerous sore muscles upon palpation, notably the deep masseter, posterior digastric and lateral pterygoids. Solution would be to use a functional appliance to prevent the eruption of the anterior teeth and to correct the problem by allowing the eruption of the posterior teeth and alveolar processes.

- Align the maxillary teeth on a properly developed maxillary arch. Correct rotations and close all spaces and torque maxillary incisors properly. If incisors are too vertical, they must be torqued with utility arches or rocking chair curves and rectangular wires. If incisors are flared they must be detorqued as seen above.
- Move the mandible forward with functional appliances to intercusate with the teeth on the maxillary arch. Examples of functional appliances include the Bionator, Bio-Finisher, Rick-A-Nator, Twin Block Appliance.
- Proponents of the functional technique believe that a definite relationship exists between orthodontics and TMJ.
- Patients treated with functional appliance treatment routinely demonstrate reduced signs and symptoms of TMJ.
- Patient's profile is significantly and routinely improved when the mandible is advanced and appears fuller and more convex.
- Broad smile (normal size maxillary arch).

It is quite evident from the above that there is a drastic difference between the Conventional (Retractive) philosophy and the Functional philosophy for treating Class II malocclusions. Two prominent orthodontic clinicians and researchers, McNamara<sup>15</sup> and Moyers,<sup>16</sup> made the startling revelation that 80% of Class II malocclusions have retrognathic mandibles. McNamara<sup>15</sup> has further stated that less than 5% of the maxillas are truly prognathic. In light of these facts, how can orthodontic practitioners (orthodontists, pedodontists, general dentists) continue to apply mechanics which cause retraction of the maxilla?

It seems only logical that if the maxilla is in the normal position and the mandible is retrognathic, we concentrate on orthopedic techniques that will advance the mandible. Therefore, rather than retractive orthodontics which distalizes the maxillary teeth and often flattens the midface, we should be utilizing anterior repositioning splints and functional (orthopedic) appliances which advance the mandible which significantly improves the patient's profile. The conventional (retractive) philosophy is too concerned with the position of the lower incisors when, in fact, more attention must be paid to the patient's profile, condylar position, TMJ health and the proper relationship between the maxilla and the mandible (antero-posteriorly and vertically).

Patient cooperation, according to Graber (1975) is the "Achilles Heel" of early treatment. The ability to motivate the patient to wear the appliances is an essential ingredient of successful orthodontic therapy. This is the reason that clinicians must learn about the newer functional appliances today, including the Rick-A-Nator and Twin Block. The advantage of these appliances is that in the case of the Rick-A-Nator and the lower block of the Twin Block Appliance these could be

cemented in the mouth as the patient could not remove them. The older functional appliances such as the Activator, Bionator and Frankel Appliances were much slower, caused the patients problems when talking, and generally were not well tolerated by the patients.

The importance of the clinician and staff being able to confidently present the functional philosophy to the patient and the parents is an essential part of the success of the treatment. The treatment philosophy must be presented at a separate consultation appointment with the patient as well as both parents in attendance. Obviously the treatment plan must be presented with confidence and enthusiasm and it is helpful to also show photos of successfully completed cases utilizing functional appliances. When you take your time and explain to the patient what the appliances are trying to accomplish and that this will decrease the need for extraction of permanent teeth, I have found my success rate to be in excess of 95%.

The interest in early treatment has increased from a general rise in the level of consciousness in interceptive and preventive medicine as well as dentistry. Parents have an understanding that the muscular problems (airways, breathing habits) and skeletal problems (constricted arches, retruded mandibles) should be corrected early in Phase 1 and 2 (orthopedic phases). Then after all the permanent teeth erupt the case can be re-evaluated and if necessary Phase 3 (orthodontic phase) utilizing fixed braces can be initiated. Certainly the likelihood of achieving well formed arches, straight profiles, broad smiles, healthy TMJ's and proper facial height are enhanced with early treatment.

Another important factor, which clinicians must seriously consider in the 1990's, is the final position of the condyle in relation to the fossa in their orthodontic treatment. Several authorities have written about the importance of the condyle being in a more downward and forward position in the glenoid fossa. Gelb describes the ideal position as the Gelb 4-7 position.<sup>8</sup> This position is much more easily attainable when the clinician employs an orthopedic or functional philosophy of treatment. There are three main factors affecting this condylar position:

\* **Transverse** - When the maxillary arch is constricted and then subsequently developed to its proper shape and size with an orthopedic (functional) appliance this allows the mandible, which may be held in a retruded position to come forward. This obviously allows the condyle to move down and forward to a more physiologically correct position in the fossa.

\* **Antero-Posterior** - In 80% of the Class II malocclusions the mandible is retruded. In these cases the treatment of choice is obviously the utilization of jaw repositioning appliances to encourage the mandible to come forward. This movement similarly ensures that the condyle will also move to a more downward and forward position.

\* **Vertical** - Most Class II malocclusions are skeletally overclosed and need some vertical development. The orthopedic approach is to encourage the eruption of the posterior teeth and posterior alveolar processes in an effort to correct the dental and skeletal problem. This routinely moves the condyles to a more downward and forward position.

According to the Quintessence Atlas of Anatomy, "Based on anatomical facts, that is the structure of the disc and the eminence, the condyle's upper most forward position in the glenoid fossa when in intimate contact with the disc is a very stable position even under considerable stress at the joint."

The most retruded position of the condyle cannot be the functional position, since the condylar head could compress or stimulate the posterior bilaminar zone with its abundance of blood vessels and nerves."

In conclusion, if you want to increase the likelihood of the condyles ending up in the correct position at the end of treatment, then the clinician is advised to employ a functional philosophy of treatment.

### **DIFFERENTIAL DIAGNOSIS IN THE TREATMENT OF CLASS II MALOCCLUSIONS**

Approximately 80% of the Class II cases will present with the following clinical information:

- Class II Skeletal: Normal maxilla with retrognathic mandible
- Class II molar relationship
- Class II cuspid relationship
- Normal or closed skeletal vertical
- Retrognathic Profile: Deep dental overbite
- Profile: When the mandible is advanced the profile is significantly improved.
- Significant signs and symptoms of TMJ
- Transcranial x-rays or tomograms reveal condyles posteriorly or superiorly displaced in the glenoid fossa.
- Treatment: Functional appliances, e.g., Rick-A-Nator, Twin Block

Approximately 15% of the Class II cases will present with the following clinical situations:

- Class I Skeletal: Normal or prognathic maxilla with a normal mandible
- Class II Molar Relationship
- Normal Skeletal Vertical
- Straight Profile
- Profile: When the mandible is advanced profile does not improve and frequently resembles bimaxillary protrusion.
- Transcranial x-rays or tomograms reveal condyles centered or positioned more anteriorly in the glenoid fossa.
- Treatment: Use molar distalization appliances, e.g.,  
Removable Appliances: e.g., Posterior Sagittal or  
Cetlin

Fixed Appliances: e.g., Wilson Distalizing or  
Pendulum

### **DISCUSSION**

In order to treat orthodontic patients in the mixed dentition in the 1990's, orthodontic practitioners must have a knowledge of orthopedics, orthodontics and TMJ. It is vitally important that treatment be initiated early so you can positively affect the TMJ as well as the patient's profile with your orthodontic-orthopedic treatment. Orthodontic cases must be treated to stable joint relationship so the emphasis must be on condylar position rather than just proper interdigitation of the teeth. If the patient has a perfect Class I occlusion at the end of treatment, but suffers for the rest of their life with head and neck pain, this can hardly be considered a successfully treated orthodontic case.

The key to proper treatment is diagnosis. If 80% of the mandibles are retrognathic in Class II cases, we obviously must have something in our treatment technique that advances the mandible. Clinicians must come to grips with the reality of the situation and must learn to use anterior repositioning splints and orthopedic appliances, which help establish a correct relationship between the mandible and maxilla both antero-posteriorly and vertically. It is completely illogical for clinicians to apply mechanics such as cervical facebow headgear, bicuspid extractions, Wilson distalizing arches, etc., which cause a retraction of the maxilla when the patient presents with a normal maxilla and a retrognathic mandible.

You must utilize a treatment philosophy that positively affects the health of the TMJ of your orthodontic patients. During the past 17 years of my orthodontic practice, I have positively and negatively affected the TMJ's of my patients. My clinical experience and that of many of my colleagues has convinced me that conventional (retractive) orthodontics, which includes the retraction of anterior teeth, distalization of molars, bicuspid extractions, cervical facebow headgear, constriction of maxillary arches frequently results in affecting the TMJ negatively. Conversely, functional orthodontics, which involves the development of the dental arches with orthopedic and fixed appliances, elimination of airway problems, proper positioning of the mandible in relation to the maxilla, and the development of the transverse sagittal and vertical dimensions will usually affect the TMJ positively.

The key to treatment for Class II malocclusions is learning how to make the proper diagnosis! In my opinion, orthodontics has to change and techniques such as the routine use of cervical facebow headgear and bicuspid extractions are no longer valid in the 1990's. It has been estimated that 60% of all orthodontic patients have some signs or symptoms of TMJ dysfunction prior to treatment. Clinicians cannot continue to ignore this fact and they must use tech-

niques that have been shown to significantly reduce the signs and symptoms of TMJ. Too many patients are being adversely affected by retractive orthodontic techniques. An excessive number of post orthodontic patients are ending up in the offices of medical doctors, general dentists, TMJ specialists, chiropractors, physical therapists, neurologists, E.N.T. specialists, etc., suffering from chronic head and neck pain.

The importance of finding and maintaining the correct relationship of the mandible to the maxilla cannot be overemphasized. If this is not one of the primary goals of orthodontic treatment, then the cases are doomed for failure and the patients will suffer increased pain and discomfort.

Keller<sup>17,18</sup> outlined 44 orthodontic cases, which were treated by orthodontists using conventional methods and each patient ended up suffering from severe head and neck pain, with dislocated joints. In other words, at the end of orthodontic treatment the condyles were posteriorly or superiorly displaced in the glenoid fossa. He retreated these cases utilizing a functional approach and all these patients have remained symptom-free for a period ranging from 3 to 14 years. If these 44 patients who were treated with the conventional or retractive approach all ended up with pain, and then were retreated with the functional approach to a pain-free state, does it not seem reasonable to apply this functional approach to all our patients in mixed dentition so these problems can be avoided?

If a functional orthopedic approach to treatment is applied to patients in mixed dentition, then there is an excellent chance that the majority of these cases can be treated non-extraction and non-surgically without compromising the health of the TMJ. Do we not owe this to our patients? Are they not depending on us to increase our knowledge of orthodontics and orthopedics so we can help them to grow up with all of their permanent teeth, with broad smiles, straight profiles, and healthy TMJ's.

Is it not time to do something about this situation? How long can we, as pediatric dentists and general dentists, tolerate this supervised neglect of our patients in mixed dentition? Our patients are trusting us to give them the best treatment. For the good of our profession and in particular for the well being of our young orthodontic patients, I urge all practitioners to reevaluate their treatment philosophy for the 1990's and upgrade their education so they can become more knowledgeable in orthodontics, orthopedics and TMJ.

## SUMMARY

The primary goal of early treatment is to correct the existing muscular, skeletal and dental imbalances before the eruption of the permanent teeth. To succeed, the clinician must solve the transverse, sagittal and vertical problems as seen with the malocclusion.

By initiating treatment early in the mixed dentition, the need for extraction of permanent teeth or orthognathic surgery is minimized. When early treatment is instituted, 80% of the malocclusion can be treated with orthopedic appliances and the remaining 20% solved with the straight wire appliance (fixed braces). This approach ensures that in excess of 95% of the cases can be treated non-extraction and non-surgically. The bottom line is that we want what is best for our young patients so we must treat early and we must treat orthopedically and functionally.

## MICKEY JUDRAS TREATED WITH A RICK-A-NATOR APPLIANCE

The Rick-A-Nator is a very simple appliance which consists of two maxillary first molar bands attached to an anterior biteplate via two .040 connector wires. The patient is allowed to function on this flat anterior biteplate for one month to help encourage patient compliance. The next month this anterior biteplate, located lingual to the maxillary anterior teeth, is transformed into an anterior repositioning splint by the addition of an incisal ramp. This incisal ramp encourages the mandible to come forward which corrects the Class II molar relationship to Class I and eliminates the overjet.

## PARTS OF RICK-A-NATOR

- Two Molar Bands with Lingual Attachments
  - \* Fixed (Soldered)
  - \* Wilson Attachment (Vertical Direction)
- .040 Connector Wire from Molar Bands to Incisal Ramp
- Anterior Biteplate (Processed Acrylic)
- Incisal Ramp (Self-Curing Acrylic)

## RATIONALE FOR COMPOSITE BUILD-UP OF PRIMARY MOLARS

In early mixed dentition treatment, the first and second primary molars will not erupt unless there is no permanent successor. One of the main problems with the utilization of the Rick-A-Nator is that the patient has difficulty chewing due to the lack of posterior occlusion. Also from a TMJ standpoint, there is a lack of posterior support which is not conducive to TMJ health and stability. Since they will not erupt, the treatment of choice is to build up the lower first and second primary molars with composite to provide some occlusion in the posterior and support for the TMJ. This support for the condyles helps move them into a more ideal position in the glenoid fossa (more downward and forward).

The primary molars are built up with composite after the anterior biteplate has been relined and the incisal ramp has positioned the mandible in an ideal relationship with the maxilla (normal overjet and overbite). When the lower primary molars are built up

to the ideal level of occlusion, the first permanent molars will passively erupt to the new occlusal plane, thereby eliminating the deep overbite. The incisal ramp, which was relined to encourage the mandible to come forward, also eliminates the overjet within 4 to 6 months. This is the fastest and indeed the most physiological way of solving the problem of a slight overjet and deep overbite in the early mixed dentition.

**CASE REPORT #1**  
**RICK-A-NATOR APPLIANCE**

1. Female Age 9 years with a retrognathic profile
2. Medical History: Head injury age 3.

3. TMJ Range of Motion: Maximum opening 42 + 6 = 48 mm, right lateral 7 mm, left lateral 11 mm.
4. TMJ signs: Several muscles sore upon palpation which included: deep masseter, anterior temporalis, lateral pterygoid, body masseter, posterior temporalis, posterior digastric.
5. TMJ Symptoms: Sore neck relieved with Tylenol pain medication.
6. Functional Problems: None
7. Airway Evaluation: Adenoid area 7 mm and tonsil area 16 mm.
8. Skeletal Problems include: Class II skeletal, normal maxilla, retrognathic mandible with a normal vertical.

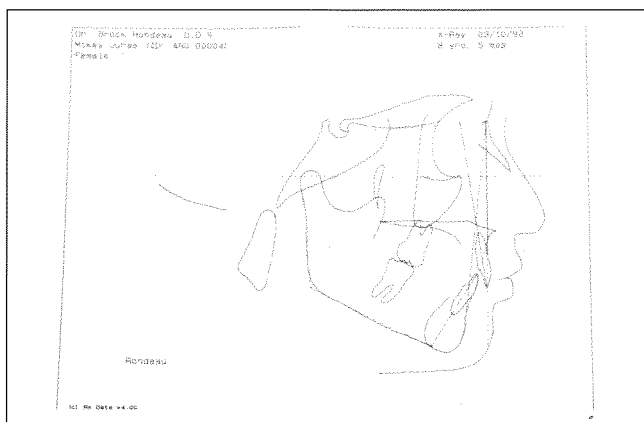


Fig. 1 Ceph tracing.

Rondeau Analysis Report

Doctor : Brock Rondeau, D.D.S.  
 Patient : Mikey Jones  
 Age : 8 Years, 9 months  
 Sex : Female  
 X-ray Date : 03/10/92  
 Operator :  
 Version : V4.00

Measurement Name	Normal Value	Actual
Profile		
S Line	MX Lip +2mm	1.4
	MD Lip +2mm	2.2
Skeletal		
SNA	82 (+/-2)	86.3
SNB	80 (+/-2)	79.7
ANS	2 (+/-2)	6.7
NSGonion	32 (+/-3)	29.9
SPSIB	2 (-2)	-0.5
NAP	2	15.0
ANS-M	60 to 55mm	64.9
ANS-M	60 to 75mm	65.9
Nite	0 (+/-2) mm	1.6
N perp A	0 (+/-2) mm	0.0
N perp Bq	+6 to 0 mm	-22.2
MX Length	26 to 160mm	99.6
MD Length	97 to 115mm	114.5
MS-MD Diff	18 to 10mm	17.9
Upper Gonial Angle	42-55	52.5
Lower Gonial Angle	70-75	75.4
Gonial		
Upper Incisor to NS	102	93.4
Interincisal Angle	170	125.8
Lower Incisor to SGN	95	79.3
Upper Incisor to NS	5 mm	-9.5
Lower Incisor to NS	0 mm	-1.1

Fig. 2 Ceph analysis.



Fig. 3 Initial study model  
Right lateral  
August 1992



Fig. 4 Initial study model  
Frontal  
August 1992





Fig. 5 Rick-A-Nator



Fig. 6 Insert Rick-A-Nator  
September 1992



Fig. 7 Reline Rick-A-Nator  
Occlusal view  
October 1992



Fig. 8 Reline Rick-A-Nator  
Frontal view  
October 1992



Fig. 9 Composite buildup  
Lower right second primary molar  
November 1992



Fig. 10 Composite buildup  
Lower second primary molar  
November 1992



Fig. 11 Right lateral  
No posterior support  
September 1992



Fig. 12 Right lateral  
Composite buildup  
Lower right second molar  
November 1992



Fig. 13 Initial right lateral  
August 1992



Fig. 14 Right lateral  
February 1993



Fig. 15 Initial frontal  
August 1992



Fig. 16 Frontal  
February 1993

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