Second Molar Extraction Technique: *Overrated or Underutilized?*

The second molar extraction technique is utilized in Class II malocclusions to assist in the distalization of the first molars when there is significant crowding in the arch. Since approximately 70% of all malocclusions are Class II, obviously clinicians should spend the majority of their time studying this malocclusion closely.

Is the second molar extraction technique overrated or is it under utilized? If you never extract second molars under any circumstances, then I would submit that the technique is under utilized. However, if you extract second molars in more than 3% of your Class II malocclusions, I would suggest that you evaluate your cases carefully and concentrate on making a proper diagnosis. Clinicians who extract any teeth including second molars, must be prepared to back up their decisions with some logical explanations. One reason I have heard is that second molars are extracted when there is 3 to 4 mm. of crowding in the arch in an effort to prevent the mesial migration of the first molars. This theory has been frequently refuted in the literature and would not make for an adequate defense for the extraction of a 12 mm. tooth at the posterior part of the mouth to compensate for 3 mm. of crowding in the anterior part of the arch. Certainly anterior crowding is a problem with some orthodontic cases, particularly in the lower arch. Most functional clinicians believe this crowding is not coming from the mesial migration of the molars, but rather from latent mandibular growth or from a narrowing of the arches due to mouth breathing or poor tongue position.

Treatment

1. Extract maxillary second molar on side of severe crowding
2. Distalize maxillary molar

The second molar extraction technique, although rare, is much better suited for the upper arch than the lower arch. The maxillary third molars almost always erupt into proper position following the extraction of the second molars. However, the mandibular third molars sometimes erupt horizontally and, at age 18, the clinician must go in and retreat the case. This can be a very time consuming and costly procedure. I highly recommend that this technique be utilized mainly in the upper arch as indicated above and only for 3% of your Class II cases.

At this time I should like to discuss the difference between functional orthopedics, which imply the movement of bone, as compared to orthodontics, which is the movement of teeth. The vast majority of Class II dental malocclusions (80%) are also Class II skeletal malocclusions with underdeveloped maxillary arches and recessive mandibles. These Class II skeletal malocclusions require an orthopedic solution which is to properly expand the maxillary arch and then to reposition the mandible forward with the use of functional appliances such as the Twin Block. The other 20% of the Class II malocclusions are Class I skeletal that do not require orthopedics, but merely the distalization of maxillary molars. This is done with orthodontic appliances such as the Posterior Sagittal or Pendulum Appliances, which are designed primarily to move teeth, not bone.

As mentioned previously, the vast majority of Class II malocclusions are Class II skeletal, normal maxilla, retrognathic mandible, constricted maxillary arch, short lower face height, deep overbite and condyles posteriorly displaced with numerous signs and symptoms of TM dysfunction. The treatment of choice is to first develop the maxillary arch to normal so that this will ensure there will be adequate space for the eruption of all the permanent teeth, allow room to advance the mandible to allow correction of Class II skeletal to Class I skeletal, increase the size of the nasal airway which encourages nasal breathing, and make more room for the tongue which eliminates speech prob-

by Dr. Brock H.M. Rondeau

SUMMARY OF CLASS II MALOCCLUSIONS

1. **80% Class II Skeletal**
   Class II Molar
   Normal Maxilla, Retrognathic Mandible
   Constricted Maxillary Arch, Deep Overbite
   Condyles Posteriorly Displaced
   Signs and Symptoms of TM Dysfunction

   Treatment
   1. Non-Extraction
   2. Expand maxillary arch
   3. Advance mandible with functional appliance such as Twin Block
   4. Erupt lower posterior teeth

2. **17% Class I Skeletal**
   Class II Molar
   Normal Maxilla, Normal Mandible
   Slight to moderate crowding
   Condyles downward and forward in fossa
   Healthy TMJ

   Treatment
   1. Non-Extraction
   2. Distalize maxillary molars

3. **3% Class I Skeletal**
   Class II Molar
   Normal Maxilla, Normal Mandible
   Condyles downward and forward in fossa
   Healthy TMJ
   Severe crowding, blocked out cuspid or second bicuspid
   Serious arch length problem

   Treatment
   1. Extract Maxillary second molar on side of severe crowding
   2. Distalize maxillary molar

lems. The key to proper functional treatment, and in fact, to proper orthodontic treatment is the proper development of the maxillary arch. Some patients with unilateral posterior crossbites have facial asymmetries due to a shifting of the mandible to the side during closure. It is critical that the maxilla be developed to normal as early as possible so the crossbite can be corrected in order to eliminate the facial asymmetry. The proper development of the maxillary arch allows the mandible to assume its correct position and the condyles to move downward and forward. This helps eliminate the signs and symptoms of TM dysfunction. Clinicians who treat and monitor the health of the TMJ with range of motion measurements, TMJ health questionnaires, muscle palpations, Joint Vibration Analysis (JVA), and TMJ x-rays including transcranials and tomograms routinely find that the proper development of the maxillary arch is one of the keys to TMJ health. The other thing that is so impressive when you develop a narrow maxillary arch to normal is that you dramatically improve the patients smile. Patients do not want a narrow smile, they want a broad smile, so you must incorporate arch widening appliances into your treatment philosophy if you want to accomplish all of the above.

The key to functional treatment is to properly relate the mandible to the maxilla in three dimensions including transversely, anterio-posteriorly and vertically. The first step when treating functionally is to develop the maxillary arch to normal width with an arch widening appliance such as a removable Schwarz Appliance, or a fixed appliance such a Banded Hyrax or new Series 2000 Appliances with the nitanium coil springs. This solves the transverse problem. The second step would be to reposition the lower jaw forward orthopedically, utilizing a functional appliance such as the Twin Block, Rick-A-Nator or Herbst Appliance. This would correct the anterior-posterior problem (overjet). The forward movement of the mandible to its normal position corrects the Class II skeletal to Class I skeletal and also significantly improves the patient's profile. The third step would be to orthopedically allow the eruption of the lower molars by adjusting the appropriate appliances which would correct the skeletal vertical deficiency as well as the dental deep overbite. The advancement of the mandible as well as the increase in the posterior vertical dimension as a result of the eruption of the lower posterior teeth allows both condyles to move downward and forward which eliminates numerous signs and symptoms of TM dysfunction. My clinical experience has been that when these cases are treated in mixed dentition, most cases can be treated non-extraction.

The extraction of second molars is only done in cases where there is severe crowding and where molar distalization is required to gain more than 6 mm. arch length. In cases of minor crowding these cases should be done non-extraction. There are a variety of excellent molar distalization appliances today which are perfectly capable of distalizing first and second molars 3 to 4 mm. in order to make room for a blocked out cuspid or second bicuspid. Second molar extraction is ideal when the patient is in the early permanent dentition, the roots of the third molars have not formed more than 50%, and there is a severe arch length discrepancy. If the cuspid or second bicuspid is more than two-thirds blocked out, and the space required is more than 5 mm. then the extraction of a second molar is a viable technique. This happens in approximately 3% of Class II cases. Prior to considering either molar distalization or extraction of second molars, you must have established proper transverse development. All arches must be developed with arch widening appliances prior to molar distalization or extraction of any teeth including second molars. If you had a cuspid completely blocked out on the upper right side, the procedure would be as follows:

1. Develop the maxillary arch transversely to 34 to 36 mm. intermolar width at the gingival margins of the maxillary first molars.
2. Torque maxillary incisors to ideal position.
3. Distalize upper right first molar from Class II to Class I.

Figure 1: Straight Profile. Concave Lips.

Figure 2: Class II Cuspid Right.

Figure 3: Pre-treatment Ceph.

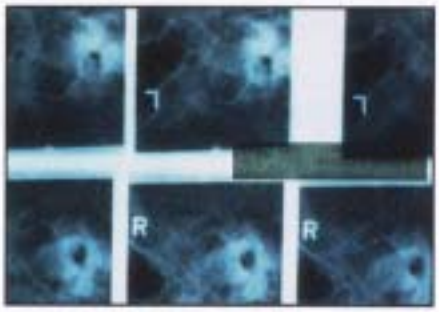

Figure 4: Pre-treatment Transcranial X-ray.

Treatment Objective

Extract upper right second molar. Distalize upper right first molar with Pendulum Appliance in order to achieve Class I molar relationship on the right side. Third molar will replace second molar.

Figure 5: TMJ Health Questionnaire. Normal TMJ.

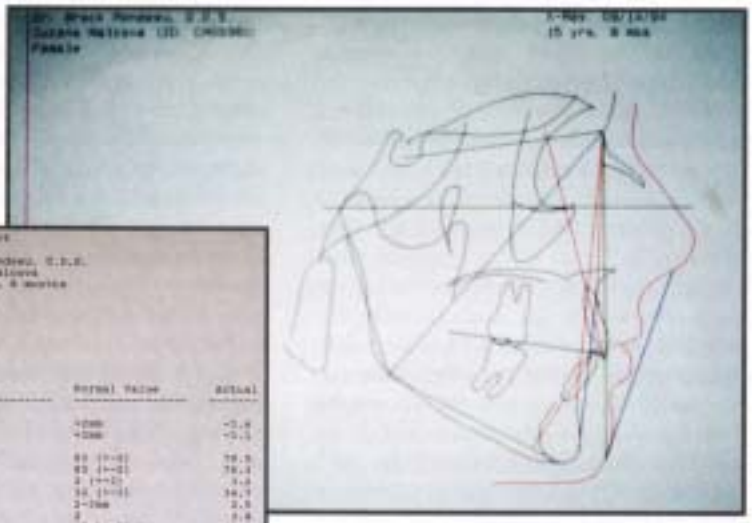

Figure 7: Ceph Tracing.

Figure 8: Ceph Analysis. Class I Skeletal.

Figure 6: Range of Motion—Normal. Muscle Palpataion—Normal.

Figure 9: Pre-treatment Right Lateral
Class II Molar Right
Class II Cuspid Right

Figure 10: Pre-treatment Left Lateral
Class I Molar—Normal Overjet
Class I Cuspid—Normal Overbite

Figure 11: Insert Maxillary Pendulum
Extract MX Right Second Molar
March 1995

Figure 12: Pendulum Distalized First Molar
6mm Overcorrect to Class III
September 1995

Figure 13: MX Right First Molar Class III
June 1995

Figure 14: Start Straight Wire
.014 NiTi Sentalloy
September 1995

Figure 15: .018 Beta Titanium
Class I Elastic, Retract Cuspid
February 1996

Figure 16: Cuspid Retracted
.018 x .025 BioForce NiTi
June 1996

Figure 17: Occlusal View, Molar Distalized
Pendulum Appliance
September 1995

Figure 18: Remove Pendulum
Insert TP—Rick-A-Nator
September 1995

Figure 19: Remove Rick-A-Nator
Upper right third molar erupted
Treatment Complete
August 1996

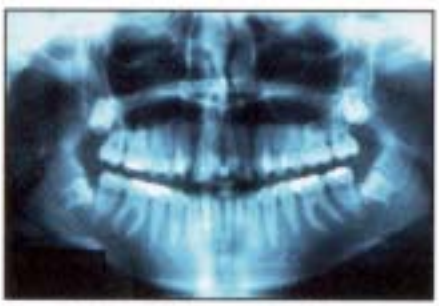

Figure 20: Final Transcranial X-Ray
Condyle in good position

Case #1 Female Patient: Z.M., Age 13 (continued)

Figure 21: Pre-treatment Panorex
All third molars present

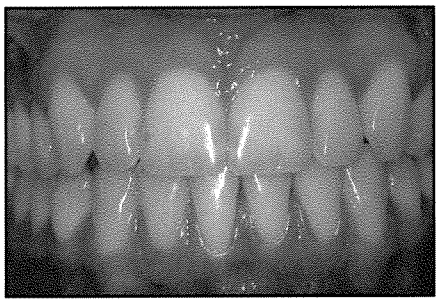

Figure 22: Post-treatment Panorex
Upper right third molar erupted

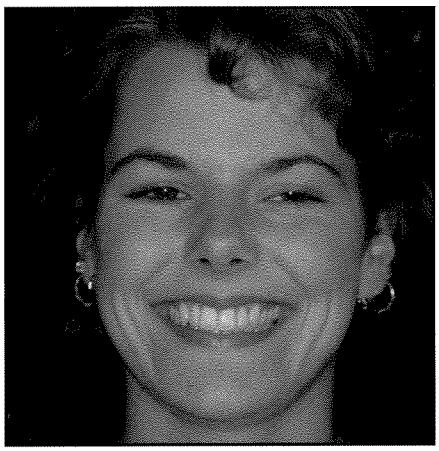

Figure 23: Post Treatment
Beautiful Broad Smile

Case #2 Female Patient: J.P., Age 9

Figure 1: Retrognathic Profile
Class Ii Skeletal
Normal Maxilla
Retrognathic Mandible
Short Lower Face Height
Large Submental Crease
February 1997

Figure 2: Straight Profile
Class I Skeletal
Normal Maxilla
Normal Mandible
Normal Vertical
Eliminate Submental Crease
August 1997

Treatment Objective

Use Twin Block Appliance to advance the mandible to correct Class II Skeletal to Class I Skeletal and to significantly improve profile. The Twin Block completed these objectives and restored a normal overjet and normal overbite within 7 months.

Figure 3: Pre-treatment Left Lateral
Overjet 7 mm
Overbite 5 mm
Class II Molar
February 1997

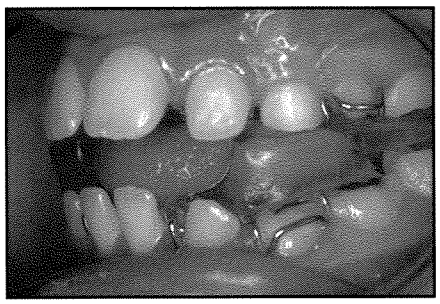

Figure 4: Twin Block
Upper & Lower Blocks
Interlock 70•
Grind upper block to allow lower first molar to erupt
August 1997

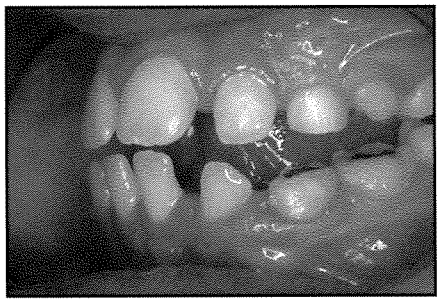

Figure 5: Mandible Advanced
Normal Overjet
Lower first molars erupted
Normal Overbite
August 1997

Figure 6: Twin Block II
Anterior Inclined Plane
Holds Mandible Forward
Worn 6 months to allow bicuspids to erupt and prevent relapse
August 1997

4. Initially, I think second molar extraction was thought of as an alternative to bicuspid extraction. The rationale was that if there was 5 mm. of crowding on both sides of the upper arch and the clinician extracted two maxillary first bicuspids (8 mm.), there would be two 3 mm. extractions sites to close. In cases where the patients presented also with an overjet, the clinician would be tempted to close those extraction sites by retracting the maxillary anteriors. This retraction technique frequently results in a flattening of the profile, and flattening of the upper lip, and distalization of the mandible with possible increase in signs and symptoms of TM dysfunction. The occlusion is not ideal as you are left with a Class II molar relationship with the upper first molar occluding with the lower second bicuspid. In cases where the second molars were extracted, the first molars were distalized back to a Class I molar relationship and in the vast majority of cases, the third molars erupted into the ideal position. This results in less retraction of the maxillary anteriors, and in cases where at the beginning of treatment presented with a Class I skeletal and the discs in proper position on both sides the patient ends up with a better profile and a healthier TMJ.

CRITERIA FOR EXTRACTION OF SECOND MOLARS

1. In cases where you have a dolicocephalic facial pattern, weak musculature, vertical grower, and you need to distalize the first molars, extraction of the second molars would be the treatment of choice. Otherwise, if you distalize the first and second molars, this will result in an increase in the dental open bite as well as the skeletal open bite.
2. Patients that present with a brachycephalic facial pattern, typically are horizontal growers with strong musculature. Both first and second molars can be distalized 3 to 4 mm. in these cases without causing the dental and skeletal open bite problems as mentioned above. Therefore, it is not necessary to extract second molars in these cases.
3. Inclination of First Molar
   a) Mesial inclination—If the first molar is mesially inclined, this is favorable to distalization.
   b) Distal inclination—If the first molar is distally inclined, this is a contra-indication for both molar distalization as well as second molar extraction. If the patient presents with severe crowding this case may require bicuspid extraction. In cases of moderate crowding arch development, proper torquing of incisors and posterior slenderizing might be the treatment of choice.
4. Severe Class I Crowding
   a) In cases where patients present with a straight profile, normal lip posture, proper size arch in transverse direction, posterior teeth upright over basal bone, incisors properly torqued, with severe crowding on both upper and lower arches, the treatment of choice would be the extraction of second molars. Extractions would be done only in the arches where there was severe crowding, first molars distalized to make room to align all the other remaining teeth.
   b) In cases where patients present with a bimax protrusion, full lips, full profile, maxilla, mandible and lips too far forward with severe crowding on both upper and lower arches, the treatment of choice would be the extraction of the first bicuspid. This would allow for the retraction of the upper and lower incisors to eliminate the fullness, which would be necessary to improve the appearance of the patient's lips and profile. Bimax protrusion cases are more common in Black and Asian patients and are quite rare in Caucasians.

In this article, I will not have time to discuss details of these various molar distalizing appliances. For more information on the Pendulum Appliance, please refer to the article that I wrote in the January/February 1994 issue of *The Functional Orthodontist.* The purpose of this article was to discuss the rationale for the extraction of second molars and the distalization of molars. There are obviously some cases where second molar extraction is the ideal treatment plan and there are those where the distalization of molars and a non-extraction approach is preferable. Both second molar extractions and molar distalization without extractions are techniques utilized when there are arch length discrepancies. The distalization of the molars allows room for the sequential eruption of the cuspids and the bicuspids.

Case #3

Male Patient: J.Y., Age 14

Treatment Objective

Distalize upper left first and second molars with Pendulum Appliance to make room for lingually displaced upper left second bicuspid. Non-extraction case.

Figure 1: Pre-treatment Frontal
Non-cooperative Teenager
Must use fixed appliances
Brachycephalic Facial Pattern

Figure 2: Pre-treatment profile

Figure 3: Pre-treatment Frontal
Overjet 2mm
Overbite 4 mm

Figure 4: Pre-treatment Left Lateral
Upper left first bicuspid rotated
Class II Molar Left

Figure 5: Pre-treatment Occlusal
Upper left second bicuspid lingually displaced
Upper left first bicuspid rated
Upper first molar drifted mesially

Figure 6: Ceph Tracing

Figure 7: Ceph Analysis
Class I Skeletal
Normal Maxilla
Normal Mandible
Normal Vertical

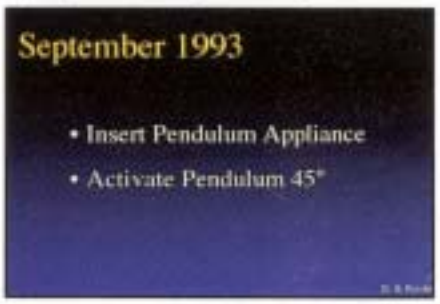

Figure 8

Figure 9: Pendulum Appliance
Pendulum spring to distalize upper left first and second molars

Figure 10: Insert Pendulum Fixed Appliance
No occlusal interferences
No problem eating
No problem talking

Figure 11: Occlusal View
Insert Pendulum
Band First Bicuspids
Band First Molars

Case #3 Male Patient: J.Y., Age 14 (continued)

Figure 12: Activation of Pendulum Spring
Activate 60°
October 1993

Figure 13: Upper Left First and Second Molars
Distalized 5 mm in 4 months
December 1993

Figure 14: Class III Molar Left
December 1993

Figure 15: Start Straight Wire
Open coil between first bicuspid and first molar to prevent relapse

Figure 16: Upper left first molar distalized 5 mm
December 1993

Figure 20: Final Finishing
.018 x .025 BioForce NiTi

Figure 22: Post-treatment
Class II Molar
Upper left second bicuspid lingually displaced

Figure 23: Post-treatment
Class I Molar
Upper left second bicuspid aligned

Figure 17:
Slight relapse
Should have used TP Rick-A-Nator

Figure 18:
Align upper left second bicuspid with .014 NiTi Sentalloy
March 1994

Figure 19
Teeth Aligned
Non Extraction
July 1994

Figure 21: Final Finishing
.018 x .025 BioForce NiTi

Figure 24: Post-treatment Frontal
Overjet 1 mm
Overbite 2mm

TYPES OF MOLAR DISTALIZATION APPLIANCES

Removable	Posterior Sagittal
Fixed	Pendulum
	Distalizing Molar
	Jig (Series 2000)

INDICATIONS

MOLAR DISTALIZATION APPLIANCE

Molar distalization appliances are primarily used when there is severe arch length discrepancies, not enough room between the lateral incisors and first molars for the eruption of the cuspids and first and second bicuspids. These appliances are utilized to distalize molars when the problem is primarily a dental problem indicated by a Class II molar relationship. Other criteria include Class I skeletal, normally positioned maxilla, normally positioned mandible, straight profile, normal skeletal vertical, normal transverse development, and no significant signs or symptoms of TM dysfunction. All patients must be thoroughly screened utilizing a TMJ health questionnaire and thoroughly examined with regard to range of motion as well as palpation of the muscles of the head and neck. If the TMJ health questionnaire, range of motion and muscle palpation all indicate a normal, healthy TMJ, then the clinician can assume the condyles are in a downward and forward position in the fossa and there exists a normal relationship between the maxilla and the mandible. Correct condylar position may also be confirmed radiographically with TMJ radiographs, transcranials or tomograms.

Molar distalization is indicated when the condyles are correctly positioned in the fossa (downward and forward). If the condyles are distally displaced at the beginning of treatment and the patient has an overjet, then any retractive orthodontic technique such as extraction of maxillary bicuspids, extraction of maxillary second molars, distalization with a Wilson Distalizing Arch, cervical facebow headgear or molar distalization appliances are contra-indicated.

To help alleviate the signs and symptoms of TM dysfunction in cases with large overjets, retrognathic mandibles, and distally displaced condyles, functional jaw orthopedic appliances such as the Twin Block or Herbst Appliance, should be utilized. Otherwise, you are building in the pathology that existed prior to the orthodontic treatment and the patient will continue to have TMJ problems at the end of treatment.

Our objective in orthodontics must be to not only finish our cases with Class I molar relationship, but also to ensure that the patient has a healthy TMJ.

INDICATIONS FOR MOLAR DISTALIZATION (NON-EXTRACTION)

1. **Profile**
   - Straight profile
   - Adequate maxillary lip support
2. **Functional**
   - Normal, healthy TMJ
   - Correct condyle-fossa relationship
   - Correct mandible to maxilla relationship
3. **Skeletal**
   - Class I skeletal, normal maxilla, normal mandible
   - Normal skeletal vertical
   - Skeletal closed
   - Normal, short lower face height
   - Maxillary arch normal, transverse width
   - Brachycephalic growth pattern
4. **Dental**
   - Class II molar relationship
   - Deep overbite
   - Permanent dentition
   - Maxillary first molar mesially inclined
   - Preferably prior to eruption maxillary second molars
   - Maxillary cuspids labially displaced
   - Loss of arch length due to premature loss of second deciduous molars

IMPORTANT PREREQUISITES FOR MOLAR DISTALIZATION APPLIANCE

The first consideration is the width of the maxillary arch.

1. Transverse

The key to proper orthodontic treatment and TMJ health is that the maxillary arch must be a normal width and shape. If the maxillary arch is constricted, this frequently causes crowding which means inadequate space for the eruption of the cuspids and bicuspids. The constricted maxillary arch also causes the mandible to assume a more retrognathic position in relation to the maxilla. The retrognathic mandible frequently causes the condyles to be posteriorly displaced which can cause the disc to be anteriorly or antero-mesially displaced. This results in an increase in the signs and symptoms of TM dysfunction which is a serious problem and must be rectified. When the maxillary arch is constricted, an arch development appliance may be utilized, such as a Schwarz Appliance (removable), Banded Hyrax Appliance (fixed) or a maxillary expansion appliance with nitanium coil springs (fixed). A measurement that I have found useful is that proposed by orthodontist, Dr. James McNamara, Ann Arbor, Michigan. The intermolar width at the lingual of the molars at the gingival margin should be 34 to 36 mm. in permanent dentition. If this measurement is less than 30 mm. a maxillary transverse development appliance should be utilized prior to the molar distalization appliance.

2. Torque Incisors

The second consideration is achieving the correct torque with the maxillary incisors. If the maxillary incisors are detorqued you can gain arch length when you torque them correctly. If the maxillary incisors are flared, they must be detorqued which will result in a loss of arch length. Molar distalization appliances are contra-indicated when the maxillary central incisors are torqued lingually such as Class II Div 2 cases. Prior to the use of a molar distalization appliance, these incisors must be torqued normally. Most Class II Div 2 malocclusions require mandibular advancement appliances such as the Twin Block or Rick-A-Nator following the torquing of the incisors either orthopedically with an Anterior Sagittal Appliance or with the straight wire appliance.

3. Distalization of Molars

As mentioned previously, prior to any thought of molar distalization, the clinician must solve the transverse problem of the maxillary arch and then torque the incisors correctly. After these two procedures have been accomplished, the remainder of the crowding problem may be solved by the distalization of the maxillary molars.

CONTRA-INDICATIONS FOR MOLAR DISTALIZATION

1. **Profile**
   - Retrognathic profile
   - Inadequate maxillary lip support
2. **Functional**
   - Numerous signs and symptoms of TMJ
   - Posteriorly or superiorly displaced condyles
3. **Skeletal**
   - Class II skeletal, normal maxilla, retrognathic mandible
   - Skeletal open, excess lower face height
   - Constricted maxillary arch
   - Dolichofacial growth pattern
4. **Dental**
   - Class I or Class III molar relationship
   - Dental open bite
   - Maxillary first molar distally inclined

DEGREE OF MOLAR DISTALIZATION

All molar distalizing appliances result in distal tipping of the first molars. The crown tips distally and the root remains mesial. When the appliance is removed, the crown will tip and upright over the roots. It is recommended that when distalizing the first molar, it be overcorrected to Class III molar relationship and then when the retention appliances are removed and the straight wire appliance placed, the first molar may be corrected to Class I.

Distal movement of the upper molars causes the bite to open and these teeth go back into the wedge of occlusion. This is not a problem if the patient does not have a vertical problem (normal or short lower face height) and has a brachycephalic growth pattern. These patients have heavy musculature which can compensate for the vertical bite opening. Molar distalization is not recommended for dolichocephalic patients with excess lower face height and weak musculature as the bite opening can cause a series of undesirable side effects.

As the bite opens, the tongue enters the space and can initiate an anterior tongue thrust, which can cause an anterior open bite. As the molars are continuing to be tipped distally, the bite can be propped open on the inclines of these teeth, allowing the posterior teeth to supererupt and further aggravate the problem. If there is no vertical problem, the first and second molars can be distalized 3 to 4 mm. very efficiently in three months.

If the cephalometric films show there is a vertical problem (long lower face height), the treatment of choice would be to extract the second molars prior to the distalization of the first molars. Second molars should also be extracted in cases where there is a serious tooth size arch length discrepancy of 6 to 8 mm. (assuming the third molars are present). This prevents the impaction of the third molar and the patient is spared a difficult extraction procedure. The third molar is replaced by the second molar and this culminates in an excellent clinical result.

When third molars erupt, they do so with no pockets and no mobility. The anatomy of the third molars should be checked before the extraction of the second molars. It is difficult to assess the form and shape of second molars until the later stages of tooth development. It would not be prudent to extract second molars until you can be assured radiographically that the third molars are a normal shape and size. The best time to extract second molars is when the cusps of the third molar crowns are approximately at the crown-root junction of the second molars.

Extractions performed earlier result in postponed third molar eruption.

One problem associated with the extraction of the maxillary second molars would be the fact that something must be done to prevent the over eruption of the mandibular lower second molar until the maxillary third molar erupts. Three things that could be done to prevent the eruption of the lower second molars include:

1. If the patient is in fixed braces, then the second molars could be bracketed or banded and held in position with a rectangular archwire.
2. Fixed lingual arch with bands on the first molars and occlusal rests covering the mandibular second molars.
3. Removable Hawley retainer with Adam's clasps on the first molars and occlusal rests on the mandibular second molars.

CONCLUSION

When considering the second molar technique for the treatment of Class II malocclusion, clinicians must diagnose their cases carefully. Two prominent orthodontists from Michigan, Dr. James McNamara and the late Dr. Robert Moyers, both noted that 80% of Class II malocclusion are Class II skeletal, normal maxilla, retrognathic mandible, and constricted maxillary arch with deep overbite. These malocclusions routinely require airway evaluation, maxillary arch development, mandibular repositioning and advancement with functional appliances. The functional appliance of choice in cases that present with large overjets would be the Twin Block, or the fixed functional appliance known as the Herbst Appliance. The functional appliance of choice for patients with slight overjets (less than 4 mm.), and deep overbites would be the Rick-A-Nator. If treatment is indicated in the mixed dentition phase, then the vast majority can be done non-extraction. Patients and parents alike much prefer the non-extraction approach to orthodontic treatment. The majority of the remaining Class II patients would have Class I skeletal with moderate to severe arch length deficiencies and Class II molar relationships. Maxillary molar distalization appliances are ideal to solve arch length problems when the maxillary first molar is Class II and either the cuspid or second bicuspid is blocked out of the arch due to a shortage of space. The order in which dental crowding problems are solved on the maxillary arch are as follows:

1. Develop maxillary arch transversely to its proper width.
2. Obtain correct torque for maxillary incisors (cephalometrically correct position).
3. Distalize maxillary molars from Class II to Class I.

If the arches are developed to proper size and shape and the incisors are torqued correctly, many cases that appear to have severe crowding are in fact minor to moderate crowding and the distalization of the molars in combination with posterior slenderizing means the cases can be done non-extraction. Non-functionally oriented clinicians erroneously assume that you cannot develop arches. Functional clinicians know that the removable and fixed expansion appliances alike can widen the mid palatal suture when these appliances are appropriately adjusted and the suture fills in with bone. This is a true orthopedic change and if the appliance is left in for at least 9 months and the patient has proper function including nasal breathing then the cases are extremely stable. The proper development of the maxillary arch to normal is the absolute key to proper functional treatment and long term TMJ health. Non-functionally oriented clinicians believe that patients have large teeth and small jaws. Therefore, the first recourse to correct the crowding problem is to extract permanent teeth, either the bicuspids or second molars. Functional clinicians believe in early treatment and the development of the arches to normal shape and size both transversely and sagittally, utilizing functional appliances. Obviously, the earlier the patient is treated, the more stable the results will be with less relapse. Development of the maxillary arch is one of the most controversial subjects between the American and the so-called European functional philosophy. If the patient has a constricted maxillary arch, crowding in the maxillary arch, and all of the space is achieved by the extraction of the second molars, then this leaves the patient resembling a "Collie Dog" with a narrow smile, narrow maxillary arch, high palate, constricted airway, lack of adequate room for the tongue, speech problems, etc.

If you do not develop the maxillary arch orthopedically to normal with an orthopedic appliance, preferably in mixed dentition, you are not practicing with a functional philosophy. Cases must not be expanded beyond the physiological limit, but the maxillary arch must be developed to normal so there will be room for all the permanent teeth, improved nasal breathing, improvement in speech since there is more room for the tongue, and a broader smile.

The distalization of maxillary molars is best accomplished in cases with Class I skeletal, normal or short lower face height, normal transverse development, healthy TMJ, mesially inclined molars and deep overbite where the main problem is an arch length discrepancy due to Class II molar relationship in patients with a straight profile.

In cases of moderate crowding in patients in mixed dentition, the first molars can easily be distalized 3 to 4 mm. on each side without impacting the second molars. Our younger patients and parents much prefer the non-extraction approach to orthodontics. In cases of severe crowding in patients in permanent dentition with severe tooth size arch length discrepancy, the extraction of second molars on one side or both sides, depending on the problem, is a viable technique. However, it must be kept in perspective that this is utilized in less than 3% of Class II cases and therefore clinicians must think carefully about diagnosis before employing this technique.

Ideally in orthodontics we do not want to extract any permanent teeth. It has been my clinical experience that if treatment is started in mixed dentition with functional-orthopedic appliances which can develop the arches transversely, sagittally and vertically, most cases can be done non-extraction. In my opinion, more attention must be paid to proper diagnosis of the Class II malocclusion.

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