Methods for Distalizing Molar – A Review

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Abstract

The extraction or non extraction debate from the Angle era to the present day orthodontics does not define an absolute indication for a specific treatment plan One of the non-compliance therapies and fairly recent concept is the MOLAR DISTALIZATIONwhich has been effectively used in the correction of malocclusion. Advances in mechanotherapy and changes in treatment concepts have reduced or minimized the need for extraction in severe discrepancies. Various techniques are currently employed in non-extraction therapy in the treatment of a malocclusion

Keywords – *Molar Distalisation, Mechanotherapy,Malocclusion*

Introduction

Early cephalometric studies have showed that little or no distal movement of upper molars was produced by class II elastic treatment of that era. The head gear was reintroduced as a means of moving the upper molars back, patient compliance plays a major role in success of head gear therapy.An appliance system independent of the patient cooperation was the need of the hour and then evolved the molar distalizers.[1]

History

The extraction or non extraction debate from the Angle era to the present day orthodontics does not define an absolute indication for a specific treatment plan. **Angle** strongly believed in retaining teeth provided by nature and molding the facial form through occlusion. Angle's unweilding allegiance to non extraction therapy was based on his own specific knowledge dentofacial growth and development and to the concepts of facial beauty harmony. **Case** argued for therapeutic extractions in orthodontia based on the fact that inherited inharmonious in contiguous structure over which we have no control makes it impossible for us to place all the teeth in the arch without fulfilling the designs of an inherited deformity.[2,3]

Indications:[4,5,6]

- In the non extraction treatment of class II malocclusion.
- In low angle cases.
- In class I skeletal pattern cases.
- In patients with mild arch length discrepancy.
- In cases where upper permanent first molars have moved mesially due to early loss of deciduous molars.
- In patients where second molar extractions are planned or has not yet erupted.

Contraindications

- In high angle cases.
- In class II and class III skeletal pattern
- Skeletal and dental open bite.
- Severe arch length discrepancy cases.

Classification

- EXTRA ORAL
- – Head gears
- Cervical pull
- Combination pull

- Kloehn.
- INTRA ORAL
  - Removable appliances
  - Fixed appliances
- Buccaly acting
- Palatally acting

DISTALIZING APPLIANCES:

TUBE PLATES:

This appliance was developed by **Alain Benauwt**[1] in the year 1972. The appliance is said to have a good retention as the movable part also contributes to the retention.Unwanted displacement of teeth is minimized due to the clasp as it avoids molar rotation.Possible to add an extra oral appliance to support and reinforce stationary part. Progressive expansion of the arch is also possible by changing the angulation of the tube in relation to saggital plane.Repair is easy.But, the construction is very delicate, since the two wires holding the movable part should do so without binding.[7]

THE CETLIN APPLIANCE:

It was developed by Cetlin[2] in 1982. It utilises extra oral force in the form of headgear and an intra oral force in the form of a removable appliance.To overcome the disadvantages caused due to the tipping of molars, the Cetlin appliance utilizes a removable appliance intra orally to tip the crowns distally and then an extra oral force to upright the roots. So the intra oral remarkable appliance can be called the crown mover while extra oral force, the root mover.The anchorage for removable appliance is by proper adaptation to the palate an acrylic shield around the four maxillary incisors and a modified Adams clasp on the first premolars.The extra oral appliance is a headgear which is inserted into the molar tube. The headgear is usually cervical or a high pull, depending on the usual consideration of skeletal pattern.[8]

THE CRICKETT APPLIANCE:

It was introduced by WEST[3] in 1984. The Crickett's appliance embraces the essential features of the quad Helix. But replaces the palatal and lingual bars of upper and lower appliances with a quad and bi-helix respectively. The Crickett's lingual arms are embedded to provide an adjustable spring action directed to lingual surfaces of all teeth, without the need for further soldering.[9]

The buccal arms are retained for attachment of elastics and for ease of insertion and removal of the appliance.Upper palatal and lower lingual main frames are constructed from 0.032" yellow and 0.038" blue elgiloy respectively.The cribs, clasps and occlusal rests from 0.028" blue elgiloy. The lingual arms from 0.030" yellow elgiloy and buccal arms from 0.045" blue elgiloy. The crickett is an effective appliance for variety of tooth movements including distalization of molars.The major limitation of this appliance is when intrusion of anterior teeth has to be performed.

REPELLING MAGNETS:

This appliance was introduced by **Gianelly** in the year 1989. This method of distalizing the molar is by the use of modified nance appliance with the use of repelling magnets.The modified nance appliance serves 2 functions:[10]

· Activation of the Magnets -This is by tying a 0.4" ligature wire through the loop and extended anteriorly to encircle a tie back hook mesial to the magnets. When tightened, the magnets are held in contact.

· To contain the reaction force arising from the magnets.

The disadvantage is that the forces exerted by magnets drops significantly as spaces are opened and discomfort to the patient.

MOLAR DISTALIZATION USING SUPER ELASTIC NITI WIRE:

This mechanics was introduced by **Locatelli** and **Bednar** in 1992.Maxillary molars are moved distally using a super elastic nickel titanium wire with shape memory (Neosentalloy).As the wire returns to its original shape, it exerts a 100 gm distal force against the molars and a mesial reaction force on premolars. There is also tendency for the premolars to move buccaly. Anchorage can be controlled by placing 100-150 gm class II elastics at the hook between canine and lateral.

This method moves the molars distally by 1-2 mm per month with little loss of anchorage.Neosentalloy is easy to insert even after all the teeth have been bracketed or banded.But the disadvantage is once the second molars are erupted, distal movement of first molars usually take more time.If the first molars do not move by atleast 1mm / month, a 200 gm 0.018 X 0.025 Neosentalloy wire can be placed with increase in force, there by increasing the chances of loss of anchorage.[11]

NITI DOUBLE LOOP SYSTEM:

To overcome the disadvantages of the conventional design, **Giancotti** and **Cozza** in the year 1998 introduced a new system using the Neosentalloy. This new system was employed in simultaneous distalization of the 1st and 2nd molars. Two sectional Niti arch wires (on either side) are prepared by crimping stops distal and mesial of the IInd premolar bracket and 5 mm distal to each second molar tube.Uprighting springs are inserted into vertical slot of the 1st premolar and class II elastics are placed between mandibular 1st molar and maxillary canine bracket.The advantages are, Minimal patient cooperation is enough. And it is ideal for simultaneous first and second molar distalization .Second Molars move easier distally compared to first molar because of their different anatomical shape of the roots and lack of posterior obstacles. Because of the stretching of transeptal fibers, an 80 gm Niti wire is used instead of 100 gm or 200 gm.[12]

PENDULUM APPLIANCE:

It was developed by **James Hilger** in the year 1992. It is a hybrid that uses a large nance acrylic button in the palate for anchorage, along with .032 TMA spring that deliver continuous force to the inner first molar without affecting the palatal button.It has a broad swinging or pendulum of force from the midline of palate to the upper molars.The right and left pendulum springs formed from 0.032" TMA wire, consist of a recurved molar insertion wire, a small horizontal adjustment loop, a closed helix and a loop for retention in the acrylic button.Springs are extended as close to the center of the palatal button as possible to maximize their range of motion, to allow for easier insertion into the lingual sheaths and to reduce forces to an acceptable range. The use of 0.032 TMA springs delivers continuous force to the upper first Molar without affecting the palatal button.

Activation can be done before appliance placement. But the disadvantage is pure bodily movement of the molar is not seen, tendency towards cross bite.[13]

MODIFIED PENDULUM APPLIANCE WITH REMOVABLE ARMS:

Pisani and **Takemoto** along with **Vecchia** in the year 2000 introduced this particular modification. It has a Double over 7mm – 9mm length of 0.032 TMA wire to form bayonets. Each bayonet is attached to an M-PENDULUM arm either by using Laser welder or by wrapping 0.10 ligature around arm and soldering the unit. It is then embed into each bayonet in the soft acrylic that will be used to form Nance button producing sheaths in which to insert the removable arm.Appliance is placed in the mouth along with the terminal ends of arms into lingual molar band sheath.Removable arms can be reactivated without debonding the occlusal rest of Nance button.[14]

MODIFIED PENDULUM APPLAINCE FOR ANTERIOR ANCHORAGE CONTROL:

This latest modification was introduced by PABLO ECHARRI and SCHUZZO in the year 2003.This design consists of four removable arms for both first and second molars. The second molars are distalized after which their arms are left passively in place for anchorage and first molar arms are activated for distalization.Pendulum is replaced with a nance button after first molar distalization. A 0.016 SS passive arch wire is placed to avoid any incisor protrusion.E-Chain is used to distalize second and first bicuspids.If anterior anchorage is critical, palatal acrylic should be kept out of contact with the incisors.Second bicuspid arm should not be cut for spontaneous distalization to prevent incisor protrusion.[15]

DISTAL JET APPLIANCE

It was introduced in the year 1996 by **Carano** and **Testa**.Bilateral tubes of 0.036" internal diameter are attached to an acrylic nance button.A coil spring and screw clasp are slid over each tube (NiTi coil spring of 150gms for children and 250gm for adults)The wire extending from the acrylic through each tube ends in a bayonet bend that is inserted into the lingual sheath of the first molar band, this results in force acting through the center of resistance of molar thereby giving

a translatory movement.An anchor wire from Nance button is soldered to bands on second premolar.[16]

DOUBLE SET SCREW DISTAL JET:

This modification of distal jet was introduced in the year 1998 by **Jay Bowman**. This modified distal jet incorporates two set screws into activation order which permits an easier, cleaner and more reliable conversion to a molar nance holding arch.The mesial set screw is used during active distalization.Upon distalization activation caller is slid mesially to gain access to the coil spring.The double set screw collar is slid back to this junction.[17]

THE K LOOP MOLAR DISTALIZER.

It was introduced by **Kalra** in the year 1998. The appliance consists of a K loop to provide the forces and moments and a Nance button to resist anchorage.The K loop is made up of 0.017 X 0.025 " TMA which can be activated twice as much as stainless steel before it undergoes permanent deformation.Force produced by the TMA will also be half. The loop of the K should be bent 8 mm in length and 1.5 mm wide.The legs of the loop are bent down 20° and inserted into molar tube and Premolar bracket.[18]

NANCE APPLIANCE AND COIL SPRING:

It was developed by **Peringer, Parmann** and **Droschl** in the year 1997.The appliance consists of 2 premolar bands, connected by a soldered palatal framework and an anterior acrylic shield for palatal support.Distalization is produced by the sentalloy coil springs (150-200gm) on sectional arch wires.

MODIFIED NANCE APPLIANCE FOR UNILATERAL MOLAR DISTALIZATION:

The class I side of 0.036" SS wire framework was finished with an anteriorly projecting 0.036" arm like that of quad helix.The active class II side has an arm which is soldered to the first bicuspid band. An 0.020" omega loop is soldered to the anterior end of framework which allows the distal end of the loop to slide distally as it is opened by activation.A 10mm 0.09"x0.036" open coil spring is added to the frame work between omega loop and first molar band.[19]

WILSON'S RAPID MOLAR DISTALIZATION:

It was advocated by **William L. Wilson** and **Robert C. Wilso**n, to distalize the maxillary molars, while the mandibular molars maintain the pre-treatment antero-posterior positions. The Wilson treatment achieves molar distalization without extra oral forces.It has advantage of having no extra oral force, the Class II correction starts immediately (even in mixed dentition), no reactionary maxillary incisor proclination and can be used in mixed dentition.It has disadvantage of longer treatment time (than originally propose) Wilson said that the treatment time was 6-10 weeks actually it takes 16 weeks. The distal tipping occurs frequently and the tipped molars have questionable stability.A significant portion of the class II correction was found to be due to mesial movement of Mandibular Molars.

THE CARRIERE DISTALIZER:

It was developed by **Carrier**e in the year 2004. It produces a distal rotational movement of maxillary first molars around their palatal roots when necessary. Simultaneously produce a uniform force for distal molar movement.Independently it can move each post segment from canine to molar as a unit. It also eliminate wire changes. It minimize periodontal reactions.The clinical evidence of achievement of these objectives will be the appearance of interincisal diastemas and wide spaces mesial to canine. The distalizer is made of mold injected Nickel free stainless steel. The 'Canine Pad' which allows distal movement of canine along alveolar ridge without tipping provides a hook for attachment of class II elastics.This pad is mesial end of the arm that runs posteriorly over the 2 upper premolars in a slight curve. The posterior end of the arm is permanently attached ball that articulates in a socket on the molar pad.

THE FRANZULUM APPLIANCE:

It was invented by **Byloff**[27]and **Darendeliler**[27] in the year 2000. Gaining space in the mandible is more difficult than in the maxilla. Extra oral appliances are seldom attached to the mandibular molar because of the pressure they place on the condyles.The Franzulum appliance's anterior anchorage unit is an acrylic button, positioned lingually and inferiorly to the mandibular anterior teeth and extending from mandibular left canine to the right canine.Rests on the canines and first

premolars are made from 0.32” stainless steel wire. Tubes between the second premolars and the first molars receive the active components.[20]

Conclusion

Though a number of appliance systems are available, every clinician should cautiously begin with a precise diagnosis, sound treatment plan and appliance selection taking into consideration various factors pertaining to the case selection like the age of the patient, growth pattern and also the factors relating to a particular appliance system (Molar Distalizers). Therefore any one molar distalizer cannot be concluded to be ideal for any clinical situations. It is in the hands of the clinician to thoroughly analyze the clinical picture and select the appropriate molar distalizing appliance. Thus it’s not just the superiority of the mechanics but the superior thinking and application of the clinician that can produce a good and stable result.

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