



Review Article

Molar distalization classification – A review

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ABSTRACT

Esthetics plays a major role from orthodontic treatment to results. Gaining space in dental arch is the most important step in the treatment planning which can be achieved by different methods one of which is molar distalisation. There are a number of methods (Arch expansion, interproximal reduction, proclination of teeth, molar derotation, use of functional appliances) to gain space. Each method has its own advantages and disadvantages and specific indications. A child with class I bases and acceptable profile, with minimal space requirements for relief of crowding or mild protrusion can possibly be best treated without sacrifice of tooth material. Various intraoral and extraoral appliances have been invented using non-extraction treatment to distalise molars. Aim of distalization is to move molars distally so as to gain space. This article provides a comprehensive review of the various methods (intraoral & extraoral) used for molar distalization.

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1. Introduction

This topic has at its core, the omnipresent question faced practically every time the orthodontists do a treatment plan for the patient. “Do we need to extract teeth or can the necessary space be created without extractions.” In the adult patients there is no clinically significant growth in the bone structure; therefore, alternative solutions must be found to obtain space in which the teeth can be moved to correct the malocclusion. Treatment options may differ depending on the amount of crowding, and whether the crowding has occurred in the maxilla or mandible. In the past, orthodontists had two main options to create the space in the arch. One was to expand the arch and the other was to extract. Whenever there is space deficiency, the methods of gaining space that strikes to our mind are extraction, expansion and stripping.

In 1930's, Charles Tweed¹⁻³ observed relapse after non-extraction expansion treatment and decided to retreat with extraction. Also at the same time Raymond. P. Begg⁴ of Australia concluded that non extraction treatment was unstable and put forward his study on Stone Age Man's dentition and proposed extractions for greater stability of orthodontic treatment results. With the popularization of Begg's concept there was a sudden restrain in the orthodontic thinking on the idea of expansion. According to Moyers (1988)^{1,5} the non-extraction treatment modalities for Class II cases resulted where the malocclusion is due to aggravation of dental symptoms and has anterior posterior and vertical skeletal imbalance requires maxillary molar distalization to achieve class I molar and canine relationship.

The term distalization means, the displacement of a structure to a position farther posterior than that which is accepted at the onset of treatment. Appliance systems that are designed to produce distal movement of first molars and buccal segments have been available from a century.

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Traditionally extra oral appliances of one type or another have been used for many years. Extraoral traction may be applied to the upper arch in association with fixed or removable appliances, but the objective in all cases is to move the upper molars distally to provide space for alignment of incisors or overjet reduction. However, we the orthodontists of today are fortunate enough to have more intraoral techniques and appliances in our hands to gain space i.e. by distalizing molar.

1.1. Indications and contraindications for molar distalization^{6,7}

1.1.1. Profile

1. Straight profile

1.1.2. Functional

1. Normal, healthy temporomandibular Joint
2. Correct mandible to maxillary

1.1.3. Skeletal

1. Class I skeletal
2. Normal, short lower face height
3. Maxilla/ normal transverse width
4. Brachycephalic growth pattern
5. Skeletal closed bite

1.1.4. Dental

1. Class II molar relationship
2. Deep overbite
3. Permanent dentition
4. Maxillary first molar mesially inclined.
5. Preferably prior to eruption of 2nd molar
6. Maxillary cuspids labially displaced.
7. Loss of arch length due to premature loss of second deciduous molar.

1.2. Contraindications

1. End on or full class II molar relationship due to mandibular retrognathism.
2. Retrognathic profile
3. Skeletal and dental openbite
4. Excessive lower anterior facial height (Dolico-facial form)
5. Constricted maxilla
6. Patients with Class-II or Class-III molar relation.

2. Timing of Distalization⁶

Different views have been expressed by different authors;

Dewel (1967) and Hass (1970) observed faster rate of molar distalization in patients in mixed dentition to those in the adult dentition.

Joseph M. Sims (1977) suggested that the patient should be treated before the age of 9 years as the root of the molar to be moved has not completed its growth and the orthodontic distal tipping or distal bodily movement is easier.

S.R. Langford and M.R. Sims (1981) illustrated that the distal movement of upper molar roots against adjacent unerupted teeth could cause resorption.

James J. Hilgers (1992) suggested that the distal movement of the first molars is most efficient before the eruption of upper second molars.

David J. Snodgrass (1996) stated that in the mixed dentition molar distalization should not be carried out until full development of the maxillary first molar roots. In the permanent dentitions, molar distalization is most effective before the full eruption of the second molar.

Bondemark (2006) suggested that it is more effective to distalize the first maxillary molars before the second molars have erupted. But from clinical experience, it is better to do molar distalization as early as possible before second molar eruption.

3. Classification⁸

1. Extraoral appliances
 - (a) Headgear
2. Intra oral appliances
 - (a) Intraarch:
 - i. Removable appliances:
 - A. ACCO (acrylic cervical occipital appliance)
 - B. Removable molar distalization splint
 - C. Segmental removable appliance in molar distalization
 - ii. Fixed appliances
3. Maxillary Arch
 - (a) Flexible palatally positioned distalization force system
 - i. Pendulum appliance and its modifications
 - ii. Distal jet and its modifications
 - iii. Intraoral Bodily Molar Distalizing Appliance (IBDA)
 - iv. Simplified molar distalizer
 - (b) Flexible buccally positioned distalization force system
 - i. Repelling magnets
 - ii. NiTi wire
 - iii. Jones jig
 - iv. Sectional jig assembly
 - v. K loop
 - (c) Flexible buccally and palatally positioned distalization force system

- i. Fixed piston appliances
- (d) Hybrid appliances (rigid buccally and flexible palatally positioned distalization force system
 - i. First class appliance for molar distalization
- (e) Transpalatal arches for molar rotation and/or distalization
 - i. Stainless steel transpalatal arch
 - ii. TMA transpalatal arch
- (f) Implant supported appliances
 - i. Graz Implant Supported Pendulum Appliance
 - ii. Skeletal anchorage system
 - iii. Midpalatal Miniscrew
- 4. Mandibular Arch
 - (a) i. Lip bumper
 - ii. Franzulum appliance
 - iii. Unilateral Crozat Appliance
- 5. Interarch
 - (a) Rigid intermaxillary appliances
 - i. Herbst Appliance
 - (b) Flexible intermaxillary appliances
 - i. Jasper Jumper
 - ii. Churro Jumper
 - (c) Hybrid appliances
 - i. Eureka Springs

3.1. Maxillary second molar extraction in maxillary first molar distalization⁶

Extraction of second molar is often use in conjunction with distalization of first molar. In last few years the extraction of second molar has become a matter of great interest and controversy within dental profession.

Hilgers (1992) suggested that when a great deal of distal movement is needed and it is preferable not to extract the upper first bicuspids, it is always beneficial to remove the upper second molars and let the third molars drift into place.

3.1.1. Chipman believes that maxillary second molar extraction is indicated when:-

1. The second molars are severely carious, ectopically erupted or severely rotated.
2. Mild –to moderate arch length deficiencies exist with good facial profile.
3. There is crowding in the tuberosity area with a need to facilitate first molar distal movement.

The optimal time for extracting second molar is when the third molars have migrated sufficiently in the maxillary alveolar bone.

3.1.2. According to Graber the indications for second molar extraction are

1. There should be excessive inclination of maxillary incisors with no spacing.
2. Overbite must be minimal or negative
3. Third molars should be present and in a good position to erupt.

3.1.3. And, the **contraindications** are:

1. Vertically inclined maxillary incisors.
2. No spacing.
3. Marked overbite.

3.2. According to Samir E. Bishara Various advantages and disadvantages of second molar extraction are as follows:

3.2.1. Advantages⁹

1. Facilitation of first molar distal movement.
2. Distal movement of the dentition only as needed to correct the overjet.
3. Reduction in the amount and duration of appliance therapy.
4. Facilitation of treatment using removable appliances.
5. Disimpaction of third molars.
6. Faster eruption of third molars.
7. Prevention of “dished in” appearance of the face at the end of facial growth
8. Less likelihood of relapse.
9. Good functional occlusion.

3.2.2. Disadvantages⁹

1. Too much tooth substance is removed in class I malocclusions with mild crowding.
2. Extraction site location far from area of concern in moderate-to -server anterior crowding
3. Extraction sites of no help in the correction of anterior posterior discrepancies without patient cooperation in wearing appliances capable of moving the dentition to the distal “en mass”.
4. Possible impaction of third molars even with second molar extraction.

4. Conflict of Interest

The authors declare no relevant conflicts of interest.

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