

DEEP BITE: IT'S ETIOLOGY, DIAGNOSIS AND VARIOUS TREATMENT MODALITIES- A REVIEW

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Abstract

Deep bite is one of the most difficult malocclusion to treat. Deep bite is a malocclusion that occurs in the vertical plane of space. Some degree of vertical overlapping or overbite is a normal feature of human dentition. However, some patients present with excessive overbite termed as deep bite or deep overbite. The deep bite in the permanent dentition may be caused by inherent factors or factors acquired during the life of that dentition. This article will describe the classification, etiology, diagnosis and various treatment modalities for deep bite correction.

Keywords: Deep bite, Extrusion, Intrusion, Begg's technique, Study models, Lateral cephalograms.

Introduction

Malocclusion can occur in three planes of space i.e. sagittal, transverse and vertical plane. Dental vertical relationships can be divided into four major categories: anterior open bite, anterior deep bite, posterior open bite and posterior collapsed bite with overclosure. The maxillary dental arch being larger than the mandibular dental arch allows the maxillary anteriors to overlap the mandibular anteriors. This overlapping of the mandibular teeth occurs in both the horizontal as well as vertical direction. The horizontal overlap is called overjet while the vertical overlap is termed as overbite. Thus, some degree of vertical overlapping or overbite is a normal feature of human dentition. However, some patients present with excessive overbite. Thus, a condition where there is an excessive vertical overlapping of the mandibular anteriors by maxillary anteriors is termed as deep bite.¹

The excessive overbite is a complex orthodontic problem that may involve a group of teeth or whole dentition, alveolar bone, of maxillary and mandibular basal bones, and/or soft tissue of the face.² The skeletal and dental patterns of deep bite malocclusion have been investigated in several studies. A deep bite anteriorly could be caused by supra-eruption of upper and/or lower incisors or infra-eruption of posterior teeth.³

Skeletal deep bite could be due to the upward and forward rotation of the mandible or it could be due to downward and forward rotation of the maxilla or it could be due to the combination of both. It was revealed that deep bite malocclusion was associated with decreased gonial angle, deep curve of spee, decreased posterior maxillary dimension, downward rotation of the palatal plane, and more forward position of the ramus. A deeper bite coincided with smaller lower facial height, larger anterior alveolar and basal areas, and retroclination of the maxillary incisors.⁴

Deep overbite can be corrected by following methods: Intrusion of anterior teeth, Extrusion of posterior teeth, Combination of both. However, it should be decided which method will be more beneficial or which will improve the patients facial appearance and functional efficacy. During the treatment planning, considerations should be given to the soft tissue, skeletal pattern, stability, occlusal plane, interocclusal space, treatment time and age of the patient. It is widely accepted that correction of deep bite is both easier to accomplish and more stable when it is performed on growing patients than when it is attempted on those with no appreciable growth remaining. An adult who has more than 6 mm overbite or 8 mm of overjet could be considered a candidate for surgery solely on the basis of dental relationships,

without even considering facial esthetics.³ Deep bite has been an enigmatic puzzle in orthodontics, the nature of this malocclusion to relapse has been of great concern to the clinician. The successful treatment of deep bite correction depends on, an elaborate clinical examination, thorough cephalometric analysis, judicious treatment planning among the various available options and by using appropriate mechanotherapy followed by a proper retention protocol.⁵

Classification

1. According to its origin
 - a) Dental deep bite (Simple)
 - b) Skeletal deep bite (Complex) (**Figure 1**)
2. According to functional classification
 - a) True deep bite
 - b) Pseudo deep bite
3. Depending on the extent of deep bite
 - a) Incomplete over bite
 - b) Complete over bite

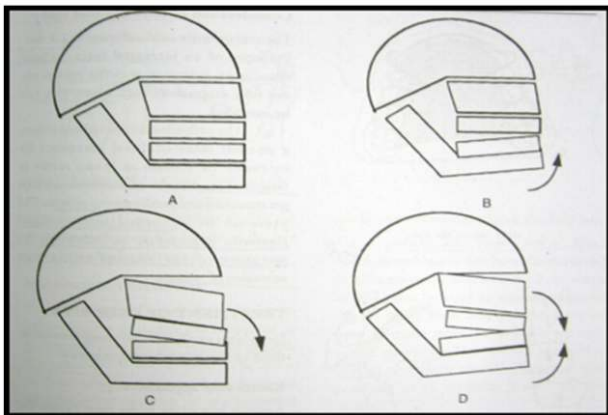


Figure 1: Skeletal deep bite: (A) Normal skeletal relationship (B) Skeletal deep bite due to upward and forward rotation of the mandible (C) Skeletal deep bite due to downward and forward rotation of the maxilla (D) Skeletal deep bite due to combination of B & C.

Etiology Of Deep Bite

The deep overbite in the permanent dentition may be caused by factors inherent in an individual's malocclusion or by other factors acquired during the life of that dentition.⁶ So, etiological factors of deep overbite is classified into:

1. Inherent factors:
 - a. Skeletal pattern
 - b. Condylar growth pattern (**Figure 2**)
 - c. Tooth morphology

2. Acquired factors:

- a. Muscular habits
- b. Dental
- c. Lateral tongue thrust habit³ (**Figure 3**)

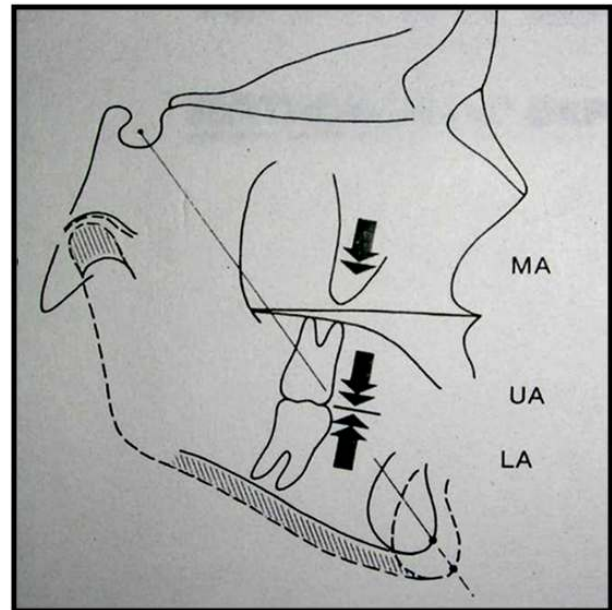


Figure 2: Upward and forward rotation of mandible in deep bite.

Figure 3: Lateral tongue thrust



Diagnosis of Deep Bite

Excessive overbite is not to be viewed as an isolated entity: it must be seen as a part of the total malocclusion. The routine diagnostic aids such as clinical examination, study models and lateral cephalograms are used for the diagnosis. The factors contributing to excessive overbite vary with the type of occlusion and skeletal pattern. Their determination is the most important step in diagnosis and treatment planning. The primary diagnostic problem in both deep bite and open bite is to ascertain the site of the dysplasias. The skeletal bite can be differentiated from dental deep bite by cephalometric analysis. Postural position is also used in the differential diagnosis of deep bite

cases: the freeway space will be larger than normal in cases with inadequate vertical development of the buccal segments and normal is cases of over-eruption of the incisor teeth.⁷

The different diagnostic aids are:

Clinical examination

Study models

Cephalograms

Photographs

Treatment Modalities of Deep Bite

Deep overbite can be corrected by following methods:

1. Intrusion of anterior teeth
2. Extrusion of posterior teeth
3. Combination of both
4. Proclination of incisors
5. Surgical

1. Intrusion of Anterior Teeth

Definition of intrusion is defined by Nicolai as "A transitional form of the tooth movement directed apically and parallel to the long axis." Burstone defined intrusion as, "Apical movement of the geometric center of root (centroid) in respect to the occlusal plane or a plane based on long axis of the tooth." Intrusion of incisors is commonly indicated in pseudo deep bite cases or the cases with increased anterior face height. It is also indicated in cases where there is an excessive gingival display during speaking or smiling. Pure incisor intrusion is not possible with removable appliances. Unless pure mechanics are included in the appliance system, however, intrusion of incisors is almost impossible. Fixed appliance therapy is probably the best to intrude the teeth for correction of deep bite in children as well as adults.

Biomechanics of intrusion

For intrusion of teeth the force should pass through centre of resistance so that translation motion takes place without any tipping. Further away the point of force of application from centre of resistance greater is the rotational moment. The possibility of flaring of incisors is more likely to occur specially in class II div 1 than class II div 2.

Optimal intrusive force for anterior intrusion

Optimal force range for intrusion has been a long time controversy. The force ranges on an

average from 15-20 g for each upper incisor and 10-15 g for each lower incisor. In adults, the forces are to be applied carefully and somewhat towards a lower range.⁸

Correction of deep bite with begg's technique

In Begg's technique there are Bite opening bends to activate arch wires so that they depress the upper and lower anterior teeth in their sockets in order to open up anterior deep bites.^{9,10} In conventional Begg's technique the bite opening bends are given mesial to the molars. This may create a distal tipping of the molars. To overcome this difficulty, various authors have proposed different sites for bite opening bends in the arch wires.^{11,12,13}

Correction of deep bite with edgewise

For intrusion of a tooth, along with incisal positioning of the edgewise brackets, a bend is given in an arch wire in such a way that the anterior segment of arch wire is made to lie gingivally to the bracket groove.¹⁴ Use of continuous arch wire for opening the bite, has found to have deleterious effects on the anchorage units. Extra care is needed to prevent these side-effects.¹⁵

Auxillary arches such as utility arch, Burstone's 3-piece intrusion arch, Mulligan's intrusive arch, K-SIR arch (Figure 4) and CIA are various different arches used along with preadjusted edgewise technique to bring about intrusion of the anterior teeth.

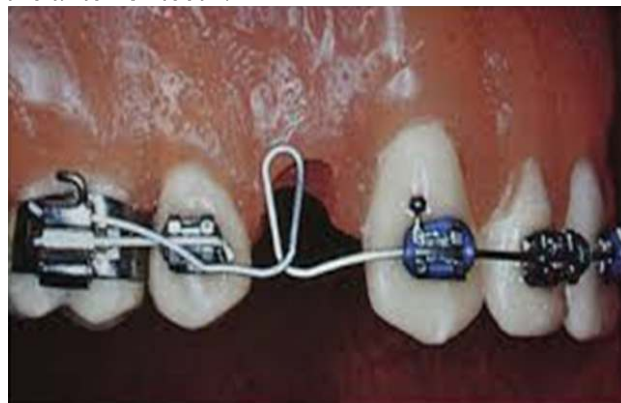


Figure 4: K-SIR

Correction of deep bite with lingual orthodontics (Figure 5)

The distance in the sagittal plane between a lingual bracket and the Cr is much shorter than between a buccal bracket and the Cr.¹⁶ Therefore, pure intrusion movement in LO (lingual orthodontic) will be closer to bodily movement than in Buccal Orthodontics (BO).

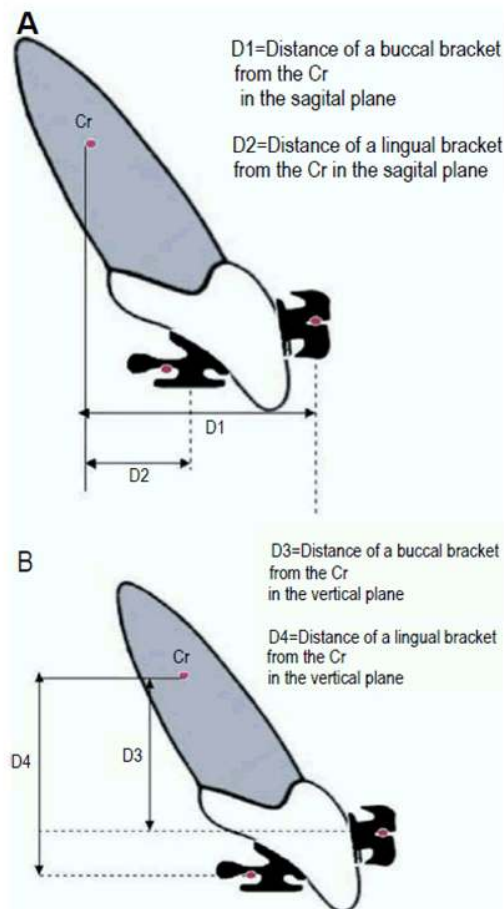


Figure 5: (A) Comparison between buccal and lingual brackets in the sagittal plane.

(B) Comparison between buccal and lingual brackets in the vertical plane.

Correction of deep bite with mini screw anchorage system

To intrude the upper incisors, the best placement of mini-screw is between the upper lateral incisors and the canines.¹⁷ The placement of the mini-screws should be done after levelling and alignment, in order to maximize the interradicular space at the placement site. In order to avoid tipping the upper incisors buccally during the intrusion, the end of the arch wire is cinched back.

2. Extrusion of Posterior Teeth

Extrusion of posterior teeth is commonly indicated in patients with decreased lower anterior face height. It is also indicated in true deep bite cases. If the incisal edges of the maxillary anterior teeth are positioned above the inferior margin of upper lip, in these cases extrusion of posterior teeth is indicated. Extrusion of molars of an average of 1mm results in 2 to 2.5 mm of bite opening. This is

probably the most common and easiest, although not always the best method to correct the deep overbites. Extrusion of posteriors can be done by myofunctional appliances, removable appliances and fixed appliance therapy. Extrusion of posterior teeth in growing patients is stable but in adults, it may result in relapse.

3.combination [intrusion of Anteriors And Extrusion of Posteriors]

In some cases, the deep overbite is due to the combination of infra occlusion of molars and supra eruption of the incisors. So, extrusion of posteriors and intrusion of anteriors are required in these cases. Fixed appliance therapy is the choice of treatment in these cases.

4. Proclination Of Incisors

Numerous deep bite cases present with retroclinated incisors. Proclination of these teeth contributes to bite opening in the anterior region. This method to correct deep bites has limited use. Proclination of incisors is indicated when there is an increased nasolabial angle and retruded lip. So, soft tissue should be evaluated before proclinating the incisors.¹⁸

5. Surgical

For patients whose skeletal deep bite is so severe that neither growth modification nor camouflage offers a solution, surgical realignment of the jaws or repositioning of dentoalveolar segments is the only possible treatment. Surgery is not substitute for orthodontics in these patients. Instead it must be properly co-ordinated with pre and post-surgical orthodontic treatment to achieve stable results.¹⁹

Conclusions

It is widely accepted that correction of deep bite is both easier to accomplish and more stable when it is performed on growing patients than when it is attempted on those with no appreciable growth remaining. Adults often need only correction of excessive overbite either due to its isolated nature or a demand for limited treatment. In adults, this treatment is often part of periodontal, restorative and/or temporomandibular joint therapy. Deep overbite can be corrected by many ways like intrusion of anteriors, extrusion of posteriors, combination of anterior intrusion and posterior extrusion,

proclination of anteriors or surgically. However, it should be decided which method will be more beneficial or which will improve the patients facial appearance and functional efficacy.

A successful treatment of deep bite requires a careful analysis of the factors contributing the problems. During the treatment planning, considerations should be given to the soft tissue, skeletal pattern, stability, occlusal plane, interocclusal space, treatment time and age of the patient.

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