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Deep bite: its classification, etiology, clinical features, diagnosis & treatment modalities

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***Abstract*---**Deep bite is one of the most common malocclusion seen in children as well as in adults and is most difficult to treat successfully. Unfavorable sequel of this malocclusion predisposes a patient to periodontal involvement, functional problems, and temporomandibular joint disturbance. The correction of deep bite is one of the primary objectives of orthodontic treatment. A deep bite anteriorly could be caused by supraeruption of upper and/or lower incisors or infraeruption of posterior teeth. This article will elaborate classification, diagnosis, etiology, features, choice of treatment, treatment modalities for deep bite correction.

***Keywords*---**deep bite, overjet, overbite, orthodontic management.

Introduction

Malocclusion can occur in three planes of space i.e. sagittal, transverse and vertical plane. 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 as overjet while the vertical overlap is termed overbite. 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. Deep bite is one of the most common malocclusion seen in children as well as adults and is most difficult to treat successfully.

Bishara [1](Glossary) defined Deep bite as Malocclusion in which the mandibular incisor crowns are excessively overlapped vertically by the maxillary incisors when the teeth are in centric occlusion. The amount of vertical overlap often varies excessively and is one of the most common and early manifestations of a malocclusion. Overbite can be described in millimeter measurement or as

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percentage of overlap of the mandibular incisors by the maxillary incisors. An unfavorable sequel of this malocclusion predisposes a patient to periodontal involvement, functional problems, and temporomandibular joint disturbance. The correction of deep bite is one of the primary objectives of orthodontic treatment. Thus an optimal treatment of deep bite requires a proper diagnosis, a careful treatment plan and an efficient appliance design.

Classification of deep bite

Deep bite can be classified as:

- Dentoalveolar deep bite and Skeletal deep bite
- True deep bite and Pseudo deep bite
- Incomplete deep bite and complete deep bite.[2]

Etiology of Deep bite

Skeletal or dental overbite may be caused by: Genetic (Inherent) or environmental factors (acquired) or a combination
of both.[3]

- Inherent factors: like Tooth morphology, skeletal pattern and malocclusion and condylar growth pattern.
- Acquired factors: like Muscular habit, Changes in tooth position, the loss of posterior supporting teeth and Lateral tongue thrust habit.

Diagnosis of deep bite

The different diagnostic aids are:

- Clinical examination
- Study models
- Cephalograms
- Photographs

A deep bite anteriorly could be caused by supraeruption of upper and/or lower incisors or infraeruption of posterior teeth[4]. To evaluate whether infraeruption or supraeruption is present, linear measurements from the base of the alveolar process can be taken. This can be established by Cephalometric analysis.

Features of deep bite

Skeletal deep bites are characterized by:

- Horizontal pattern of growth
- Growth discrepancy of the jaw bones
- Convergent jaw bases
- Decreased ramal height[5].

- In patients with deep bite, anterior facial height is often short, particularly the lower third of the face

Dental deep bites is characterized by:

- Supraeruption of the anteriors[6,7] (Fig.1)
- Infra occlusion of the posterior teeth[8]
- Excessive overbite[2,6,5,9]
- Or a combination.
- Alterations in the morphology of tooth[5,10]
- Failure of age-related opening of the bite.
- Early loss of teeth may result in lingual tipping of the anterior teeth.

Fig 1. Supraerupted Anteriors

The choice of treatment is based on:

- Etiology of deep bite.
- Amount of remaining growth.
- The vertical dimension.
- Relationship of the teeth with the adjoining soft tissue structures.

Treatment modalities of deep bite

Methods of deep bite correction are:

- Extrusion of posterior teeth.
- Intrusion of anterior teeth.
- Combination of both.
- Surgical.

Extrusion of posterior teeth

This modality of correction of deep bite is most commonly indicated in horizontal growing patients.

- The removable appliances such as bite planes (Fig.2), sved bite planes[11] (fig.3), modified bite planes, myofunctional appliances such as activator[12]

(fig.4), Bionator[13], Functional regulator[14] Twin blocks[15](fig.5) allow the extrusion of posterior teeth leads to opening the bite.

Fig 2. Anterior bite plane

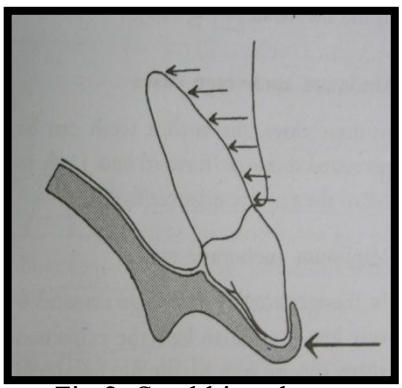

Fig 3. Sved bite plane

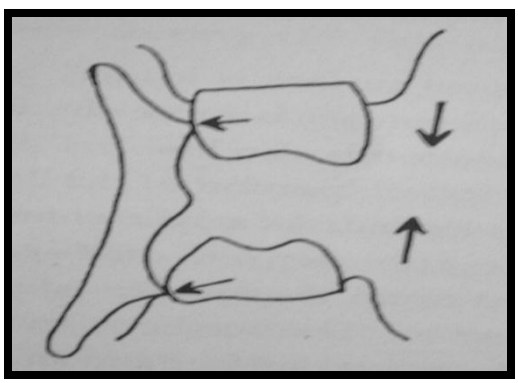

Fig 4. Trimming of activator for molar extrusion

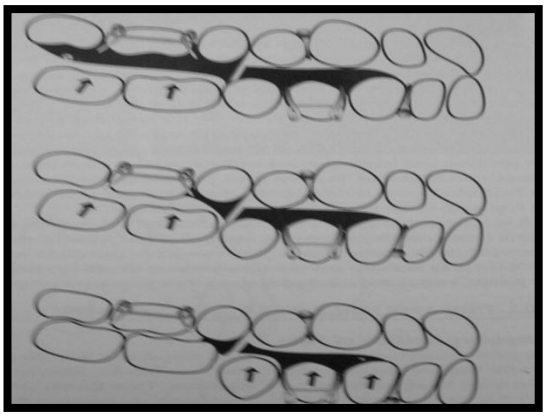

Fig 5. Trimming of twin block for extrusion of teeth

- Cervical headgears exert a vertically downward component of force of about 200-300 g per side for duration of 14-16 h per day[16]. This causes extrusion of the molars and leads to correction of deep bite.
- Fixed modified Nance appliance[17], fixed bite plate with glass ionomer cement[18] and bonded bite planes[19] with composite resin (indirect technique) on the palatal aspect of maxillary incisors also can be used for extrusion of posteriors.

Intrusion of Anterior Teeth
Optimal intrusive force for anterior intrusion[20]

For intrusion of teeth the force should pass through centre of resistance so as to translate teeth without tipping. Any force away from centre of resistance may cause incisor flaring. Average force varies from 15-20g for each upper incisor and 10-15 g for each lower incisor is recommended. In adults, the forces are generally lower in range.

Correction of deep bite with begg's technique

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. Bite opening bends are given to intrude the upper and lower anterior teeth so as to correct anterior deep bite.[21,22]

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 archwire in such a way that the anterior segment of arch wire is made to lie gingivally to the bracket groove.[23] Use of continuous archwire for opening the bite, has found to have deleterious effects on the anchorage units.

Correction of deep bite with lingual orthodontic

The distance in the sagittal plane between a lingual bracket and the Cr [Fig.6 (A) and (B)] is much shorter than between a buccal bracket[24] and the Cr. Therefore, intrusion movement by lingual orthodontic will be closer to bodily movement and would be easy to achieve.

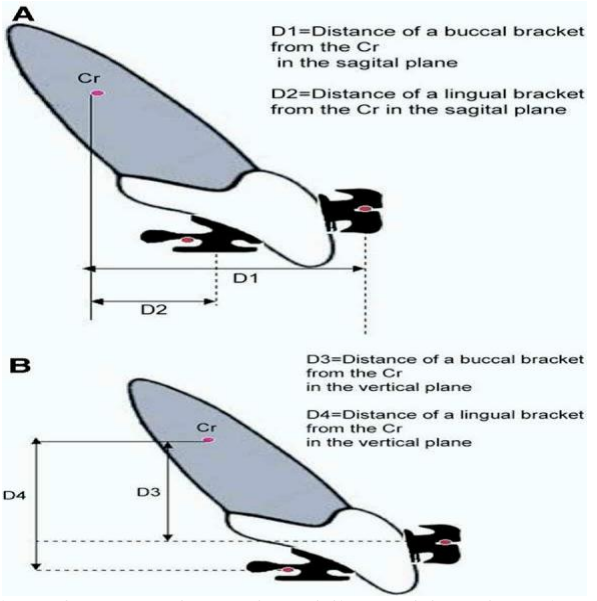

Fig 6. (A) Comparison between buccal and lingual brackets in the sagittal plane. (B) Comparison between buccal and lingual brackets in the vertical plane.

Correction of deep bite with mini screw anchorage system

To intrude the upper incisors, mini-screws are placed between the upper lateral incisors and the canines.[25] The placement of the mini-screws is done after leveling and alignment. This can lead to tipping of upper incisors buccally. To avoid such, end of the arch wire is cinched back.

Combination of Intrusion and Extrusion

By altering positioning of brackets includes:

- Placing anterior brackets occlusally and posterior brackets gingivally
- By using reverse-curve archwires
- Simultaneous intrusion of anterior teeth and extrusion of posterior teeth

However, there is absolute no control over such mechanics.[26]

Correction of deep bite with orthodontics and surgery

On the basis of dental relationships[27] an adult who has more than 6 mm overbite or 8 mm of overjet could be considered for surgery. In patients with very short

face height, upward and forward rotation of the chin may partially or even totally conceal their mandibular deficiency. These patients may need to have their chin moved straight down even so, advancement of mandible is needed other wise, the chin would inevitably go backward as is moved downward because the mandible would rotate on an arc. It is much more difficult to permanently increase anterior face height by rotating the mandible at the condyles than it is to rotate it within the body-ramus region via a ramus osteotomy. The first approach requires lengthening of elevator muscles because ramus osteotomy allows the muscles to shorten as the chin goes down but the gonial angles go up.

The surgical treatment options in deep bite patients are as follow[28]:

- Orthodontics and interposition genioplasty.
- Orthodontics and Inferior onlay mandibuloplasty.
- Orthodontics and mandibular advancement.
- Orthodontics and total subapical mandibular advancement.
- Orthodontics and inferior repositioning of maxilla and mandibular advancement.
- Orthodontics and combined maxillary and mandibular surgery.

Summary and Conclusion

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. 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. 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.

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