DEEP BITE CORRECTION METHODS
(Literature Review)

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ABSTRACT

Deep bite or excessive overbite (>2mm) is a complex orthodontic problem and become a common feature of many type of malocclusions but it often related to class II malocclusion. Deep bite has been considered one of the most common malocclusion and the most difficult to treat successfully. Deep bite not just compromising esthetics but it may be associated with periodontal problem such as gingivitis and periodontitis, palatal impingement, severe trauma to periodontal tissue, abnormal mastication, tooth wear, and risk factor for temporomandibular disorder (TMD). There are several factors that seem to be related to the development of deep bite. Optimal correction of deep bite requires proper diagnosis and treatment planning, and efficient treatment mechanics to achieve a desirable esthetic and functional result and to minimize relapse during postretention phase. Individualized treatment planning requires an optimal strategy that provides a "blueprint" for treatment. Several factors contribute to the development of the treatment: soft tissue considerations (interlabial gap, upper incisor display, smile line, lip length), crown-gingival relationships, occlusal plane considerations, and skeletal considerations. Correction of a deep overbite can be achieved mainly by intrusion of incisors, extrusion of molars, or a combination of both. Commonly used mechanics in the management of deep bite: utility arch, Burstone intrusion arch, J-hook headgear, removable anterior biteplate, reverse curve archwire, direct bonding material and bite turbo, step up and step down bend, bonded acrylic biteplate, invisalign system, fixed anterior bite plane, and miniscrew/mini-implant.

Key Words: Deep bite, deep bite correction, intrusion, extrusion

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Introduction

The arch form of the maxilla tends to be larger than that of the mandible. This results in the maxillary teeth overlapped the mandibular teeth when the teeth are in centric occlusion (the position of maximal intercusption).¹

Deep bite is a complex orthodontic problem that is a common feature of many malocclusions. A decrease in vertical skeletal growth, axial inclinations of the upper and lower teeth, vertical positions of the anterior and posterior teeth, and loss of periodontal support are among the factors that contribute to the development of deepening of the bite.² Correction of a deep bite is an important part of orthodontic treatment due to the potential deleterious effects of the temporomandibular joint and periodontal health, and facial esthetics.²

Numerous treatment mechanics have been advocated for the management of deep bite. Clinically successful results have been obtained with many techniques. Each technique has advantages and disadvantages and must be carefully selected for specific etiology and the desired treatment. Although the correction of deep bite is routinely achieved through orthodontic treatment, the need for careful diagnosis and logically sequenced plan of treatment is critical for optimal result.

Deep bite

A normal occlusion is characterized by a vertical and horizontal relationship of the anterior teeth of about 2 mm, as measured from the incisal edges.³ The common definition of overbite was developed by Strang who defined it as “the overlapping of the upper anterior teeth over the lowers in the vertical plane.”⁴ If a patient has a normal vertical skeletal relationship, but excessive of the teeth anteriorly, a dental deep bite is present, as often is observed in class II division 2 malocclusion.³
The correction of deep bite is one of the primary objectives of orthodontic treatment. Deep bite has been considered one of the most common malocclusions and the most difficult to treat successfully.\textsuperscript{4} The amount of vertical overlap often varies excessively and is one of the most common and early manifestations of a malocclusion. Non-surgical correction of a deep bite involves extrusion of posterior teeth, intrusion of the incisors, or both.\textsuperscript{5} Treatment of choice depends on a variety of factors such as amile line, upper lip length, incisors display, and vertical dimension.\textsuperscript{6}

**Etiology**

There are several factors that seem to be related to the development of deep bite. Among these are incisor supraocclusion, excessive overjet, mesiodistal width of the anterior teeth, incisor angulation, canine position, molar infraocclusion, molar cusp height, failure of age-related natural opening of the deep bite, mandibular ramus height, and vertical facial type.\textsuperscript{4}

**Treatment consideration**

The following factors contribute to the development of the treatment and treatment mechanics plans for deep bite correction.

**Soft tissue**

Clinical examination of a patient soft tissue facial features can help in strategy selection between posterior teeth extrusion and intrusion of upper and/or lower intrusion. Facial evaluation should include an assessment of the interlabial gap, upper incisor display, smile line, and lip length.\textsuperscript{6}

**Crown-gingival relationships**

The most favorable relationships is for the central incisors and canine gingival margins to be higher than the lateral incisor margins. "High-low-high" appearance of the gingival line of the maxillary incisors improve the harmony of smile.\textsuperscript{7}

**Occlusal plane considerations**

The level of the occlusal plane can be identified from a lateral cephalometry analysis. There may be a steps between the anterior and posterior teeth within the occlusal plane. Selecting consistent treatment
objectives for both the occlusal plane and vertical tooth movement (intrusion versus extrusion) may impact on treatment planning for deep bite correction.  

**Skeletal considerations**

Extrusion of the posterior teeth can affect the skeletal vertical dimension and soft tissue appearance. Extrusion is contraindicated in patients with excessive lower facial height. In short face patients with deep bite malocclusions, increasing the vertical dimension through posterior extrusion may be advised.  

**DEEP BITE CORRECTION**

Many biomechanical systems are currently used to correct deep bite during orthodontic treatment. The system of choice depends on the objectives of treatment: incisor intrusion, incisor protrusion and molar eruption, or extrusion. Incisor intrusion particularly of maxillary incisors is generally perceived to be the major biomechanical problem.  

Incisors intrusion can convincingly be demonstrated using fixed or removable appliances. Molar extrusion or eruption induced by removable appliances, cervical headgear or intraoral elastics is an established clinical procedure.

**Utility Arch**

One of the most versatile auxiliary arcwires that can be used in either mixed or permanent dentition treatment is the utility arch. The utility arch is a continuous wire that extends across both buccal segments but engages only the first permanent molars and the four incisors. A 0.016"x 0.016" blue elgiloy is placed into the bracket of the four incisors bypassing the canines and premolars. Tipback bends are incorporated mesial to the first permanent molars and are typically 45° to the horizontal plane. Typically, a force of 150 grams is recommended for intrusion of four incisors however the exact amount of force delivered is unknown because the system is statically indeterminate.
placed. The lower wire needs to be flat (no torque) in the incisal region to prevent proclination of lower incisors but placing it in the upper teeth increases palatal root torque to the upper incisors and this is beneficial in majority of cases.

**Direct Bonding Material**

An adequate substitute for a removable bite plate in low angle deep bite cases is the placement of direct bonding material on the palatal surface of the upper incisors. Coloured adhesive such as Bandlock™ from Reliance or Transbond Plus™ from 3M Unitek are useful and can be easily removed from the tooth surfaces after bite opening. In average to high angle cases, the placement of similar coloured adhesive on the occlusal surface of the first molar is helpful in bite opening.12

**Step Up and Step Down Bends**

The common method to correct a deep bite is by placing a step up on the upper incisors or step down on the lower incisors.7 The correction method combined canines and posterior teeth extrusion and a little incisors intrusion. Burstone and Koenig had explained the force system produce two moment in the same direction that will alter tooth inclination dan occlusal plane cant.

**Bonded Acrylic Lingual Biteplanes**

Ronald Madsen had been using an acrylic extension that bonded to lingual surfaces of the maxillary incisors to produce an intrusive effect or grow-restrain on the incisors while allowing the extrusion of the posterior teeth.13 He originally called “lingual bite steps” (because of their staiestep form) to distinguish them from removable bite plane. Similar systems have been described in recent years as bonded biteplanes or “bite turbos”.

**Invisalign System**

Align technology, Inc (Santa Clara, Calif) introduce invisalign system several years ago.14 Invisalign takes the principles of Keslin, Nahoum, others, and Raintree Essix even further, using Computer Aided Design/Computer Aided Manufacture (CAD/CAM) technology combined with laboratory techniques to fabricate a series of custom appliances that are esthetic and
J-hook Headgear

The use of J-hook headgear associated with continuous archwires has been advocated for the treatment of deep bite. Although this treatment has considerable merit, a number of limitations are associated with the use of this appliance. The amount of force delivered to the maxillary anterior teeth is substantial and may result in significant resorption of the roots of the anterior teeth.

Burstone Intrusion Arch

In the 1950, Charles R. Burstone developed an approach to orthodontic therapy which did not use continuous arches. The technique, known as “the segmented technique” used different cross sections of wire within the same arch. The basic mechanism for intrusion consists of three parts: (1) a posterior anchorage unit, (2) an anterior segment, and (3) an intrusive arch spring.

The proper force magnitude for the four upper incisors was initially suggested by Burstone to be around 1 N and a maxillary 0.017"x0.025" TMA Burstone intrusion arch exerted forces within this range. The Burstone intrusion arch does not require a cinch, since the incisor inclination can be controlled by the contact point of the incisor tie.

Removable Anterior Bite Plate

Callaway and Thompson advocated stimulating the eruption of the posterior teeth as a way of “filling in” the bite by opening the bite anteriorly with a bite plate then allowing the posterior teeth to erupt into occlusion. A simple anterior bite plate is often used in conjunction with cervical extraoral traction to open the bite. A bite plate also use as an adjunct to fixed appliance treatment, especially in situations in which the patient would have heavy contact on brackets bonded to the mandibular teeth.

Reverse Curve Archwire

In the great majority of cases, after rectangular stainless steel wires have been in place for 6 weeks, the arches are normally level and if this is not so, the reverse curve archwire or bite opening curve in rectangular can be
removable, and that can move teeth from beginning to end. The orthodontist's prescription is followed in positioning the teeth and the bite to proper alignment virtually on the computer with the company's treat software (align technology, Santa Clara, Calif).\textsuperscript{14}

**Fixed Anterior Bite Plane**

Reduction of excessive overbite often involves the use of a removable plate with an anterior bite plane. To be successful with bite plate therapy, the orthodontist is highly dependent on good patients cooperation. With the fixed appliance patient cooperation was reduced and the individual response to treatment was found to be quite predictable.\textsuperscript{15}

**Miniscrew/mini implant**

Over the years, orthodontists have developed varies approaches for intruding posterior teeth and controlling the vertical dimension, including posterior bite blocks, headgear, magnetic forces, active vertical corrector, vertical chincups, and maxillofacial surgery, among others. Although these approaches are viable treatment options, most have limitations, such as force control and patient compliance, which directly affect treatment results.

Miniscrews are used in orthodontics as a stable anchorage unit. Due to their small dimension, they can be placed in interdental areas where traditional implants cannot be inserted.\textsuperscript{16}

Conventional intrusion mechanics frequently cause labial tipping of incisor, a situation which does not always give favourable treatment outcome indicated that the segmented arch technique is the treatment of choice for patients with elongated incisors or periodontal bone loss.\textsuperscript{15} However, since conventional arches are connected to the posterior teeth during intrusion, the presence of counteracting moments is frequently inevitable. Direct application of intrusive forces from miniscrews offers an efficient alternative to 2x4 arches and true intrusion can be achieved.
References