

# ORTHODONTIC MANAGEMENT OF DEEP BITE IN ADULT: A REVIEW

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## Abstract

In case of deep bite in adult patients, when upper anteriors overlap lower anteriors, and lower anteriors make contact with palatal surface, which causes damage to the periodontium on lingual surface. In some cases of deep bite, when mandibular incisors slides over the palatal surface of maxillary incisors, results in trauma from occlusion and also pain in TMJ. Deep bite has deleterious impact on facial aesthetics, impingement of the palatal tissues, and it is most detrimental to the teeth and health of the jaw joints. This article described various method for correction of deep bite in adult patients that are less invasive than surgery.

**Key words:** Deep bite, orthodontic management, TMJ pain.

## Introduction

An anterior deep bite (or often referred to as a deep overbite) is defined as an increased vertical overlap between the upper and lower incisors.<sup>1,2</sup> Depending on the definition of “increased,” the reported prevalence of deep bite ranges from 11.8% to 36.7% . A large cross-sectional study in the United States reported that 15%–20% of the population had overbite  $\geq 5$  mm , depending on the range of interest. Extremely deep overbite can be associated with impingement of the palatal tissues, resulting in damage to the periodontium on the lingual surface of the maxillary incisors.<sup>3</sup>

There are so many treatment techniques for deep bite correction that have important role in oral function and facial appearance .<sup>4</sup>



Figure 1: Deep Bite

## Diagnostic Considerations in Management of Deep Bite

### 1. Soft tissue considerations<sup>5,6,7</sup>

- Interlabial gap: Normal -2 mm. (Range 2- 4 mm). if more than its molar extrusion mechanics should be avoided.
- Smile line: Intrusion mechanics of maxillary incisors should be done in case of gummy smile.
- Lip length: Intrusion should be carried out in cases of short upper lip.

### 2. Dental alveolar considerations<sup>5,6</sup>

Up to 4 mm maxillary incisor intrusion can be achieved from intrusion mechanics. It should be done in case of supraeruption of anteriors and gummy smile.

### 3. Skeletal considerations<sup>5,6</sup>

- Intrusion of anterior: In case increased face height.
- Extrusion of molars: In case decreased lower anterior face height (growing children). The stability of the result will be questionable if the same is attempted in adults.

## Various Methods for Correction of Deep Bite in Adult

There are so many treatment techniques for deep bite correction that have important role in oral function and patient's facial appearance.

- Incisor intrusions 3-piece intrusion
- Connecticut Intrusion Arch
- Utility arch
- Molar extrusion-
  - a) tip back
  - b) Base arch 0.16 distal extension
  - c) 0.016" Distal Extension
- Implants
- K-sir arch

### A) 3 Piece Intrusion Arch<sup>6,7,8</sup>

It was introduced by Burstone. The mechanisms had different wire cross sections in a given arch as compare to continuous arch wire and its same as segmented arch technique.

**Indicated** – In those clinical cases where continuous type of intrusion arch not effected, when incisors are undue flared. (Figure2)

**Advantages** –It shift the point of application of force more distal ,close to lateral incisors which is anticipated at centre of resistance.

### Parts of Utility arch-

- post anchorage unit
- anterior segment posterior extension
- Intrusion cantilevers
- Power chain

**Biomechanics:** It is similar to continuous arch. It required a stable anchorage unit for posterior teeth and a separate anterior segment.<sup>8</sup> Instead of a continuous utility archwire, separated tip back spring is activated on right and left buccal segment. The anterior wire segment is ligated on four incisors, bend gingivally distal to the lateral incisors, and then bend horizontally creating a step of approximately 3mm. The distal part of this arm extends posteriorly to distal end of the canine bracket, where it forms a hook. This anterior wire segment should be made of 0.021x0.025 ss wire to rigidly keep the segment in arch form. Anterior segment allows distal placement of the intrusive forces to the center of resistance of anterior segment, which is a pre-requisite in situation of undue flared incisors. Elastic chain attached to hook which has an important role in simultaneous intrusion and retraction.<sup>9,10</sup>

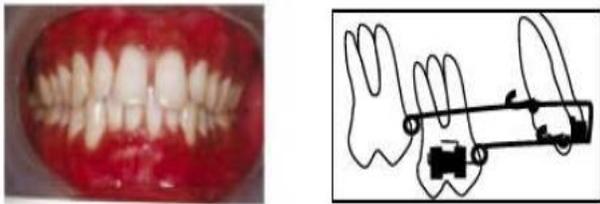


Figure 2:3 Piece Intrusion Arch

Keep in mind -If intrusive force directed through center of resistance of anterior teeth true intrusion will occur without axial inclination.

If intrusive force away from the center of resistance, flaring or uprighting of incisors will occur. If intrusive force perpendicular to distal extension of anterior segment and is applied through center of resistance of anterior teeth will intrude incisor segment.

Tip back of anterior teeth will occur when the line of action of resulting force will be lingual to center of resistance. It is possible to change the direction of intrusive force by applying a small distal force.

To achieve a line of action of intrusive force through the center of resistance and parallel to long axis of incisors, the point of force application must be more anterior and as close to distal of lateral incisor bracket as possible.

**B) Connecticut Intrusion Arch-** CIA is a multifunctional wire that was developed by Dr. Ravindra Nanda.<sup>11</sup>

Used for: 1. Incisor Intrusion. 2. Simultaneous Class II Molar Correction. 3. Incisor Flaring. 4. Correction of Minor Open Bite (Incisor Extrusion). 5. Correction of

Anterior Occlusal Cant. 6. Preventing the side effects associated with canine retraction.

CIA (Connecticut Intrusion Archwire) CNA™ Beta III Titanium Archwire CTA™ Nitanium Super Elastic Archwire Appliance Design Two wire sizes are available: .016 × .022 and .017 × .025 (for both CNA and CTA)

a) CTA™ Nitanium Super Elastic Archwire is fabricated from a nickel titanium alloy to provide the advantages of shape memory, spring back, and light, continuous force distribution. Additionally, low forces help to minimize root resorption. Two wire sizes are available: .016 × .022 and .017 × .025. (Figure 3)<sup>12</sup>

The maxillary and mandibular versions have anterior dimensions of 34mm and 28mm, respectively. Although in most cases the wire is not directly ligated into the bracket slots, that's why all the anterior wire dimension is adequate for all cases. The bypass, located distal to the lateral incisors (posterior dimensions), is available in two different lengths to accommodate for extraction, nonextraction, and mixed dentition cases.

b) CNA™ Beta III Titanium Archwire version delivers higher forces and accepts permanent bends. Bending allows force adjustment and cinch back. Two wire sizes are available: .016 × .022 and .017 × .025.

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### Biomechanics

CIA's basic mechanism for force delivery is a V-bend calibrated to deliver approximately 40-60g of force. Upon insertion, the V-bend lies just anterior to the molar tubes. When the arches activated, a reciprocal action of the intrusion arch on the molars or the buccal segments is the extrusion and/or distal tip back of the crowns and the mesial movement of the roots.

Mechanics the intrusion arch is activated by: 1- Placing a 30-degree gingival bend 2- to 3-mm mesial to the molar tubes so that the wire lies passively in the vestibular sulcus. 2- Activation is accomplished by bringing it occlusal at 30° and tying it to the anterior segment as a point contact. The intrusion arch can also be tied back or cinched to prevent flaring of the incisors, if the intrusive force is being applied anterior to the center of resistance (CRES) of the incisors.

As a general guideline, 10 to 15 g of force per incisor is acceptable to prevent posterior side effects.<sup>13</sup> Recent evidence has shown that the intrusive forces can be made so light that reactive forces on the anchor teeth remain well below the force levels needed for extrusion and tipping. Therefore the use of a headgear to prevent side effects is completely avoidable on average, after the initial activation period of 3 to 4 weeks the base arch

should intrude 0.4- to 0.6-mm per month about 1mm of intrusion can be expected every six weeks.



Figure 3: Connecticut Intrusion Arch

### C) Utility Arches:

It is one of the most versatile biomechanics described by Burstones for correction of deep bite. It is Passive non heated full arch appliance that engages permanent incisors and molars.

**Wire selection:** It is most commonly made from rectangular cross sections of chrome cobalt alloy. Other wires that can be used are TMA wires (titanium-molybdenum alloy) or non heat treated 0.016 x 0.016" blue Eligloy.

For 0.018" slot, the recommended utility arch size is 0.016 x 0.022".

For 0.022" slot, the recommended utility arch size is 0.019 x 0.019".

#### Utility arches is four types

- Passive
- Intrusion
- Retrusion
- Protraction

But intrusion utility arches mainly used for correction of deep bite.<sup>14</sup>

#### Intrusion Utility Arches:<sup>2</sup>

It has a similar design to passive utility arch. It produces 60-100g force for lower arch incisors intrusion.

#### Fabrication:

Intrusion utility arch is stepped up gingivally at molars, passes through buccal segment area then stepped occlusally at incisors to avoid distortion from occlusal forces.<sup>15</sup>

In contrast to passive utility arch the fits flush against auxiliary tube of molar, there is at least 5 mm space between anterior border of auxiliary tube and posterior vertical segment of utility arch.(Figure4)

#### Activation:

Intrusion can be produced by two ways:

Ligating the utility arch into the anterior brackets bent passively to fit existing occlusion. Then occlusally directed gabel bend in the posterior portion of vestibular segment will produce an intrusive force.

And 2<sup>nd</sup> intrusion force is produced by placing of utility arch in brackets of the incisors and tip back bend in

molar segment it create activation moment that allows the long arm of utility arch to intrude the lower incisors.

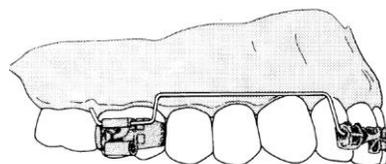


Figure 4: Utility Arches

### D) Molar Exrusion

a) Tip back mechanism:<sup>5, 7, 8</sup>

**Indication-** In growing patients without hinging the mandible open, for correction of deep curve of spee, for steepened natural plane of occlusion

**Contraindication-** In those patients with a backward rotation of mandible.

Tip back mechanism consists of:

- 0.036" lingual arch,
- 0.018x0.025" hooks of tip back spring
- 0.018" x 0.0125" inch anterior segment and for posterior stabilizing segment

In normal axial inclination of anterior segment, hooks (tip back spring) should be positioned between canine and lateral incisor. If lower anterior segment is flared, the depressive force must be positioned distal to center of resistance of anterior segment.<sup>16</sup>

Intrusive forces in anterior segment that create negative moment and eruptive force on buccal segment producing centre of rotation at distal aspect of root of 2nd molar.

Correct use of tip back mechanism+, one will notice that: Center of rotation is located distally around distal root of 2nd molar. Eruption and rotation of buccal segments, increase in arch length distal to canines (1-2mm), no flaring of anterior teeth, because hook is made to slide freely along arch wire.

(b) Base arch mechanism -This is based on intrusive arch mechanism. It is made from 0.018x0.025" stainless steel with helices.<sup>17</sup> It is contraindicated in flaring of anterior teeth.

A ligature can be passed through helices to tie base arch back. Force system is same as tip back mechanism and no hooks placed on anterior side. If base arch tied back, center of rotation moves mesially or either close to mesial root of first molar.

The correct use of base arch mechanism, one can notice: Eruption and to prevent rotation of posterior segment. It Maintain the increase in arch length.

(c) 0.016" distal extension

**Used** –eruption, rotation to level deep curve of spee for correction of deep bite

**E) Implants:** Mini-screw Implants<sup>17</sup>(Figure-5).It provide act as skeletal anchorage for tooth movement with fixed

appliance that could not otherwise have been performed. The retraction J hooks are soldered facing occlusally for effective intrusion.<sup>18</sup>

Indication - Intrusion of anteriors, supra eruption of molar, retraction of anterior, protraction of posterior



Figure 5: Intrusion with Implants

**F) K-SIR arch** -Dr.VarunKalra introduced K-SIR arch technique. It is fabricated from 0.19x0.025" TMA wire with closed 7mmx2mm loops at the extraction site for functioning Simultaneous intrusion and retraction of anteriors. It produces 125 gm of intrusive force on the anteriors.<sup>20</sup>



Figure 6: K Sir Arch

**Conclusion**

Deep bite correcting appliance has these advantages: a) simple yet efficient, b) easy to fabricate and place, c) hygienic and comfortable for the patient, d) requires minimal patient cooperation and e) low cost.

**References**

1. Stability of deep bite correction :a systemic review J World Fed Orthod 2012
2. Nanda R. Biomechanics in Clinical Orthodontics, 1997
3. Nanda R. Biomechanics and Esthetic Strategies in Clinical Orthodontics.
4. Nanda R., Differential Diagnosis and treatment OD excessive overbite.
5. Graber TM. Vanarsdall RL. Orthodontics current principles and techniques: 3rd edition, 2000.
6. Shroff B., Yoon W.M., Lindauer S.J., Burstone C.J. Simultaneous intrusion and retraction using a three piece base arch. Angle Orthod 1997; 67:455-461.
7. Shroff B., Yoon W.M., Lindauer S.J., Burstone C.J. Segmented approach to simultaneous intrusion and space closure. Am. J. Orthod 1995; 107:136-143
8. Burstone C.R., Deep overbite correction by intrusion. Am. J. Orthod 1977; 72: 1-22.

9. Carano A., Velo S., Incorvatic, Poggio P. Mini Screw Anchorage System in the maxillary alveolar bone. J. Ind. Orthod Soc 2004; 37:74-85
10. Kalra V., Simultaneous intrusion and retraction of the anterior teeth. J. Clin. Orthod 1998; 35(9):535-540
11. The Connecticut intrusion arch." Journal of clinical orthodontics: JCO 32.12 (1998): 708. Esthetics and biomechanics in orthodontics, second edition, Ravindra Nanda
12. Steevenbergen EV, Burstone CJ, Prah-Andersen B, Aartman IHA. The influence of force magnitude on intrusion of the maxillary segment. Angle Orthod. 2005; 75:723-729.
13. Esthetics and biomechanics in orthodontics, second edition, Ravindra Nanda.
14. Lindauer, S.J.: Orthodontic treatment planning, in Biomechanics in Clinical Orthodontics, ed. R. Nanda, W.B. Saunders Co., Philadelphia, 1997, pp. 23-49.
15. Romeo, D.A. Burstone, C.J.: Tipback mechanics, Am. J. Orthod. 72:414-421, 1977.
16. Cope J. Temporary anchorage devices in orthodontics: a paradigm shift. Semin Orthod 2005; 11(1):3-9.
17. Marcotte MR. Biomechanics in Orthodontics. 1st Edition
18. Carano A., Velo S., Incorvatic, Poggio P. Mini Screw Anchorage System in the maxillary alveolar bone. J. Ind. Orthod Soc 2004; 37:74-85
19. Kalra, V.: The K-loop molar distalizing appliance, J. Clin. Orthod. 29:298-301, 1995.
20. Kalra V., Simultaneous intrusion and retraction of the anterior teeth. J. Clin. Orthod 1998; 35(9):535-540

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