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MANAGEMENT OF DEEP BITE- A REVIEW

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ABSTACT: Deep bite is a malocclusion that occurs in the vertical plane. Some degree(1-2mm) of vertical overlapping or overbite is present in human dentition. However, patients with excessive overbite are 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. Deep bite can be corrected with removable, myofunctional or fixed appliances. Generally removable appliances are used in those cases in which extrusion of posterior teeth is acceptable. Myofunctional appliances and orthopedic appliances are used in growing patients so that the results achieved are stable. Fixed appliance mechanotherapy is used in mixed dentition as well as permanent dentition. There are several fixed appliance techniques to intrude the anteriors or to extrude the posteriors or combination of both. Which technique should be used requires the sound theoretical and clinical knowledge. The force used for intrusion of teeth should be light and continuous. Surgical realignment of the jaws or repositioning of dentoalveolar segments is the only possible treatment in those patients whose skeletal deep bite is so severe that neither growth modification nor camouflage offers a solution.

Keywords: Deep Bite, skeletal, dental, Treatment

INTRODUCTION

Graber[1] has defined deep bite as a condition of excessive overbite, where the vertical measurement between the maxillary and mandibular incisor margins is excessive when the mandible is brought into habitual or centric occlusion.

Deep bite is one of the most commonly seen malocclusions next to crowding. It can occur along with other associated malocclusions. It may jeopardize the periodontal support, occlusions itself or temporomandibular joint. Deepbite is a complex orthodontic problem that can involve teeth, alveolar bone, maxillary and mandibular basal bone, and soft tissue of the face. The management of this malocclusion requires a careful diagnostic analysis, treatment plan and selection of appropriate treatment therapy.[2]

DIAGNOSIS

Various diagnostic aids such as clinical examinations that include extra oral and intraoral features, cephalometric analysis and study cast analysis are used.

Study Model Analysis

- Flat palatal vault- can be analysed by Korkhaus analysis
- Wide maxillary arch (analysed by Pont's analysis)
- Study models show excessive overbite
- Lower arch shows increased curve of spee

Cephalometric analysis

A lateral cephalogram is one of the orthodontic records that provide information about the vertical and sagittal relationships of the craniofacial skeleton, the dentition, the soft tissue profile, the cervical vertebrae and the pharynx. [28]

In deep bite different cephalometric analysis present with following findings:

a) DOWNS ANALYSIS[3]

Y-axis	59.4^0	Decreases
Mandibular plane angle	21.9^0	Decreases
Inter incisal angle	135.4^0	Increases

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b) STEINER ANALYSIS[3]

Mandibular Plane angle	32^0	Decreases
Inter incisal angle	131^0	Increases

c) RICKETTS ANALYSIS[3]

Facial axis	90^0	Increases
Mandibular plane angle	26^0	Decreases

d) BURSTONE ANALYSIS[3]

Measurements	**Males**	**Females**
1) ANS – Gn (1HP)	68.6mm	61.3mm
2) MP -HP angle	23^0	24.2^0
3) Upper incisor -NF (U/1 NF)	30.5mm	27.5mm
4) Lower incisor –MP(L/1 MP)	45mm	40.8mm
5) Upper molar - NF (U/6 NF)	26.2mm	23mm
6) Lower molar - MP (L/6 MP)	35.8mm	32.1 mm

In skeletal deep bite cases all the values decrease.

e) SASSOUNI ANALYSIS[4,5,6]

This analysis emphasizes the importance of vertical as well as horizontal planes and interaction between them. Sassouni pointed out that the horizontal anatomic planes i.e. anterior cranial base, F-H plane, Palatal plane, Occlusal plane Mandibular plane in a well proportioned faces tend to converge towards a single point. If the planes are nearly parallel, so that they converge far behind the face then there is a skeletal tendency towards anterior deep bite.

TREATMENT OF DEEPBITE

A. REMOVABLE APPLIANCES

Miller[7] used bite plate in 1879 to permit the elongation of posterior teeth. With this appliance the antero inferior teeth, which will contact the acrylic plate provoking a separation or posterior dis-occlusion, increasing the passive or forced eruption of molars and premolars, which will open the anterior bite.

Then Sved[8] modified the bite plate to attempt to obtain some depression of the maxillary anterior teeth as well as the mandibular anterior teeth

A. MYOFUNCTIONAL APPLIANCES

Andreason[9] said that the deep overbite cases with infraocclusion of molars can be treated by activators designed and trimmed to permit extrusion of these teeth. Problems in this category are functional true overbite cases, with a large clearance. The construction bite may be either moderate or high depending on the size of the free way space.

According to **Balter**[9], cases of a deep over bite can also be successfully managed with the standard type of Bionator, after grinding away of the acrylic in a manner that permits uninhibited eruption of the buccal segment teeth. This means a step by step trimming in the area on the molars and premolars.

For correction of deep overbite, **Frankel**[9] used FR Ia and FR Ib appliances. Increase of vertical extraoral space is possible because of the construction bite that is taken so that the bite is opened in the posterior segments as the mandible is held forward.

Clark [10] reduced deep overbite by twin block, by vertical over correction to an edge-to-edge incisor relationship with an interincisal clearance of 2-3 mms in the protrusive bites. Occlusal cover of the posterior molars of 1 mm is equivalent to 3 mms to 4 mms vertical clearance in the first premolar region.

B. ORTHOPAEDIC APPLIANCES[11]

Cervical pull headgear is used in the treatment of Class II maxillary protrusion cases with low mandibular plane angle, deep bite and short face. In these cases extrusion of upper posterior teeth is desirable.

C. SEMI-FIXED FUNCTIONAL APPLIANCES[12]

i. modified nance appliance

ii. bonded bite plates with composite resin (indirect technique)

iii. bonded acrylic lingual bite plates (direct technique)

iv. temporary bite raiser

D. FIXED APPLIANCES

Tweed did intrusion with the help of step bends and headgear. He also used loops such as vertical loop, tear drop loops etc.

Dr. Raymond P Begg and Dr Kesling[13] gave anchor and gable bends for bite opening. Hocevar's modified these and gave bendson either side of the canines. Kameda said that using a simultaneous anchor and gable bends, the canines and the premolars if engaged are extruded, while the lateral and centrals experience progressively more intrusive effect.

Mclaughlin, Bennett and Trevisi explained the use of bite opening curves for relative intrusion in maxillary and mandibular arches. In this technique intrusion can also be achieved by changing the bracket position (incisally or occlusally).

Burstone [14] used a three-piece base arch to intrude the anterior segment. A heavy stainless steel segment (0.018" x 0.025") with distal extensions below the center of resistance of anterior teeth is placed passively in the anterior brackets. The intrusive force is applied with a 0.017" x 0.025" TMA tip-back springs. The overall force system obtained is an intrusive force anterior and an extrusive force posterior associated with the tip back moment. The design of this appliance enables low-friction sliding to occur distally of the anterior segment during space closure.

Ricketts [15,16] used retraction and protraction utility arches for intrusion of maxillary and andicbular incisors. Loops are incorporated in the archwire anterior and posterior to the anterior vestibular segment.

Mulligan's[17] utility arch or 2 x 4 appliance is used for incisor intrusion and molar extrusion in deep bite cases. The archwire used is round 0.016" stainless steel. The bracket slot is 0.022 x 0.025". All brackets are leveled and uprighted with initial wires. Then the wire is placed in the setup. Arch wire is tightly cinched back distal to the molars. The 'V' bend tipback bends or tipback bends given to the arch wire for intrusive action on incisors and extrusive action on molars.

The K-SIR [18](Kalra simultaneous Intrusion and Retraction) archwire given by **Varun Kalra** is a modification of the segmented loop mechanics of Burstone**.** It is a continuous 0.019" x 0.025" TMA archwire with closed 7mm x 2mm U – loops at the extraction sites.

Mini screw anchorage [19] can also be used to intrude the upper incisors. the best placement of mini-screw for this is between the upper lateral incisors and the canines. The mini-screws are placedafter leveling and alignment, so as 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.

E. SURGICAL-ORTHODONTIC TREATMENT OPTIONS[20]

Interpositional genioplasty increases lower-third face height, softens the deep labiomental fold, and reduces the prominent pogonion

Inferior onlay mandibuloplasty can achieve an esthetic balance in lower-third facial proportions. In these instances, alloplastic vertical augmentation of the inferior border of the mandible should be performed, since, when a significant amount of augmentation is required, it is readily obtained, easily shaped, and predictable

Individuals with a short lower-third face and mandibular deficiency may be treated satisfactorily by total mandibular advancement in conjuction with orthodontic therapy. Orthodontic leveling of the mandibular arch can be done before or after surgical advancement of the mandible, depending upon interincisal relations.

Individuals with short face morphology, Class II malocclusion, and a normal prominence of pogonion are candidates for consideration of total subapical mandibular advancement

There is a small group of individuals with short face dentofacial morphology who have been described to have "vertical maxillary deficiency". Surgical inferior repositioning of the maxilla is a procedure indicated for selected individuals

Surgical anterior and inferior repositioning of the posterior maxilla, mandibular anterior subapical osteotomy, and mandibular advancement should be done to increase lower-third face height, level the mandibular arch, and advance the deficient mandible. It is important to note that inferior repositioning of the posterior maxilla with a coexisting mandibular deficiency actually worsens the anterior projection of the mandible and exaggerates the Class II malocclusion, because of the postero-inferior rotation of the mandible.

CONCLUSION

A successful treatment of deep bite requires a careful analysis of the factors contributing the problems. Detailed clinical examination of the occlusion, dentition, jaw movements and soft tissue pattern of the face is very important. Along with clinical examination, study models, cephalograms and photographs must be taken to study the dental, skeletal and soft tissue relationship and growth pattern and its status.

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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