ORIGINAL RESEARCH PAPER

Volume-8 | Issue-4 | April-2019 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

ORTHODONTICS AND GUMMY SMILE

Dental Science

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ABSTRACT

One of the predominant objective of seeking orthodontic treatment is enhancement of dental esthetics. Smile comprises of the most essential factor of an individual's facial esthetics. When an excessive amount of gingiva is displayed superior to the maxillary anterior teeth upon smiling the smile is said to be "gummy". Based on the underlying etiology various methods can be employed for the correction of gummy smile orthodontically.

KEYWORDS

Orthodontics, Gummy Smile, Mini Implant Intrusion.

INTRODUCTION

According to Husley "A smile is one of the most effective means by which people convey their emotions".[1] With the increasing awareness regarding esthetics amongst the common population the challenge for an orthodontist to provide excellent occlusion along with outstanding and highly satisfying aesthetics has also increased.Gingival Smile is known by a variety of names such as Gummy smile, high lip line, short upper lip or a full denture smile.[2-6] Peck et al in 1992 found that the tendency of a person to project a gummy smile was related to anterior vertical maxillary excess, the muscular ability to raise the upper lip higher than average when smiling, greater overjet, greater interlabial gap at rest and greater overbite.[2]

Acceptable range of gingival exposure has long been debated, it is apparent that an excess of 4mm of gingival display on smiling is considered unesthetic and the majority of literature supports 0-1mm of gingival exposure as the ideal. Kokich et al, first reported that 4mm of gingival dispay represents the threshold acceptability.[7]

ETIOLOGY OF GUMMY SMILE

1. Sex predilection
2. Soft tissue factors- Lip Incompetence, Lip length
3. Dental factors- (i)Dentogingival type -Altered Passive Eruption, Inflammation, Gingival Enlargement
   (ii)Dentoalveolar type -Protrusion of upper anterior dentoalveolar complex
4. Skeletal factors-Vertical Maxillary Excess, Maxillary Protrusion
5. Orthodontic treatment induced-Extrusive Forces, Unexpressed Vertical Growth, anterior- posterior position of the Maxilla.

DIAGNOSIS OF GUMMY SMILE

It involves systematic recording of

1. *Interlabial distance at rest*

When interlabial space at rest is normal (1-3 mm), gummy smile is considered to have a predominantly muscular origin. Usually, the main cause of increased interlabial space is dentoskeletal disharmony (vertical maxillary excess and/or protrusion of upper incisors), which may or may not be associated with anatomical and/ or functional changes in the upper lip.[8]

2. *Upper incisor exposure during rest and speech*

At rest, the exposure of the upper incisors of 2 - 4.5 mm in women and 1 - 3 mm in men is considered to be within the normal range. Factors causing an increased exposure of the upper incisors at rest are; upper incisor extrusion, dolichocephalic facial pattern, Vertical maxillary excess, short upper lip. Assessment of phonetics during clinical examination is also important.[8]

3. *Smile arc*

Females have a sharper curvature, whereas in males the curvature is flatter. Also brachycephalic facial patterns tend to have a flatter smile arc than in individuals with a mesocephalic or a dolichocephic facial pattern.[8]

4. *Width/length ratio of maxillary incisors*

The gold standard ratio for the width of the maxillary incisors should be 80% of its length, whereas for upper lateral incisors that same ratio should be around 70%.It is important to assess whether the crowns of anterior teeth appear very short primarily for two reasons: a reduction in height of the incisal edges of upper teeth by friction and/or fracture or gingival overgrowth.[8]

5. *Morphofunctional characteristics of the upper lip*

Morphofunctional features of the lip, such as: length, thickness and insertion, direction and contraction of various lip related muscle fibers, all effect the amount of gingival exposure upon smiling.[8]

ORTHODONTIC TREATMENT MODALITIES FOR CORRECTION OF GUMMY SMILE

The appropriate treatment is determined by the etiology of the problem and the age of the patient. Treatment line for the correction of gummy smile depends entirely on the underlying etiology. Individuals with a gummy smile due to altered passive eruption need surgical procedures such as; gingivectomy, crown lengthening or apical reduction of the entire dentogingival complex for its correction whereas cases of a hyperfunctional lip elevator muscle will require procedures such as; muscle resection, anterior nasal spine implant or an injection of botulinum toxin. If the gummy smile is due to an incorrect dental and skeletal relationship, it can be corrected by orthodontically. According to Proffit, three possible approaches can be used to treat excessive gingival exposure due to incorrect dental and skeletal relationships ; orthodontic intrusion, orthognathic surgery to move the maxilla up and implant anchorage to intrude the maxillary anterior teeth.[9]

Orthodontic Intrusion-

If the maxillary anterior teeth are excessively extruded in relation to the posterior teeth and the bite is deep, then the anterior teeth can be orthodontically intruded. According to Garber and Salama, the entire attachment apparatus, incorporating the bone, periodontal ligaments, and the soft tissue moves together with the tooth, and therefore intrusion should improve a gingival smile.[10] Cases with excessive vertical growth of upper anterior dentoalveolar complex usually show extrusion and retroclination of upper incisors, deep overbite along with gummy smile.

Intrusion arches such as; Ricketts Utility arch, Burstone three piece intrusion arch, CAN intrusion arch by Nanda, Cetlin's intrusion arch; can be successfully used for the correction of gummy smile in such cases.(Figure 1)

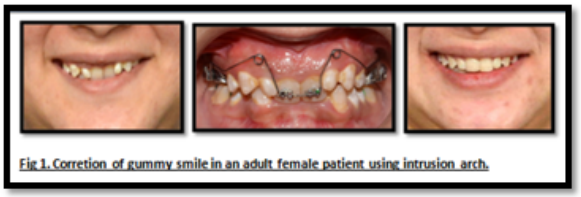

Fig 1. Correction of gummy smile in an adult female patient using intrusion arch.

If the gingival smile is owing to a skeletal Vertical Maxillary Excess, then the posterior portion of the maxilla will also be vertically overexpressed, causing the mandible to rotate downward and backward. If such a condition is diagnosed in a growing patient, the growth pattern of such an individual can be modified to prevent further posterior vertical growth of the maxilla, thereby allowing the mandible to rotate upward and forward. The orthodontic treatment approach for the correction of gummy smile associated with such a condition includes the use of a high-pull headgear to the maxillary molars or high pull headgear with either a maxillary splint, or functional appliance such as a twin block or activator.[11-14](Figure 2)

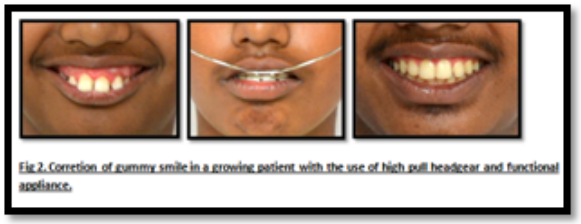

Fig 2. Correction of gummy smile in a growing patient with the use of high pull headgear and functional appliance.

Implant Intrusion

With the advent of orthodontic implants, also known as temporary anchorage devices, effective intrusion of anterior teeth has become possible. Mini-implants can be effectively used as a treatment modality in individuals with a gummy smile due to vertical overgrowth of the upper anterior dentoalveolar complex without an extrusion of the upper molars. This method was first introduced by Creekmore and Eklund in For true intrusion of the upper anterior segment, the mini implants are placed near their center of resistance, which lies 8 – 10 mm apical and 5 – 7 mm distal to the lateral incisors.[15-19](Fig 3)

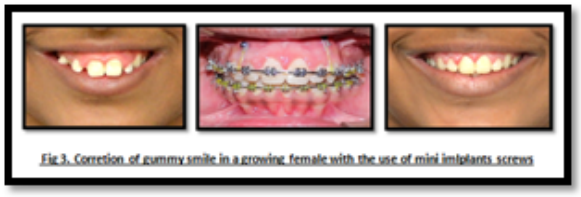

Fig 3. Correction of gummy smile in a growing female with the use of mini imlplants screws

Conclusion

Various orthodontic treatment mechanics can be used for the successful correction of gummy smile, however an accurate diagnosis and thorough clinical examination must be done for evaluation of the underlying etiology of excessive gingival display. Currently, mini implant based intrusion seems to be the most promising and acceptable treatment modality for correction of gummy smile.

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