



Extravagant gingival display: a review of the literature

Muhamad A. H. AL-Bahadli , BDS, MSc.*

Hayder S. B , BDS, MSc.**

Susan F. k. Al-sudani , B.Sc., M.Sc., PH.D***

* Assit. Lect. At College of Dentistry, Albayan University, Department of Periodontic Dentistry , Iraq, B.D.S., M.Sc. in Periodontic Dentistry, E-mail: muhamad.ali@albayan.edu.iq.

** Assit. Lect. At College of Dentistry, Albayan University, Department of Periodontic Dentistry , Iraq, B.D.S., M.Sc. in Periodontic Dentistry, E-mail: hayder.sadiq@albayan.edu.iq.

*** Lect. At College of Dentistry, Albayan University, Department of Basic Sciences, Iraq, B.D.S., M.Sc., Ph.D. E-mail: susan.f@albayan.edu.iq.

Abstract

Extravagant gingival display, gummy smile and vertical maxillary excess are the same for one condition which is recognized by the maxillary gingival overexposure more than wanted during smiling. It is recently received a lot of concern and awareness. Making the correct diagnosis and carrying out the appropriate technique depend on having knowledge of the background information regarding the cause or causes of each case of extravagant gingival display and how it is treated. Providing comprehensive information about the gummy grin problem, the numerous aetiological variables that contribute to the condition, and the various treatment options was conducted in this review. The treatment options include many modalities according to real cause in each condition.

Keywords: Extravagant gingival display, gummy smile, vertical maxillary excess, short lip.

Introduction

When smiling, bidding the gingiva to some extent creates a young appearance that is aesthetically pleasing (1). A beautiful smile is a key component of attractiveness that society today places an increasing emphasis on. Gums, teeth, and lips are the three anatomical entities that make up the idea of a beautiful smile (2). The dynamic interplay among the teeth, gingiva, and lips when smiling is something that every physician should consider when evaluating a patient's smile. This is due to the growing awareness of beauty and physical allure (3). Excessive gingival bidding, commonly referred to as a "gummy smile," occurs when the maxillary gingiva is overexposed while smiling. In some extreme cases, the overexposed

gingival tissue is visible even while the lips are at rest (1). When smiling, a gingival show of 1 to 2 mm is seen as normal (4). When you smile, your gums should be exposed between the gingival margin of your anterior central incisors and the inferior edge of your upper lip (3). When smiling, it's normal for the gingiva to show between 0 and 2 millimetres, and when the lips are relaxed, the maxillary incisor edges should show between 2 and 4 millimetres. While specialists classify a smile in which the exposure of gingiva more than 2 mm as having an extensive gingival display or a gummy smile (5). Finding the cause of a gummy grin is essential for managing it since it

affects the course of treatment and its results. A eruption, excessive maxillary length, dentoalveolar extrusion, and gingival overgrowth are some of the conditions that can cause a gummy grin, but excessive maxillary length is one of its most frequent causes (6). Improved aesthetic results for adults are becoming more and more important in these treatments, to the point that some patients are solely interested in the cosmetic aspect and not the practical benefit (7). Therefore, it's imperative to identify a successful treatment for each of the causes of the gummy smile.

Epidemiology

Extravagant gingival show is seen in about 10% of people aged 20 to 30; it is more prevalent in women (8, 9). As people age, the condition becomes less common because the upper and lower lips dripping, hiding the gingiva and maxillary anterior teeth (10).

Aetiology and treatment

Numerous research have announced the major reasons of extravagant gingival display, outlining the crucial elements that may contribute to a gummy smile. The exhibiting of teeth and gingiva depends on the coordinated actions of several different factors (vertical maxillary excess, increased muscle capacity, huge inter-labial hiatus in resting position, and size of overjet and overbite) (11). The major influencing factors are lip length and its mobility rate (12). The abnormal teeth of anterior maxilla and gingival expression seem owing to diverse functional or anatomical agents, it may be hereditary or inborn (5). Common reasons for a gummy smile are:

- 1- A narrow upper lip.
- 2- Hyperactivity of the upper lip because its muscles of elevation.
- 3- Excessive protuberance.
- 4- Vertical maxillary growth.
- 5- An irregular eruption of teeth
- 6- Condition of gingival enlargement.

Actually, many different variables influence people get what is named a gummy smile. Though sometimes just one of them is

short or hyper-mobile upper lip, altered passive apparent, other times there are several. A good treatment strategy is produced by a thorough examination and accurate diagnosis of the reason.

Short upper lip

Normal upper lip lengths for males and women are 23 and 20 mm, respectively (13). Its measuring was conducted from subnasale (lower tip of the nose) to stomion (lowest line of upper lip) (12). With an extravagant size of teeth displayed while at rest, the clinical measurement of the length of the upper lip can be used to make the diagnosis of an extravagant gingival presentation (14). Contrariwise, no clear divergence in gum expression inter alia the persons for normal or short lip, when maximum smiling, so the union of many elements like high capacity of muscle, excessive maxillary length, extravagant inter-labial hiatus when rest situation, then the volume of overbite and overjet possess a bigger influence on the expression of gingiva more than the length of maxillary lip itself (12). Lip repositioning surgery was described before (15). It is a good treatment to less hard surgery. It is consisting of elliptical excision of mucosa and flap coronally advanced. The process is made to inhibit the hyper-activity of the elevation lip muscles, and reshape vestibule depth (16). It was then modified to correct the gummy smile reasoned by stumpy upper lip, by dissociate muscles of the underneath bone to put an upper lip in place more coronally (17). This surgical process had not a complication, though there were some ambits of relapse (18).

Hyper-mobility of the upper lip

When face height, lip length, gingival levels and length of maxillary incisors in

persons who have extravagant gingival display are normal, the probable aetiology is hyper-mobility of maxillary lip (19). Mobility of upper lip was illustrated as the girth of lip motion that happens when a person smiles. So, it was gauged by subtracting the incisal appeared at rest state from dento-gingival display at full smile (12). The hyper-function of elevation muscles is the cause of hyper-mobility of maxillary lip thus leads to extravagant gingival display (20). The upper lip is generally raised between 6 and 8 millimetres from its resting position to the full smile posture (14, 19). To minify the hyper-mobility of the elevation muscles and reformed the vestibule depth, the lip repositioning surgery is performed (16). Botulinum toxin type A injection is other nonsurgical treatment option which has been used for treatment of upper lip hyper-mobility (21). Also, by injecting a little amount of hyaluronic acid in the para-nasal region, specialists can correct hyper-mobility of the upper lip by pressing the lateral fibres of the Levator Labii Superioris Alaeque Nasi [LLSAN] to stop the deep portion of the muscle from moving. This would lead to a major improvement in a gummy smile by lowering the height of the lip whilst smiling. The infiltration point concords to the nasolabial fold most cranially, at 3 mm laterally to alar cartilage, same point where usually bespoke to insert botulin toxin (22). The relapse will happen after treatment in the third month (23). After 24 weeks, it was estimated by following up to be roughly 2 mm. Therefore, this offers short-term benefits (21). However, it is stay a viable alternative for individuals who choose a limited course of treatment and do not like having surgical procedures.

Vertical maxillary excess

Vertical maxillary excess is extravagant vertical overgrowth of maxilla which sometime leads to an anterior open bite (24). When the facial lower third is bigger than other two thirds would generate an extravagant gingival display, this is a sign of vertical maxillary excess (14). Extravagant

gingival display is close correlated to vertical maxillary excess, 2 to 3 millimetre (11, 25). Also the consequence of association between the anterior alveolar bone protrusion and excessive maxilla lead to gummy smile (20). The anterior maxillary extent is a maxillary incisors to the plane of palate which consider high in men (+1.03 millimetre) also women (+2.13 millimetre) squads who have a extravagant gingival display which stated in previous study (26). The orthognathic surgery is the treatment option (27). According to the extent of the gingival exposure identified, it was implemented to the maxilla. The gummy smile, some kinds of open bites with skeletal origins, long face syndrome, and labial sealing can all be treated by maxillary impaction (28). The maxilla can be effectively repositioned by reducing bone between the apical ends of the maxillary teeth and the nasal floor owing to the Le Fort I osteotomy (29). In cases of modest vertical maxillary excess, lip repositioning surgery is an option as well (30).

Bimaxillary protrusion

A common deformity among African Americans as well as some Asian communities is bimaxillary protrusion (31). The protruding and buccally positioned mandibular and maxillary incisors, in addition to increased drooping of the lower and upper lips, are all features of this malformation. An incompetent lip, an extravagant gingival display, mentalis tension, and an anterior open bite can all be symptoms. A maxillary and mandibular dentoalveolus that protrudes unnaturally is referred to as bimaxillary protrusion. Generally speaking, this is associated with malocclusion, dento-alveolar flare of the anterior teeth in mandibular and maxilla, and lips protrusion, which results the facial profile convexity in addition. More frequently, bimaxillary protrusion is escorted by varying grades of lip insufficiency which is detachment in the rest state more than four mm). Though it can may find in severe class 2 to class 3, the anteroposterior correlations typically indicates a class II malocclusion with an imperfect mandible (32). Bimaxillary protrusion has a variety of environmental and

genetic causes, including habits like mouth breathing, lip biting, and large tongue size (33). First premolar extractions may be used as part of the corrective option, followed by ostectomy at the extraction sites to mobilise the anterior maxilla division. In addition to setting back the segment, it was intended to minimise the incisors' labial flare. Sometimes the antero-posterior maxillary excess can be treated without tooth extraction or segmental ostectomy using only the maxillary setback (32).

Altered passive eruption

A condition known as altered or impaired passive eruption (2), occurs when the interaction between teeth, the soft tissues, and the alveolar bone in the maxilla exhibits an excessive amount of gingiva. This in turn displays the gummy smile's clinical characteristics (34). It is attributed by extravagant gingival exposure in proportion to the maxillary teeth's crowns (35). The gingiva awry to move in the intended apically direction throughout tooth emergence and instead remained in a coronal position in reference to the cemento-enamel junction, resulting in an unfavourable gingival exposure and minimal exposure of the teeth when smiling (14). The prevalence of this kind of eruption is about 12 percent of the population (36). The perfect gingiva should be at least 3 millimetres long from its crest to that of alveolar. The preferred course of treatment is typically gingivectomy followed by aesthetic shaping and lengthening of crowns to achieve the desired dimension and contour of teeth, that in the altered passive eruption case, it occurs in a larger quantity (19). An apically positioned flap, with ostectomy of alveolar bone indicated where the diagnostic reveals bone levels that are closer to the cemento-enamel juncture. When there is gingival asymmetry involving one or more anterior teeth, eruption or an intrusion orthodontically which is treatment be used (37).

Conditions causing gingival enlargement

The chronic inflammation which developed by bacterial plaque may lead to gingival enlargement. The gingival overgrowth linked with hormonal differences that occur in adulthood and pregnant women, plus contraceptive drugs (14). It is may be occurred because of partake of appliances that used in orthodontic treatment (38). It may be caused by some drugs such as with the female patients used amlodipine, which is an antihypertensive drug (39). The cell turnover process of normal gingival formation which influenced by suppression of apoptotic pathways is the cause beyond uncontrolled proliferation of cell in drugs that cause gingival overgrowth (40). The effects such as oral hygiene condition, age, demographic and pharmacokinetic changes, molecular and cellular variables, as well as genetic predisposition may influence the gingival enlargement (40, 41). The leukemic cells in leukemic diseased patients spread in the gingiva (42). Therefore, some manifestations, such gingival bleeding and gingival overgrowth, will result (43). The treatment must be concentrated on rigorous cause which leads up to enlargement of gingiva. To make a more accurate diagnosis of the uncommon illnesses that cause gingival enlargement, token of painstaking history and biopsy for histological study plus hematologic tests carried out if needed. Plaque control is a crucial part of all patients' treatment plans. When the outside factor that is causing the gingival expansion is stopped or controlled, some of these cases may settle. For example, the abstraction of all local irritants and may then a surgical treatment were done for eradication of any fibrotic remains in pregnancy gingival overgrowth and puberty (44). So the gingivectomy, or apically repositioned flap are the choices for treatment (20).

Prognosis

The majority of gummy smile instances can be greatly improved with the treatment options available, unless the degree of gingival excess reduction will depend on its underlying cause.

Some situations can be resolved without much difficulty using less intrusive techniques such as (botulinum toxin, hyaluronic acid) injection, but the results only endure for a few months. Others will need surgery, which will produce permanent correction.

Conclusion

The person smile is an influential aesthetic lineament and in current recent society a beautiful smile has direct effect on the personality. Gummy Smile is more unaccepted aesthetically and has a psychological negative effect on the person and lead to reduce his/her self confidence. For a person to have an overall pleasant appearance, this defect must be corrected which depended on good identification of gummy smile aetiology and should be treated according to the available selections of treatment which is better for the patient.

Conflict of interests

There is no conflict of interests in the products or companies described in this article.

References

1. Silberberg N, Goldstein M, Smidt A, Excessive gingival display--etiology, diagnosis, and treatment modalities. Quintessence international (Berlin, Germany : 1985). 2009 Nov-Dec [[PubMed PMID: 19898712](#)]
2. Izraelewicz-Djebali E, Chabre C. Gummy smile: orthodontic or surgical treatment? Dentofacial Anom Orthod 2015;18:102. Published online: 04 September 2015.
3. Sharma A, Sharma S, Garg H, Singhal V, Mishra P. Lip repositioning: A boon in smile enhancement. J Cutan Aesthet Surg 2017;10:219-22.
4. Rao AG, Koganti VP, Prabhakar AK, Soni S, Modified lip repositioning: A surgical approach to treat the gummy smile. Journal of Indian Society of Periodontology. 2015 May-Jun [[PubMed PMID: 26229285](#)]
5. Pausch NC, Katsoulis D. Gender-specific evaluation of variation of maxillary exposure when smiling. J Craniomaxillofac Surg 2017;45:913-20.
6. Pavone AF, Ghassemian M, Verardi S, Gummy Smile and Short Tooth Syndrome--Part 1: Etiopathogenesis, Classification, and Diagnostic Guidelines. Compendium of continuing education in dentistry (Jamesburg, N.J. : 1995). 2016 Feb [[PubMed PMID: 26905089](#)]
7. Charrier JB. Orthognathic surgery of adults and facial aesthetics. J Dentofacial Anom Orthod 2012;15:302.
8. Tjan AH, Miller GD, The JG, Some esthetic factors in a smile. The Journal of prosthetic dentistry. 1984 Jan [[PubMed PMID: 6583388](#)]
9. Peck S, Peck L, Kataja M, The gingival smile line. The Angle orthodontist. 1992 Summer [[PubMed PMID: 1626754](#)]
10. Vig RG, Brundo GC, The kinetics of anterior tooth display. The Journal of prosthetic dentistry. 1978 May [[PubMed PMID: 349139](#)]
11. Peck S, Peck L, Kataja M. The gingival smile line. Angle Orthod 1992;62:91-100.
12. Roe P, Rungcharassaeng K, Kan JYK, Patel RD, Campagni WV, Brudvik JS. The Influence of Upper Lip Length and Lip Mobility on Maxillary Incisal Exposure. Am J Esthet Dent 2012;2:116-125.
13. Sabri R. The eight components of a balanced smile. J Clin Orthod 2005;39:155-67.
14. Bhola M, Fairbairn PJ, Kolhatkar S, Chu SJ, Morris T, de Campos M. LipStaT: The Lip Stabilization Technique-Indications and Guidelines for Case

- Selection and Classification of Excessive Gingival Display. *Int J Periodontics Restorative Dent* 2015;35: 549-59.
15. Rubinstein AM, Kostianovsky AS. Cosmetic surgery for the malformation of the laugh: Original technique in Spanish. *Prensa Med Argent* 1973;60:952.
 16. Humayun N, Kolhatkar S, Souiyas J, Bholia M. Mucosal coronally positioned flap for the management of excessive gingival display in the presence of hypermobility of the upper lip and vertical maxillary excess: a case report. *J Periodontol* 2010;81: 1858-63.
 17. Litton C, Fournier P. Simple surgical correction of the gummy smile. *Plast Reconstr Surg* 1979;63:372-3.
 18. Grover HS, Gupta A, Luthra S. Lip repositioning surgery: A pioneering technique for perio-aesthetics. *Contemp Clin Dent* 2014;5:142-45.
 19. Robbins JW. Differential diagnosis and treatment of excess gingival display. *Pract Periodontics Aesthet Dent* 1999;11:265- 72.
 20. Ezquerro F, Berrazueta MJ, Ruiz-Capillas A, Arregui JS. New approach to the gummy smile. *Plast Reconstr Surg* 1999;104:1143- 50.
 21. Polo M. Botulinum toxin type A (Botox) for the neuromuscular correction of excessive gingival display on smiling (gummy smile). *Am J Orthod Dentofacial Orthop* 2008;133:195-203.
 22. Diaspro A, Cavallini M, Piersini P, Sito G. Gummy Smile Treatment: Proposal for a Novel Corrective Technique and a Review of the Literature. *Aesthetic surgery journal*. 2018 Nov 12 [[PubMed PMID: 30010767](https://pubmed.ncbi.nlm.nih.gov/30010767/)]
 23. Aly LA, Hammouda NI. Botox as an adjunct to lip repositioning for the management of excessive gingival display in the presence of hypermobility of upper lip and vertical maxillary excess. *Dent Res J (Isfahan)* 2016;13:478-83.
 24. Wolford LM, Karras SC, Mehra P. Considerations for orthognathic surgery during growth, part 2: maxillary deformities. *Am J Orthod Dentofacial Orthop* 2001;119:102-5.
 25. Mackley RJ. An evaluation of smiles before and after orthodontic treatment. *Angle Orthod* 1993;63:183-90.
 26. Wu H, Lin J, Zhou L, Bai D. Classification and craniofacial features of gummy smile in adolescents. *J Craniofac Surg* 2010;21:1474-9.
 27. Pinto SCS, Higashi C, Bonafé E, Pilatti GL, Santos FA, Tonetto MR, et al. Crown Lengthening as Treatment for Altered Passive Eruption: Review and Case Report. *World J Dent* 2015;6:178-83.
 28. Steinhäuser S, Richter U, Richter F, Bill J, Rudzki-Janson I. Profile changes following maxillary impaction and autorotation of the mandible. *J Orofac Orthop* 2008;69:31-41.
 29. Nascimento Meger M, Tiboni F, dos Santos FS, Verbicaro T, Deliberador TM, Scariot R, et al. Surgical correction of smile in dynamic motion. *Am J Orthod Dentofacial Orthop* 2005;128:8-15.
 30. Dym H, Pierre R 2nd. Diagnosis and Treatment Approaches to a "Gummy Smile". *Dental clinics of North America*. 2020 Apr [[PubMed PMID: 32111273](https://pubmed.ncbi.nlm.nih.gov/32111273/)]
 31. Scott SH, Johnston LE. The perceived impact of extraction. and nonextraction treatments on matched samples of African American patients. *Am J Orthod Dentofacial Orthop* 1999;116: 352-8.
 32. Chu YM, Bergeron L, Chen YR. Bimaxillary protrusion: an overview of the surgical-orthodontic treatment. *Semin Plast Surg* 2009;23:32-9.

33. Lamberton CM, Reichart PA, Triratananimit P. Bimaxillary protrusion as a pathologic problem in the Thai. *Am J Orthod* 1980;77:320-9.
34. Rossi R, Brunelli G, Piras V, Pilloni A. Altered passive eruption and familial trait: a preliminary investigation. *Int J Dent* 2014; 2014:874092.
35. Pinto SCS, Higashi C, Bonafé E, Pilatti GL, Santos FA, Tonetto MR, et al. Crown Lengthening as Treatment for Altered Passive Eruption: Review and Case Report. *World J Dent* 2015;6:178-83.
36. Miskinyar SA. A new method for correcting a gummy smile. *Plast Reconstr Surg* 1983;72:397-400.
37. Dolt AH 3rd, Robbins JW. Altered passive eruption: an etiology of short clinical crowns. *Quintessence Int* 1997;28:363-72.
38. Trossello VK, Gianelly AA. Orthodontic treatment and periodontal status. *J Periodontol* 1979;50:665-71.
39. Narwal A, Singh V, Bala S. Drug-induced atypical hyperplasia enveloping salivary gland malignancy. *J Indian Soc Periodontol* 2017;21:409-11.
40. Ritchhart C, Joy A. Reversal of drug-induced gingival overgrowth by UV-mediated apoptosis of gingival fibroblasts - an in vitro study. *Ann Anat* 2018;217:7-11.
41. Nakib N, Ashrafi SS. Drug-induced gingival overgrowth. *Dis Mon* 2011;57:225-30.
42. Savona M, Talpaz M. Chronic myeloid leukemia: changing the treatment paradigms. *Oncology (Williston Park)* 2006;20: 707-11.
43. Chowdhri K, Tandon S, Lamba AK, Faraz F. Leukemic gingival enlargement: A case report and review of literature. *J Oral Maxillofac Pathol* 2018;22(Suppl 1):S77-S81.
44. Agrawal AA. Gingival enlargements: Differential diagnosis and review of literature. *World J Clin Cases* 2015;3:779-88.