

### **Esthetic Crown Lengthening and Midline Diastema Closure - A Case Report**

<sup>1</sup>Dr Shilpa Jaryal, MDS Post Graduate Student, Department of Periodontology and Oral Implantology, National Dental College and Hospital, Derabassi, Mohali, Punjab

<sup>2</sup>Dr Shireen Mann, BDS, Department of Periodontology and Oral Implantology, National Dental College and Hospital Derabassi, Mohali.

<sup>3</sup>Dr Gurpreet Kaur, HOD, Department of Periodontology and Oral Implantology, National Dental College and Hospital, Derabassi, Mohali, Punjab

**Corresponding Author:** Dr Shilpa Jaryal, MDS Post Graduate Student, Department of Periodontology and Oral Implantology, National Dental College and Hospital, Derabassi, Mohali, Punjab

**Citation of this Article:** Dr Shilpa Jaryal, Dr Shireen Mann, Dr Gurpreet Kaur, “Esthetic Crown Lengthening and Midline Diastema Closure - A Case Report”, IJDSIR- March - 2021, Vol. – 4, Issue - 2, P. No. 17 – 23.

**Copyright:** © 2021, Dr Shilpa Jaryal, et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License. Which allows others to remix, tweak, and build upon the work non commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**Type of Publication:** Case Report

**Conflicts of Interest:** Nil

#### **Abstract**

The aim of this case report was to describe the surgical sequence of crown lengthening to apically reposition the dentogingival complex, in addition to an esthetic restorative procedure. Gingival tissues form an important part of what we can consider to be a pleasing smile. Framing the teeth, within the confines of the gingival architecture, has a tremendous impact on the esthetics of the smile. The appearance of the gingival tissues surrounding the teeth plays an important role in the esthetics of the anterior maxillary region of the mouth. Abnormalities in symmetry and contour can significantly affect the harmonious appearance of the natural or prosthetic dentition. [1] An ideal anterior appearance necessitates healthy and inflammation-free periodontal tissues. [5]

The common causes of short clinical crown include caries, erosion, tooth malformation, fracture, attrition, excessive tooth reduction, eruption disharmony, exostosis, and genetic variation.[2]

It is generally accepted that crown-lengthening surgery helps to relocate the alveolar crest at a sufficient apical distance to allow room for adequate crown preparation and reattachment of the epithelium and connective tissue. [6] Furthermore, by altering the inciso-gingival length and mesiodistal width of the periodontal tissues in the anterior maxillary region, the crown-lengthening procedure can build a harmonious appearance and improve the symmetry of the tissue. [7]

Periodontal surgery has a major role in today’s aesthetic dentistry. Main indications for esthetic crown lengthening of anterior

teeth are to expose the anatomic crown of teeth, reduce asymmetry between contralateral teeth, and to reduce the excessive gingival exposure. present on all or some of the upper anterior teeth. [3] In addition to establishing the smile line, the restoring dentist evaluates the anterior and posterior occlusal planes for harmony and balance, as well as the anterior and posterior gingival contours. This information allows the restoring dentist to determine the ideal inciso-gingival length and mesiodistal width of the anterior maxillary teeth. On the basis of these projections, the periodontist recontours and relocates the gingival margin and the alveolar crest to achieve both an esthetically pleasing appearance and periodontal health.

Different indications for aesthetic crown lengthening are as follows:

1. Excessive gingival exposure or “gummy smile” appearance.
2. Asymmetry of tooth length and gingival margins.
3. Incomplete passive eruption or “short teeth” appearance.

The amount of exposure is relative to the position of the upper anterior teeth vis-à-vis the upper lip movement while smiling. This study aims to report a case of excessive gingival display because of incomplete passive eruption or ‘short teeth and midline diastema treated by means of diastema closure using fifth generation composite system with light curing associated with esthetic crown lengthening. A 23-year-old male patient, with 2-3 mm gingival display during smile caused by altered passive eruption and midline diastema, underwent the surgical crown lengthening procedure associated with gingivectomy.

### **Introduction**

In the present era of dentistry, aesthetics holds a significant aspect and clinicians are more concerned about achieving it. An attractive smile and a healthy appearing

gingiva are an important factor. Excessive gingival display in contrast can severely compromise the appearance of the individual. Ideally, the inferior border of the upper lip when smiling should rest at the level of the apices of the six maxillary anterior teeth. Maxillary canines and central incisors should have their gingival apices at the same level, whereas the lateral incisors should fall slightly below the imaginary line connecting the apices of the canines and the central incisor. A range of up to 3 mm above the gingival zenith is considered aesthetically pleasing. [3] Therefore, the aim of this case report was to describe the surgical sequence of crown lengthening to apically reposition the dentogingival complex, in addition to an esthetic restorative procedure.

### **Case Report**

A 23-year-old man with an evident gingival display on full smile was referred for esthetic crown lengthening in the maxillary anterior region. The primary concerns of this patient included anterior diastema and dissatisfaction with the size and shape of teeth. His medical history was noncontributory, and he denied a history of smoking or alcohol consumption. Extraoral examination revealed no significant findings. Periodontal examination revealed good oral hygiene with minimal plaque and calculus deposits. The gingiva was pink and firm, and the papillae were intact (Figure 1). Clinical examination revealed shallow probing depths (Figure 2), no mobility and adequate amounts of keratinized attached gingiva. Approximately 2-3 mm of excessive gingival tissue was observed on the maxillary anterior teeth in relation to the cemento-enamel junction (CEJ) (Figure 1). In addition, the anterior teeth presented an unsatisfactory gingival contour and crown size discrepancies. The smile analysis showed disproportional maxillary clinical crown lengths with high gingival margins position for upper right and left canine and upper central and lateral incisors. Hence, the clinical

crowns appeared shorter on the right compared to the left maxillary anteriors. In this case, internal bevel gingivectomy was taken as the treatment of choice, to maintain the periodontal health and postoperative aesthetics of the patient. An internal bevel incision can thin down the gingival margin to a knife-edge contour while preserving the maximum amount of attached gingiva. At the same time, it gives maximum comfort to the patient rather than external bevel gingivectomy because of open wounds in the latter. Ideally, the central incisors and canines are approximately equal in length and are usually 20% longer than the lateral incisors. The central incisors should be 25% wider than the lateral incisors and 10% wider than the canines. Furthermore, the length-to-width ratio of individual teeth should be 1.2:1 for the canines and lateral incisors and 1.1:1 for the central incisors. [8] Clinically, adequate amount of keratinized gingiva was present with probing depths of 2-3 mm. Projected restorative treatment required an increase in clinical crown width for the upper central incisors and symmetrical crown lengths for the lateral incisors and canines. The treatment plan included esthetic crown lengthening to reduce the amount of gingival display, raise the height of the anterior teeth, and correct gingival symmetry and parallelism.

A pre procedural rinse with a 0.12% chlorhexidine solution for a minute was done. Local anaesthesia was administered using 2% lidocaine with 1:100,000 epinephrine. Preoperative crowns lengths were measured outlining the amount of soft tissue reduction required to determine proposed clinical crowns lengths and width (Figure 2,3,4). Biologic width measurements were determined by bone sounding. Internal bevel gingivectomy of 1.0 to 1.5 mm was performed for maxillary right canine, lateral and central incisors and left

central incisors to achieve symmetrical clinical crown lengths (Figure 8).



Figure 1: Approximately 2-3 mm of excessive gingival tissue was observed on the maxillary anterior teeth in relation to the cementoenamel junction (CEJ).



Figure 2: Clinical examination revealed shallow probing depths.



Figure 3: Preoperative crowns lengths were measured outlining the amount of soft tissue reduction required to determine proposed clinical crowns lengths.



Figure 4: Preoperative crowns width was measured outlining the amount of soft tissue reduction required to determine proposed clinical crowns lengths.



Figure 5: Measurement on the scale.



Figure 6: Pin point marking on the soft tissue



Figure 7: Gingivectomy of 1.0 to 1.5 mm was performed for maxillary right canine, lateral and central incisors and

left central incisors to achieve symmetrical clinical crown lengths.

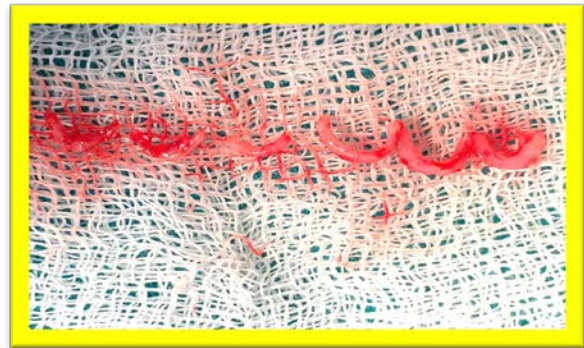


Figure 8: Tissue removed after surgery.



Figure 9: Post- operative after surgery.



Figure 10: Composite light cured is done wrt 11 and 21.



Figure 11: Post –operative after composite restoration.



Figure 12: Aluminium foil placed canine to canine.



Figure 13: Coe- pack application.

### Discussion

Crown lengthening is performed for aesthetic improvement during restorations and in teeth with subgingival caries or fractures; in addition, this surgical procedure can establish an accurate bone width [9] and correct gingival asymmetries [10]. The esthetic crown lengthening requires gingivectomy procedures to expose the needed additional tooth structure; therefore, a

minimum of 2 to 5 mm of keratinized tissue is necessary to ensure the gingival health [11,12]. Ribeiro suggested the method to treat APE, i.e., a minimally invasive flapless esthetic crown lengthening procedure using microchisels, via incision. In their randomized controlled trial, the esthetic crown lengthening, with or without flap elevation, showed similar and stable results for up to 12 months. Initial investigation by Sterrett et al. analyzed clinical crowns widths, lengths and width to length ratios revealing a correlation among them [24]. They found width dimensions of 8.6 mm, 6.6 mm and 7.6 mm and lengths of 10.2 mm, 8.9 mm and 10.1 mm for the central, lateral incisors and canines respectively. The width to length ratios of 0.85, 0.76 and 0.77 with an average of 81% was suggested as esthetically pleasing dimensions. After crown-lengthening surgery, the periodontium continues to remodel and mature. Bragger and others reported that gingival recession can occur between 6 weeks and 6 months after the surgery. [24] These measurements are similar to Chu et al. recommendations of a 78% width to length ratios for esthetically pleasing smile [25]

Claffey and Shanley described the biotype as thin with gingival thickness of 1.5 mm or less and thick with 2.0 mm or more [26]. Thin periodontal biotype patients are more likely to experience gingival recession compared to more tissue rebound in areas of thick biotype [27]. The patient periodontal biotype in the current case report was “thick” and chances of recession were less likely.

Moreover, the management of the papilla is another important aspect of the surgery. (about 5 mm or less) [13,14]. Any smaller residual interproximal space can be eliminated by apically positioning the contact area of the definitive restoration [15,16]. This can be surgically achieved by crown lengthening, or orthodontically by

forced tooth eruption or by a combination of both procedures [18].

Several studies suggest that the biologic width reestablishes itself after crown lengthening procedures, in 6 months [20,21,22] Ingber suggested that an additional 1 mm might be coronally added to the 2 mm dentogingival junction, as an optimal distance between the bone crest and the margin of a restoration, to permit healing and proper restoration of the tooth [28] In conclusion, crown lengthening surgery is a viable option for facilitating restorative therapy or improving esthetic appearance. However, to plan a crown lengthening the whole periodontal condition of the patients and their hygiene habits should be evaluated. Furthermore, an accurate diagnostic and interdisciplinary approach is mandatory for obtaining improved, conservative, and predictable results in esthetic areas.

#### **References**

1. Anterior Esthetic Crown-Lengthening Surgery: A Case study Jim Yuan Lai, BSc, DMD, MSc (Perio) Livia Silvestri, BSc, DDS, MSc (Perio) Bruno Girard, DMD, MSc (Perio)
2. M. Davarpanah, C. E. Jansen, F. M. A. Vidjak, D. Etienne, M. Kebir, and H. Martinez, "Restorative and periodontal considerations of short clinical crowns," *International Journal of Periodontics and Restorative Dentistry*, vol. 18, no. 5, pp. 425– 433, 1998.
3. Liebart MF, Fouque-Deruelle C, Santini A, Dillier FL, Monnet-Corti V, Glise JM, et al. Smile line and periodontium visibility. *Periodontol.* 2000;1:17–25.
4. Diagnosis and classification of delayed passive eruption of the dentogingival junction in the adult. Coslet JG, Vanarsdall R, Weisgold A *Alpha Omegan.* 1977 Dec; 70(3):24-8
5. Garguilo AW. Dimensions and relationships of the dentogingival junction in humans. *J Periodontol* 1961; 32:261-7.
6. Carnevale G, Sterrantino SF, Di Febo G. Soft and hard tissue wound healing following tooth preparation to the alveolar crest. *Int J Periodontics Restorative Dent* 1983; 3(6):36-53.
7. Bragger U, Lauchenauer D, Lang NP. Surgical lengthening of the clinical crown. *J Clin Periodontol* 1992; 19(1):58-63.
8. Gillen RJ, Schwartz RS, Hilton TJ Evans DB. An analysis of selected normative tooth proportions. *Int J Prosthodont* 1994; 7(5):410-7.
9. K. Pradeep, N. Patil, T. Sood, U. Akula, and R. Gedela, "Full mouth rehabilitation of severe fluorozed teeth with an interdisciplinary approach (6 handed dentistry)," *Journal of Clinical and Diagnostic Research*, vol. 7, no. 10, pp. 2387–2389, 2013
10. P. Fletcher, "Biologic rationale of esthetic crown lengthening using innovative proportion gauges," *The International Journal of Periodontics & Restorative Dentistry*, vol. 31, no. 5, pp. 523– 532, 2011.
11. N. P. Lang and H. Loe, "The relationship between the width of " keratinized gingiva and gingival health," *Journal of Periodontology*, vol. 43, no. 10, pp. 623–627, 1972.
12. J. G. Maynard Jr. and R. D. Wilson, "Physiologic dimensions of the periodontium significant to the restorative dentist," *Journal of Periodontology*, vol. 50, no. 4, pp. 170–174, 1979
13. J. C. Kois, "Altering gingival levels: the restorative connection part I: biologic variables," *Journal of Esthetic and Restorative Dentistry*, vol. 6, no. 1, pp. 3–7, 1994.
14. D. P. Tarnow, A. W. Magner, and P. Fletcher, "The effect of the distance from the contact point to the crest of bone on the presence or absence of the interproximal

dental papilla,” *Journal of Periodontology*, vol. 63, no. 12, pp. 995–996, 1992

15. H.-S. Cho, H.-S. Jang, D.-K. Kim et al., “The effects of interproximal distance between roots on the existence of interdental papillae according to the distance from the contact point to the alveolar crest,” *Journal of Periodontology*, vol. 77, no. 10, pp. 1651–1657, 2006.

16. P. Martegani, M. Silvestri, F. Mascarello et al., “Morphometric study of the interproximal unit in the esthetic region to correlate anatomic variables affecting the aspect of soft tissue embrasure space,” *Journal of Periodontology*, vol. 78, no. 12, pp. 2260–2265, 2007.

17. U. Bragger, D. Lauchenaer, and N. P. Lang, “Surgical lengthening of the clinical crown,” *Journal of Clinical Periodontology*, vol. 19, no. 1, pp. 58–63, 1992

18. J. C. Kois, “New paradigms for anterior tooth preparation. Rationale and technique.,” *Oral Health*, vol. 88, no. 4, pp. 19–22, 1998.

19. S. K. Lanning, T. C. Waldrop, J. C. Gunsolley, and J. G. Maynard, “Surgical crown lengthening: evaluation of the biological width,” *Journal of Periodontology*, vol. 74, no. 4, pp. 468–474, 2003.

20. G. Carnevale, S. F. Sterrantino, and G. Di Febo, “Soft and hard tissue wound healing following tooth preparation to the alveolar crest,” *The International Journal of Periodontics & Restorative Dentistry*, vol. 3, no. 6, pp. 36–53, 1983.

21. E. Oakley, I.-C. Rhyu, S. Karatzas, L. Gandini-Santiago, M. Nevins, and J. Caton, “Formation of the biologic width following crown lengthening in nonhuman primates,” *International Journal of Periodontics and Restorative Dentistry*, vol. 19, no. 6, pp. 529–541, 1999.

22. H.-W. Seol, J.-Y. Koak, S.-K. Kim, and S.-J. Heo, “Full mouth rehabilitation of partially and fully edentulous patient with crown lengthening procedure: a case report,”

*Journal of Advanced Prosthodontics*, vol. 2, no. 2, pp. 50–53, 2010.

23. Bragger U, Lauchenaer D, Lang NP. Surgical lengthening of the clinical crown. *J Clin Periodontol* 1992; 19(1):58-63.

24. Sterrett JD, Oliver T, Robinson F, Fortson W, Knaak B, et al.(1999) Width/length ratios of normal clinical crowns of the maxillary anterior dentition in man. *J Clin Periodontol* 26:153.

25. Chu SJ (2007) Range and mean distribution frequency of individual tooth width of the maxillary anterior dentition. *Practical Procedures and Aesthetic Dentistry* 19:209.

26. Claffey N, Shanley D (1986) Relationship of gingival thickness and bleeding to loss of probing attachment in shallow sites following nonsurgical periodontal therapy. *J Clin Periodontol* 13:654-657.

27. Pontoriero R, Carnevale G(2001) Surgical crown lengthening: a 12-month clinical wound healing study. *J Periodontol* 72:841-848.

28. J. S. Ingber, L. F. Rose, and J. G. Coslet, “The ‘biologic width’: a concept in periodontics and restorative dentistry,” *Alpha Omegan*, vol. 70, no. 3, pp. 62–65, 1977.