

Surgical Crown Lengthening: Restoring Aesthetics and Function

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ABSTRACT

Short clinical crown affects appearance and retention of the restoration placed within aesthetic zone. Thereafter, Surgical crown lengthening procedure is done to increase crown length for restorative or aesthetic reasons without breaching the biologic width. Herewith, we present a case of crown lengthening procedure along with osseous reduction on maxillary anteriors in a 25 years female patient referred to our department which resulted harmonious appearance and symmetry of tissues on follow up. Aesthetic crown lengthening procedure can be challenging. So, appropriate case selection with accurate diagnostic and interdisciplinary approach are essential for getting enhanced and conservative results in aesthetic areas.

Keywords: Aesthetics; biologic width; crown lengthening, osseous reduction.

INTRODUCTION

Crown lengthening is a surgical procedure designed to increase the extent of supragingival tooth structure for restorative or aesthetic purposes by apically positioning gingival margin or removing supporting bone or both.¹ This concept was first introduced by D.W Cohen in 1962. It can be categorized as aesthetic and functional² with common objectives of re-establishment of biologic width in more apical position. Various clinical facts need to be considered as sulcus depth, biological width, osseous crest, crown root ratio, gingival health, and apical extent of fracture or caries to allow healthy, optimal relationship between restoration and periodontium along with aesthetic maintenance.

CASE REPORT

A 25 years female patient was referred from Department of Prosthodontics after removal of crown to extend tooth structure and relocate previously prepared restorative margins that was violating biological width. Her dental history revealed endodontic treatment with crown placement three years back but compromised aesthetic outcome with no medical history. Extra-oral examination discloses apparently high smile line.



Figure 1: Endodontic treated teeth with favorable crown root ratio.

Periodontal examination revealed good oral hygiene with extensive loss of clinical crown due to previous tooth preparation, adequate width of attached gingiva, thick biotype. Intraoral radiograph showed root canal therapy with favorable crown root ratio with no periapical radiolucency (Figure 1). After a thorough clinical examination and investigation, aesthetics and functional crown lengthening was planned and informed consent was obtained.

The patient was referred to our department with prepared mockup crown on maxillary anteriors taking into consideration of required height, width of tooth and gingival zenith that guides amount of gingival resection (Figure 2). After local anesthesia administration, bleeding points were marked in relation to mock up crown (Figure 3). Internal bevel gingivectomy was performed by using

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Citation

Bhusal S, Humagain M, Lamichhane S, Rijal AH. Surgical Crown Lengthening: Restoring Aesthetics and Function. J Nepal Soc Perio Oral Implantol. 2022 Jul-Dec;6(12):95-7.



Figure 2: Mock up crown.



Figure 3: Bleeding points marked in relation to mockup crown.



Figure 4: Internal bevel incision.



Figure 5: Excised tissue removed.



Figure 6: Intraoperative tooth preparation with elevation of full thickness flap and ostectomy.



Figure 7: Interrupted suture with provisional crown.



Figure 8: Suture removal after 1 week.



Figure 9: Final crown placement after 6 months.



Figure 10: Stable gingival margin with periodontal health 7 month follow up.

No 15 BP blade along bleeding points (Figure 4). Excised tissue was removed (Figure 5). Intraoperative tooth preparation was done (Figure 6) and measured distance between prepared restorative margin and underlying alveolar crest was less than 3 mm. Thus, bone reduction was required.

A full-thickness mucoperiosteal flap was raised (Figure 6). Osseous resection was performed using low-speed handpiece and carbide bur under copious saline irrigation to maintain biologic width (Figure 6). Interrupted sutures were placed (Figure 7). Immediately after surgery, provisional restoration was given to maintain aesthetics and to guide the contour of gingival tissue during healing but care was taken to ensure that its margins do not interfere with healing (Figure 7). Postsurgical instructions, medications with chlorhexidine mouthwash (0.2%) were given. Sutures were removed after 1 week (Figure 8). After six months, zirconia crown was placed till then retained with provisional crown (Figure 9).

DISCUSSION

Crown lengthening is one of the most common surgical procedures in periodontal practice. American Academy of Periodontology 2003 survey reported that approximately 10% of all periodontal surgical procedures are performed to achieve adequate crown length.³

Establishment of biologic width and preservation of sufficient keratinized gingiva are two main goals of crown lengthening. Gargiulo et al. 1961 defined biologic width as sum of junctional epithelium and supracrestal connective tissue attachment with dimension 2.04 mm where connective tissue attachment 1.07 mm and epithelial attachment 0.97 mm.⁴ Ingber et al. suggested adding 1 mm gingival sulcus depth coronal to 2 mm biologic width to achieve minimum extent of 3 mm between bone crest and restorative margin needed to allow proper healing and restoration of tooth.⁵ Biologic width maintenance is an integral part during restorative and prosthetic rehabilitations, to maintain optimal periodontal health and its violation results in

gingival inflammation, recession, pocket depth and bone resorption.⁶

Different treatment approaches are advocated to increase crown length as gingivectomy, apically repositioned flap with or without osseous reduction and orthodontic tooth extrusion. Gingivectomy is indicated when there is excess keratinized gingiva and underlying bone crest is at 3 mm or more from gingival incision level. If gingivectomy could lead to less than 3 mm of keratinized postoperative gingiva, then apically positioned flap without osseous resection should be considered as treatment approach. In cases where osseous level is less than 3 mm from level of gingival resection, apically positioned flap with osseous resection should be used to avoid postsurgical rebound of supracrestal gingival tissue.³ In our case, we performed crown lengthening using internal bevel gingivectomy with osseous reduction since there was adequate attached gingiva and violation of biologic width. As compared to external bevel incision, internal bevel incision preserves attached gingiva and more comfortable for patient as healing is by primary intention.

Gingival zenith is considered an important parameter for enhancing esthetics. According to Chu et al, gingival zenith position for central, lateral incisors, and canines was about 1 mm, 0.4 mm distally, and 0 mm, respectively and gingival zenith level for lateral incisors was approximately 1 mm coronal to gingival zenith position of central incisor and canine.⁷ A study by

Humagain et al. shows average gingival zenith position of 1.02 ± 0.20 mm for central incisor, 0.51 ± 0.22 for lateral incisor, and 0.15 ± 0.07 for a canine.⁸ Generally, width/height proportions of upper anteriors is around 80%. We applied all these esthetics parameters in our case to improve natural smile of patient.

Complete wound-healing after crown lengthening must be allowed to achieve optimal results. Any disruption of healing process leads undesirable consequences as periodontium continues to remodel and mature. According to Bragger et al. gingival recession can occur between 6 weeks and 6 months after surgery.⁹ Hence if final restorations are planned, recession might be observed during healing phase. So, final crown insertion can be done after complete wound healing, which may be after 6 months as we did in our case.^{3, 6, 9, 10}

Periodontal phenotype is a crucial factor, especially in aesthetic outcomes, as it impacts final position of gingival margin. According to Arora et al,¹⁰ greater tissue rebound at 6 months was for thick periodontal phenotype and suturing flap less than or equal to 3mm from the osseous crest was not in accordance to our case, as there was stable gingival margin on follow up (Figure 10).

Crown-lengthening is a good option for enhancing restorative therapy or esthetics. Therefore, coordinated interdisciplinary evaluation is necessary for successful outcome and patient satisfaction.

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