

SURGICAL CROWN LENGTHENING FOR ENHANCED ESTHETICS AND FUNCTION IN FULL MOUTH REHABILITATION: A CASE REPORT

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ABSTRACT

Full mouth rehabilitation is one of the most challenging treatment procedures in dentistry because it requires comprehensive diagnosis and systematic treatment planning to reach the best outcome that optimizes function, health, and aesthetics. Crown lengthening procedures have become an integral component of the aesthetic armamentarium. To utilize crown lengthening, understanding the concept of biologic width is of particular importance. Surgical crown lengthening plays a crucial role in creating a healthy and harmonious relationship of the gingiva and bone levels to gain sound tooth structure, which can be restored in cases of short clinical crowns. This article describes surgical crown lengthening for full mouth rehabilitation in a 26-year-old female patient with inadequate clinical crown height.

CASE REPORT

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INTRODUCTION

Tooth wear is a natural, dynamic, and inevitable process that consists of the gradual loss of dental hard tissue expressed in the alteration of crown surface morphology. It results from three main interacting mechanisms: attrition, abrasion, and erosion.^[1] Excessive occlusal wear can result in pulpal pathology, occlusal disharmony, impaired function, and aesthetic disfigurement.^[2] It is important to identify the factors that contribute to excessive wear and to evaluate the alteration of the vertical dimension of occlusion (VDO) caused by the worn dentition.^{[3],[4]}

Full mouth rehabilitation of the worn dentition presents the clinician with many

challenges and potential pitfalls.^[5] It includes a comprehensive treatment plan that fulfills occlusal, functional, and aesthetic parameters in maintaining the harmony of the stomatognathic system.^[2]

Garguilo et al reported mean dimensions of 0.69 mm for the sulcus depth, 0.97 mm for the epithelial attachment, and 1.07 mm for the connective tissue attachment. Accordingly, the sum of the epithelial and connective tissue measurements forms the biologic width, which is commonly stated to be 2.04 mm.^[6] It has been generally observed that, placing restorative margins within the biologic width frequently leads to gingival inflammation, clinical attachment loss, and

bone loss.^[7] Also, biologic width violation leads to gingival recession in thin tissue biotype and hyperplasia in thick tissue biotype.^[8] Therefore, a minimum of 3 mm of space between the restorative margin and crestal bone is considered to be prudent to adhere to in restorative treatment planning.^[9]

Crown lengthening is a surgical procedure that aims at the removal of periodontal tissue to increase the clinical crown height and re-establishing the biologic width. It is a procedure that helps to meet both restorative and aesthetic demands of the patient and may be accomplished with or without osseous resection.^{[8],[9]} Indications for crown lengthening include teeth with subgingival caries or shortened by extensive caries, fractures, wears, short clinical crowns with or without esthetic deficiencies, and teeth shortened by incomplete exposure of the anatomic crown.^[9]

The present case report demonstrates the use of full mouth crown lengthening to meet the functional and aesthetic demands of a patient with reduced vertical dimension.

CASE DESCRIPTION

A 26-year-old female patient reported to the Department of Periodontics with a chief complaint of generalized worn-out teeth which caused discomfort while eating food and compromised her smile. She also complained of a generalized sensitivity to hot and cold food/drinks. No parafunctional habits were reported. Her medical history was non-contributory.

On clinical examination, generalized worn out dentition with reduced clinical crown length, excessive gingival display, and collapsed bite was observed (figure I & II). No temporomandibular joint tenderness or soreness of the mastication muscles was noted. Periodontal examination revealed good oral hygiene with minimal plaque and calculus deposits, normal probing depths (3 mm or less), adequate width of attached gingiva, and no mobility of teeth. Gingiva was firm with

intact interdental papillae. Radiological examination revealed an adequate crown to root ratio.

After thorough prosthodontic and endodontic consultations and keeping aesthetic and functional goals in mind, the following treatment plan was formulated:

- Initial phase I therapy (scaling and root planing)
- Endodontic treatment of teeth having insufficient clinical crown structure
- Surgical crown lengthening (full mouth)
- Full mouth rehabilitation with porcelain-fused to metal (PFM) crowns after completion of endodontic and periodontal treatment procedures.

The patient was explained about the detailed treatment plan and informed consent was obtained. Accordingly, phase I periodontal therapy and endodontic treatment were performed followed by full-mouth surgical crown lengthening, which was carried out sextant-wise.

SURGICAL PROCEDURE

Adequate local anesthesia with a solution of 2% lignocaine with 1:80,000 adrenalin was administered. Transgingival probing was performed using a periodontal probe to ascertain the biological thickness and determine the height and position of the bone crest. Bleeding points were recorded. An internal/inverse bevel incision was made following the bleeding points, maintaining as much keratinized gingiva as possible, and reshaping interproximal papilla to facilitate a sound wound closure (figure III). Then, a crevicular incision was given followed by removal of tissue wedge with the help of a curette.

A mucoperiosteal flap was designed and elevated and bone was exposed to calculate the biologic width. A low-speed handpiece with carbide round bur under copious sterile saline irrigation was used to perform osseous reduction (osteotomy and osteoplasty) in such a way that an overall

distance of 3 to 4 mm between the gingival margin and the alveolar crest was achieved (figure IV & V). The flap was repositioned and interrupted sutures (silk 3-0) were placed.

At this time, it was observed that the maxillary labial frenum was exerting tension over the marginal gingiva causing its displacement during lip movement. This could endanger the long-term stability of the newly created gingival margins. Therefore, to relieve the frenal pull as well as to prevent impairment of post-surgical healing, a frenectomy was performed (figure VI).

Routine postoperative instructions were given. Medications included analgesics (Ibuprofen 400mg) for 3 days and chlorhexidine mouthwash (0.2%) for 2 weeks. Sutures were removed after 1 week and the surgical area was irrigated with an antimicrobial solution. Healing was uneventful. All the sextants were operated in a similar manner without any intraoperative and postoperative complications. After completion of full mouth crown lengthening, oral hygiene instructions were reinforced. At 1 month follow up, proper exposure of clinical crowns with increased crown height was observed; then the patient was referred to the Department of Prosthodontics for completion of full mouth rehabilitation with metal-ceramic crowns. Provisionalization was done 1 month postoperatively (figure VII) whereas; definitive prosthesis was delivered after 6 months (figure VIII).

DISCUSSION

The ultimate goal of crown lengthening is to provide a tooth crown dimension adequate for a stable dentogingival complex and the placement of a restorative margin, to achieve the best marginal seal and an aesthetically pleasing final restoration.^[10]

An important clinical parameter that should be considered during crown lengthening is the amount of attached gingiva. Studies have suggested that at least 2 to 3 mm of attached gingiva should be present to

maintain periodontal health.^{[11], [12]} In the present case, incisions were given in such a way that at least 3mm of the attached gingiva was preserved.

To satisfy the requirements of biologic width, several studies have been carried out to assess the minimal distances restorative margins must be from the bone crest to avoid deleterious effects.^{[9],[13],[14]} Ingber et al suggested that a minimum of 3mm was required from the restorative margin to the alveolar crest to permit adequate healing and restoration of the tooth.^[13] Wagenberg et al found that the length of the clinical crown, furcation locations, and esthetic considerations were the factors limiting the crown lengthening surgery and suggested a 5 mm distance from bone to the restorative margin.^[14] However, in the present case, a minimum of 3 mm of supracrestal tooth structure was obtained which was adequate for margin placement (supragingival, wherever possible).

Esthetic crown lengthening lays a lot of importance on the management of papilla. While performing surgery in the present case, the interproximal bone was carefully removed to maintain the anatomic structures so that the interproximal tissues are allowed to coronally proliferate and facilitate the papilla to replace the distance from the bone crest to the base of the contact area (about 5 mm or less), in accordance to the studies by Kois et al,^[15] Tarnow et al,^[16] Oliveira et al.^[17]

Initiation of final prosthetic treatment requires a waiting period of at least three months and possibly up to six months for aesthetically important areas, as the free gingival margin requires a minimum of three months to establish its final vertical position.^[18] Bragger et al evaluated periodontal changes in the healing phase after surgical crown lengthening and suggested delaying margin placement for six months following crown-lengthening surgery in areas of aesthetic concerns.^[19] Considering these

suggestions for the present case, the definitive prosthesis was delivered after six months of surgery. As the aesthetic, as well as functional goals, were successfully met, the patient was extremely satisfied with the treatment outcome.

CONCLUSION

Full mouth rehabilitation of worn out dentition requires a systematic

multidisciplinary approach to diagnosis and treatment planning. Surgical crown lengthening is a reliable and well-established treatment procedure for cases with short clinical crowns and worn-out dentitions with reduced vertical dimensions to achieve predictable functional and aesthetic outcomes.

FIGURES



Figure I: Generalized short clinical crowns

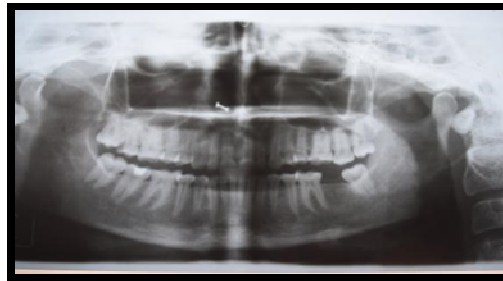


Figure II: Orthopantomograph showing adequate crown to root ratio



Figure III: Inverse bevel incision



Figure IV: Mucoperiosteal flap elevation to expose bone



Figure V: Distance of atleast 3mm between the gingival margin and alveolar crest after bone reduction



Figure VI: Flap repositioned and sutured; labial frenectomy done



Figure VII: Provisional prosthesis done 1 month postoperatively



Figure VIII: Full mouth definitive prosthesis

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