

Surgical crown lengthening: A case report

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Abstract

Objective: The present case report shows a surgical crown lengthening procedure as a treatment on a vertical crown fracture on a 47-years-old woman.

Methods: A 47 years old woman come to periodontics department as referred by conservative dentistry department with a tooth fracture on the second upper right premolar. Intraoral examination shows a crown fracture reaches until under the cemento enamel junction area. Periapical radiograph shows non-hermetic obturation. No extra oral anomaly was found. The retreatment of the tooth was done by the conservative dentistry then the surgical crown lengthening was done

after the retreatment and the final restoration was done 3 months post-operative.

Results: Proper identification and analysis of the problem playing the main role to achieve a satisfying outcome. The position of the gingival tissue, alveolar bone height, and clinical crown length are the determinant factor for identifying the problem.

Conclusion: There is a significant relationship between restorative dentistry and periodontal health. Predictable long-term successful restoration requires a good combination between the restorative principles and the correct management of the periodontal tissue.

Keywords: Biological width, Crown lengthening, Functional restoration
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Introduction

The relationship between periodontal health and the restoration of teeth is intimate and inseparable. Although it is widely accepted that the best restorative margin is one that is placed coronal to marginal tissue, most restorations have margins in the gingival crevice, and permanent tissue damage is common.¹

Gottlieb initially described that the “epithelial attachment” around the natural tooth covering distinct areas of the enamel surface of the cementum and is not just attached to the cement enamel junction at a certain point or level, later on, these findings have been confirmed by Orban & Muller.²

This procedure often employs some combination of tissue reduction with or without an osseous surgery for the purpose to expose tooth structure.^{3,4} 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.³

Biologic width (BW) is defined as the physiologic dimension of the junctional epithelium and connective tissue attachment, according to the pioneering study conducted by Gargiulo et al. In this study, the authors demonstrated that humans, on average, show a connective tissue attachment of 1.07 mm, above the alveolar bone crest, and a junctional epithelium, below the base of the gingival sulcus, of 0.97 mm. The combination of these two measurements constitutes the biologic width is 2.04 mm in average.^{1,4,5}

That an additional 1mm might be coronally added to the 2mm 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.⁵ Other literature suggests that the amount of tooth structure exposed above the osseous crest should be around 4-5 mm to provide a stable dentogingival complex and biological width to permit proper tooth preparation and a good marginal seal with retention for both provisional and final restoration.⁴ Therefore, the present case report shows a surgical crown lengthening procedure as a treatment of a vertical crown fracture on a 47-year-old woman.

Case Report

A 47-year-old woman came to Periodontics Department who was referred by Conservative Dentistry department with a tooth fracture on tooth 15. Intraoral examination showed a vertical crown fracture on tooth 15 extending to below cemento-enamel junction area. The periapical radiograph showed non-hermetic obturation and no extraoral anomaly was found on the patient.

At the first visit, we recorded the full condition of the periodontal status of the patient. Then, scaling and root planning was performed and oral hygiene procedure was given to the patient. After a few visits for the periodontal treatment, the healthy periodontal condition was achieved [Figure 1](#). Then, the patient was scheduled for the crown lengthening surgery procedure.

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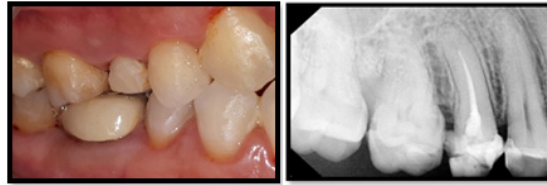


Figure 1. Preoperative view and intra oral periapical radiograph of tooth 15.

Crown Lengthening Surgical Procedure

Before the surgery patient was given an aseptic procedure extra and intraoral with a 2% povidone-iodine. The procedure was carried out under local anesthesia (articaine 4% with epinephrine 1: 100,000). The bone sounding was performed to reconfirm the location of the biological width. Intra sulcular incision was given on the buccal and palatal aspect and the periosteal releasing incision was given with the help of periosteal elevator to procedure a tension-free flap **Figure 2**.

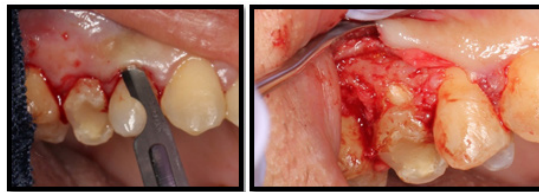


Figure 2. Intrasulcular incision and reflection of the flap was given on tooth 15.

The root surfaces and the rest of epithelial tissue were mechanically treated with the use of curettes and the bone sounding procedure was performed again to reconfirm the position of the cemento enamel junction (CEJ) to the crest of the alveolar bone **Figure 3A** and **Figure 3B**. Resective osseous procedure was performed with the combination of osteotomy and osteoplasty on the buccal and palatal aspect of the tooth. The bone sounding procedure was performed again to reconfirm the new level of the bone position. Then interrupted suture was performed using 5-0 nylon to suture the flap to the original position and the temporary crown was a place **Figure 4A** – **Figure 4C**.



Figure 4. A Resective osseous procedure, B. Bone sounding procedure after resective osseous procedure, C. Temporary crown

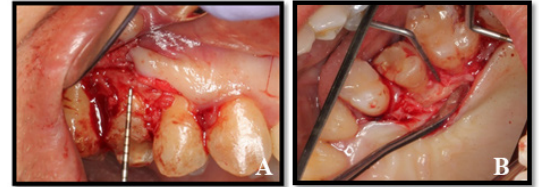


Figure 3. Bone sounding procedure, A. On the buccal aspect, B. On palatal aspect

Postoperative care

The patient was instructed not to disturb the surgical site in any way until the sutures were removed. Other post-operative instructions were also given. The patient was advised to take antibiotics & analgesics for 7 days postoperatively (Amoxicillin 500mg & Mefenamic Acid 500mg). Use of 0.12% chlorhexidine rinse was also advised. Two weeks postoperatively the sutures were removed. Healing was satisfactory and a no sensitive pain was reported. Recall after 6 months revealed stable results and the final prosthesis was delivered **Figure 5A** – **Figure 5B**.

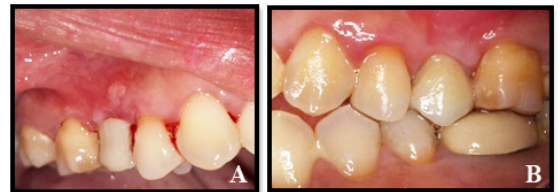


Figure 5. Clinical view, A. 2 weeks post-operative, B. 6-month post-operative show a good final prosthesis margin adaptation and a good gingiva margin

Discussion

There are two primary indications for clinical crown lengthening surgery. The first one is an aesthetic indication for increasing the length of clinical crowns. The second indication, and the most common, as practice shows, is the positioning of the tooth preparation border supragingival or gingivally, to avoid the negative impact of dental restorations on the biological width, resulting in chronic inflammation of the periodontium around the applied prosthetic restoration.^{6,7}

Crown lengthening treatment is based on two principles: the establishment of BW and maintenance of adequate keratinized gingiva (KG) around the tooth. The BW is defined as the dimension of soft tissue that is attached to the portion of the tooth coronal to the alveolar bone crest. Studies show that a minimum of 3 mm of space between restorative margins and alveolar bone would be adequate for periodontal health, allowing for 2 mm of BW space and 1 mm for sulcus depth. Whenever

possible, an adequate width of KG (≥ 2 mm) should be maintained around a tooth for gingival health. According to Nevins and Skurow, when subgingival margins are indicated, the restorative dentist must not disrupt the junctional epithelium or connective tissue apparatus during preparation and impression taking.^{8,9}

The case discussed here is an endodontically treated upper premolar tooth which lacks sufficient clinical crown structure requires restoration with a crown, supported and retained by a post and core system. Therefore, in this case, post and core preparation is used together with clinical crown lengthening for better prognosis of the zirconia crowns. 5mm of apical GP was left after creating the post space with peeso reamers, to maintain the proper apical seal and eliminate chances of microleakage or percolation (by blocking of lateral canals in the apical delta region). Furthermore, in this case, surgical crown lengthening procedure performed to avoid any violation of biological width that can have various effects to the periodontium leading to gingival inflammation, loss of attachment and alveolar bone resorption. Hence, proper identification and analysis of the problem play a main role to achieve a satisfactory outcome. The position of the gingival tissue, alveolar bone height, and clinical crown length are the determinant factor in identifying the problem.¹⁰

Conclusion

There is a significant relationship between restorative dentistry and periodontal health. Predictable long-term successful restoration requires a good combination between the restorative principles and the correct management of the periodontal tissue.

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Conflict of Interest

The authors report no conflict of interest

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