Combined Periodontal and Esthetic Approach in Restorative Crown Lengthening

Garima Singh, Shankar T Gokhale, Sidharth Shankar, Kausar Parwez Khan, Priya Saxena

ABSTRACT

Few of the conditions like deep subgingivally located carious lesions, crown and root fractures, pre-existing deep preparation margins are unfavorable for successful restorative procedures. In such situations, surgical lengthening of the clinical crown will improve the anatomical conditions and facilitate restorative procedures. Gingivectomy with ostectomy/osteoplasty procedure enables the positioning of the alveolar crest at a distance upto 2 to 3 mm from the future reconstruction margin and leads to stable periodontal tissue levels over a period of 6 months. When combined with frenotomy meets at relocating the frenal attachment so as to create a zone of attached gingiva between the gingival margin and the frenum.

Keywords: Crown lengthening, Frenectomy/Frenotomy, Gingivectomy, Ostectomy/Osteoplasty.


Source of support: Nil
Conflict of interest: None

INTRODUCTION

Crown lengthening involves the surgical removal of hard and soft periodontal tissues to gain supracrestal tooth length, allowing for longer clinical crowns and maintenance of biological width. Crown lengthening procedures are required to solve problems, such as (1) inadequate amount of tooth structure for proper restorative therapy, (2) subgingival and subcrestal location of fracture lines, and (3) subgingival location of carious lesions. The techniques used to accomplish crown lengthening include (1) apically positioned flap procedure including osteoplasty and ostectomy, and (2) forced tooth eruption with or without fiberotomy.

The interplay of periodontics and restorative dentistry is present at many fronts including the response of the gingival tissue to the restorative preparations. Dental restorations and periodontal health are inseparably interrelated.

With the increasing popularity of esthetic-oriented treatment, an understanding of the therapeutic synergies brought about a multidisciplinary approach has developed. As a result, crown lengthening procedures have become an integral component of the esthetic armamentarium and are utilized with increasing frequency to enhance the appearance of restorations placed within the esthetic zone.

A frenum is a fold of mucous membrane, usually with enclosed muscle fibers, that attaches the lips and cheeks to the alveolar mucosa and/or gingiva and underlying periosseous. A frenum may create tension on the gingival margin (frenal pull) concomitant with or without gingival recession. This condition may be conducive to plaque accumulation and inhibit proper brushing of the teeth.

A stable, healthy gingival margin and adequate exposure of the clinical crown is mandatory prior to crown preparation. This is necessary to prevent the exposure of the crown margin and root surface after the crown is placed. To deal with these aspects there are many innovative forms of therapies of periodontal minor surgeries which may be used to improve the crown stabilization, to stabilize the results and enhance the esthetics.

Crown lengthening procedures enable the dentist performing the restoration to develop an adequate area for crown retention without extending the crown margins deep into the periodontal tissues, referred to as the biologic width. The term biologic width is used to describe the junctional epithelium and connective tissue that attach to the root surface. Studies have indicated that the average lengths of the connective tissue attachment and junctional epithelium are 1.07 and 0.97 mm, respectively. Therefore the average length of the biologic width is about 2 mm. If the restorative margin is placed into this area, the crestal bone will be lost to re-establish the biologic width.

Clinical crown-lengthening procedures include gingivectomy, an apically positioned flap (APF), an APF with osseous reduction, forced eruption combined with surgery, and forced eruption combined with fiberotomy.

A gingivectomy technique can be used to eliminate the tissue that forms the pocket or sulcus wall; such tissue may be overgrown (gingival pocket) and may interfere with the intended restorative procedures. Removal of the tooth-
Combined Periodontal and Esthetic Approach in Restorative Crown Lengthening

The purpose of this paper is to present a case with inadequate amount of tooth structure for prosthetic crown placement with high frenum attachment. This case was treated by gingivectomy with ostectomy and frenotomy.

CASE REPORT

A 19-year-old female patient referred to the department of periodontology in need of crown lengthening of right maxillary central incisors. Patient gave history of having sustained fractured maxillary central incisor 1 month back following road traffic accident, for which she had to undergo root canal treatment immediately.

The patient’s medical history was nonsignificant for major conditions or allergies and free of contributory factors (e.g., systemic disease), making her an ideal surgical candidate. After discussion with the restorative dentist, esthetic crown-lengthening was recommended to allow a healthy, optimal relationship between the teeth and the periodontium.

Intraoral examination (Figs 1A and B) and radiograph (Fig. 2) revealed that the Ellis class III fracture of tooth 11, had been treated endodontically. Periodontal examination revealed good oral hygiene with minimal plaque and calculus deposits. The gingiva was pink and firm, and the papillae were intact. Clinical examination revealed shallow probing depths, no mobility, inadequate amount of keratinized attached gingival of 11 on the buccal aspect and palatal aspect and tension on the gingival margin due to high labial frenum attachment.

To start, thorough scaling was done followed by oral hygiene instructions. After 3 to 4 weeks of initial therapy patient was recalled for next phase of surgical procedure aiming to do crown lengthening. On the labial side an inverse bevel incision was given on 11 and extending out to 21 (Figs 3A and B) to maintain symmetry of gingival margins among the central incisors, by using Bard Parker blade (No.15), thereby considering the esthetic value of the smile.

On the palatal aspect inverse bevel incision was given limiting its extent to 11 and at the same time an effort was made to retain scalloped margin using a Bard-Parker blade (No. 15). A full thickness mucoperiosteal flap including palatal gingiva and alveolar mucosa was raised by means of a mucoperiosteal elevator. The marginal collar of tissue, including pocket epithelium and granulation tissue, was removed with curettes, and the exposed root surfaces are carefully scaled and planed (Fig. 4).

The alveolar bone crest was contoured (ostectomy) with the objective of recapturing the normal form of the alveolar process, i.e. positive architecture but at a more...
apical level. The osseous surgery was performed labially, palatally and interproximally using carbide burs with external irrigant and every effort was made to meet the requirement of biologic width (Figs 5A and B). Following careful adjustment, the labial and palatal flap was sutured to the level of the newly recontoured alveolar bone crest (Fig. 6).

A frenotomy scissor incision was given over the labial frenum (Fig. 6). Finally sutures were given at the frenum to prevent relocating of the fibers (Fig. 7). And over that a periodontal dressing (Coe-Pak®) was placed (Fig. 8). Antibiotics (amoxicillin 500 mg tid for 5 days) and analgesics (Diclofenac sodium 50 mg bid for 3 days) were prescribed. After 24 hours 10 ml chlorhexidine gluconate rinse 0.2% bid was advised for 2 weeks, and the patient was given appropriate postoperative instructions.

The sutures were removed after 7 days and the surgical site was irrigated with saline. The healing of the surgical site was quite uneventful and satisfactory (Fig. 9). After 3 months, the apical displacement of the free gingival margin was 3 mm (Figs 10A and B).

Final preparation of the teeth began a half year later, to confirm the final position of gingival margin following postsurgical recession. Care was taken to ensure that the margins of the temporary crown were smooth and closely adapted to ensure gingival health. Final cementation of the crowns was performed after 6 months.
DISCUSSION

There is a significant relationship between restorative dentistry and periodontal health. Deeper subgingival margins, especially those encroaching the junctional epithelium, and placed near alveolar bone cause the gingival inflammation, loss of connective tissue and bone resorption. Thus, periodontal surgery is recommended to support restorative dentistry for allowing long clinical crowns and re-establishment of biological width.

The concept of the biological width stems from histologic description of the dentogingival complex by Gragious et al (1961). He concluded the mean total length of the dentogingival complex was 2.73 mm. Rosengren et al (1980) combined epithelial and connective tissue attachment of 2 mm with 1 to 2 mm for the restorative finish line, resulting in a recommendation of 3.5 to 4.0 mm. Wagenberg et al. 1989 suggested that at least 5.0 to 5.25 mm of tooth structure should be above the osseous crest.

There is significant marginal tissue rebound following crown lengthening surgery that has not fully stabilized by 6 months. The amount of coronal rebound appears to be related to the position of flap related to the alveolar crest at suturing. These findings support the premise that clinicians should establish proper crown height during surgery without
over reliance on flap placement at the osseous crest to gain necessary crown length.\textsuperscript{10}

After the surgical clinical crown-lengthening procedure, the provisional restoration must be readapted. A waiting period of 12 weeks has been suggested prior to starting the final restoration, although Bragger et al reported no change in attachment levels or probing depths after 6 weeks of healing. However, due to the possibility of recession, Bragger et al (1992) recommended a waiting period of 6 months for areas that held esthetic concerns.\textsuperscript{11}

Alveolar bone loss caused by inflammatory periodontal disease often results in an uneven outline of the bone crest. The purpose of osteoplasty is to create a physiologic form of the alveolar bone without removing any 'supporting' bone. Osteoplasty therefore is a technique analogous to apically positioned flap surgery. Patients not receiving adjunctive antibiotic therapy, apically positioned flap surgery with osseous recontouring is more effective than apically positioned flap surgery without osseous recontouring in reducing periodontal pocket depth and levels of major periodontal pathogens.\textsuperscript{12}

Crown lengthening involves the surgical removal of hard and soft periodontal tissues to gain supracrestal tooth length allowing for longer clinical crowns and re-establishment of the biological width. A human study to evaluate the positional changes of biologic width, following surgical crown lengthening, showed that biological width was reestablished to its original vertical dimension by 6 months.\textsuperscript{13}

**CONCLUSION**

There is a significant relationship between restorative dentistry and periodontal health. Periodontal surgery is recommended to support restorative dentistry, maintaining esthetics and improve long-term prognosis. Surgical crown lengthening should be the most immediate and common approach, since, it will expose the sound tooth structure immediately after surgery.

Surgical crown lengthening done with gingivectomy, the bone level can be lowered to allow for the placement of the prosthetic margin. This surgical approach accomplishes the goal of re-establishment of the biological width with a permanent apical shift of the alveolar crest and the gingival margin. Crown lengthening with frenotomy improved patient compliance by avoiding a second surgical exposure. Thus, stable margins are achieved exposing tooth structure for restorative therapy.

**REFERENCES**