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Citation

Abstract
The successful integration of periodontal and restorative dentistry for natural teeth requires knowledge and application of both mechanical and biological principles. While some restorative margins need to be placed at or below the margin of the free gingiva, this should be considered as a compromise and margins should not be placed more than 0.5 mm into a healthy gingival sulcus. Approximately 2-3 mm of healthy, natural supra-alveolar tooth surface is needed for attachment of the gingival tissues to the tooth. This dimension is called the biological width. If adequate biological width does not exist, surgical or orthodontic procedures to expose healthy tooth structure are recommended before final restorations are placed. This article explains the use of electrosurgery for the conservative crown lengthening of fractured tooth.

INTRODUCTION
The importance of periodontal tissue health for restoration of defected teeth or dental arches is often underestimated. It is necessary to prepare the periodontal tissues before restorative treatment to ensure good form, function and esthetic of masticatory apparatus and patient comfort. To maintain healthy periodontal tissues, the attached gingiva and biologic width must be considered. The biologic width is the distance established by the junctional epithelium and connective tissue attachment to the root surface of a tooth (1,2). This distance is 2.04 mm (on average), of which 1.07 mm is occupied by the connective tissue attachment and another approximate 0.97 mm being occupied by the junctional epithelium. Impinging biologic width may cause periodontal tissue destruction (3,4). Therefore, in crown lengthening, the position of the margin is important.

In addition to removing 2 mm of bone to establish a proper biologic width, another 2 mm should be removed to reveal enough tooth structure to allow for a 2 mm ferrule (5). A ferrule, in respect to teeth, is a band that encircles the external dimension of residual tooth structure. It has been shown to significantly reduce the incidence of fracture in the endodontically treated tooth (6).

If there are less than 2 mm from restoration’s margin to marginal bone clinical crown lengthening possibility should be considered in dental treatment plan (7,8). The choice depends on relationship of crown-root-alveolar bone and esthetical expectations (9). The clinical tooth crown could be lengthened surgically or combining methods of orthodontic eruption and surgery. Surgical removal of soft tissue with a scalpel is a commonly used method but is associated with excessive blood flow and inadequate visibility. On the contrary, electrosurgery is a controlled, precise application of heat to the soft-tissue site achieved by means of carefully designed electrodes (10-12). This procedure contours the gingival tissue. This correction of tissue morphology reduces plaque and calculus retention and creates a physiologically healthy gingiva.

ELECTRO-SURGERY - A NOVEL METHOD FOR CROWN LENGTHENING SURGERY
There are two basic types of electrosurgery units-Monopolar and Bipolar. In monopolar electrosurgery units, the current begins with the electrosurgery device and travels along a wire to the oral site then to an indifferent plate placed behind the patient’s back. As the surgical electrode contacts the patient’s oral soft tissues, heat is produced and controlled cutting is achieved. Crown lengthening with monopolar electrosurgery produces pain and smoke thus necessitating the use of anesthetic. Bipolar electrosurgery devices have two electrodes on the cutting tip. The current flows from one electrode to the other, making a broader cut than does the
monopolar unit, but eliminating the need for the indifferent plate. In this case report monopolar electrosurgery unit is used.

The margin of the provisional restoration should not hinder healing before the biologic width is established by surgical procedures. Therefore, a restorative treatment should be initiated after 4-6 months.

**CASE REPORT**

An 18-year-old male patient reported to the department of conservative dentistry and endodontics at Prabhu Dayal Memorial (PDM) dental college and research institute, Bahadurgarh, Haryana, India with the chief complaint of fractured maxillary right lateral incisor due to trauma. Clinical examination showed transverse fracture of crown portion of the tooth (Fig.1). Clinically, the fracture line was supra gingival on labial aspect and sub gingival on palatal aspect. On probing 3 to 4mm pseudo pocket was present on palatal aspect. Intra oral periapical radiograph showed complete formation of the apex of the lateral incisor. No fracture line was observed in other incisors. The remaining coronal portion of the fractured tooth on labial aspect was only 1mm and was found to be insufficient for the retention of prosthesis. Endodontic therapy was carried out immediately (Fig.2).

**Figure 1**

Fig.1: Intraoral periapical radiograph of fractured maxillary right lateral incisor

**Figure 2**

Fig.2: Fractured maxillary right lateral incisor (12)

Considering the age of the patient, following treatment options were discussed:

Extraction of fractured tooth, followed by replacement with interim removable prosthesis. Final prosthesis will be either

Implant or Bridge.

Conservative management through endodontic therapy, crown lengthening procedure and restoration using fibre post, composite buildup and ceramic prosthesis.

The second option was chosen as the line of treatment.

PROCEDURE

Local anesthesia was given by infiltration in labial sulcus and palate. A primary incision is made against the alveolar crest using #15 blade along the gingival surface (Fig.3).

Figure 3

Fig.3: A primary incision made against the alveolar crest using #15 blade along the gingival surface

A #12 blade was used to make secondary incision from the gingival sulcus to alveolar crest. A third incision is made with an Orban interdental knife and follows the morphology of alveolar crest and the collar of tissue is removed as one mass (Fig.4).

Figure 4

Fig.4: A #12 blade is used to make secondary incision from the gingival sulcus to alveolar crest and the collar of tissue is removed as one mass

This was followed by removal of excessive soft tissue on labial and palatal aspect using electrosurgery unit (Bonart Art Electrosurgery Unit, Bonart Medical Technology Inc.) (Fig.5,6). In this study monopolar electrosurgery unit was used. Current used in electro-surgery unit is fully rectified filtered (0.9 amperes, 230 volts, at 1.5-1.7MHz working frequency) and the electrode tip cuts but does not drag. After removal of excessive soft tissue, slight rounding of interdental bone is done on mesial and distal aspect with round bur without disturbing the supporting bone. This much osteoplasty is sufficient for exposing 3 mm of the sound tooth structure coronal from the alveolar crest along the tooth circumference. This was followed by suturing the operated area and coe-pak(GC company,USA) application (Fig.7,8). Patient was recalled after a week and coe-pak followed by sutures was removed. Electrosurgery unit along with tips is shown in fig-8.

Figure 5
Fig.5: Use of electrosurgery electrode for gingivectomy

Figure 6
Fig.6: Electrosurgery unit along with tips

Figure 7
Fig.7: Suturing the operated area

Figure 8
Fig.8: Coe-pak applied to the operated area

Fabrication of fiber post and porcelain fused to metal crown

Afterward, the gutta percha was removed with Gates drills (Antaeos, VDW GmbH, Munchen, Germany) without enlarging the canal. At least 3–5 mm of gutta percha was left at the apex of the root. The depth of the prepared canal was measured using a periodontal probe, and the root canal drilled according to general principles until it measured the estimated depth required for the post. The inside of the root was rinsed and dried carefully, and the working area was isolated from moisture by cotton plugs.

The root canal walls were etched with 37% phosphoric acid for 15 seconds, washed with spray, and then air dried. The excess water was removed from the post space using paper

points. Subsequently, two consecutive coats of bonding agent (Single Bond 2, 3M ESPE, St Paul, MN, USA) were applied with a micro-brush and air dried, and then cured with LED light source of 1000 mW/cm² intensity (Elipar Free Light 2, 3M ESPE, St. Paul, MN, USA) for 20 seconds. To fit with the diameter of the canal, an EverStick Post (Stick Tech Ltd, Turku, Finland) with a diameter of 1.2 mm was used. The post was inserted into the root canal to the appropriate depth, and the coronal section of the post was then shortened to an appropriate length with sharp scissors.

Prior to cementation, a layer of light-curing resin adhesive was applied to the surface of the post by gently blowing the surface of the post with dry, oil-free air and curing with light for 10 seconds. After checking the fit of the glass fiber post inside the root canal, the post was also light cured for 20 seconds.

Dual-resin cement (Rely X Unicem, 3M ESPE, Seefeld, Germany) was used as a luting agent for the glass fiber post. The cement was applied with a lentulo spiral into the post space. The fiber post was immediately inserted into the post hole to the base of the prepared channel and light-cured from different positions for 2 minutes. Excess resin cement was removed with a clean micro-brush and the cement was light cured for 40 seconds. Core build up was done with dual core composite resin. Patient was recalled after 6 weeks and tooth restored with porcelain fused to metal crown (13) (fig .9).

Figure 9
Fig.9: Final restoration by porcelain fused to metal crown

Electro-surgery has several applications in almost all branches of dentistry, but this technique is not very widely used. Electrosurgery has always had serious limitations in the oral cavity. Some problems included its inability to touch bone or metal, high heat and current spread, the need for a grounding pad, and the fact that it cuts by an advancing spark. These limitations have limited its acceptance by many general dentists and almost a complete avoidance by periodontists and oral surgeons. Regular users of Electrosurgery know from experience, that when Electrosurgery is applied according to principles, predictable and good wound healing can be achieved. Electrosurgery can never completely replace the scalpel but although Electrosurgery requires more knowledge and skill, the advantages out number and outweighs its disadvantages.

References
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