Crown Lengthening Procedure: Report of Two Cases

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Abstract
Crown lengthening is a surgical procedure designed to increase the extent of the supragingival tooth structure, so that the clinician can restore the tooth. Crown lengthening procedure is done to maintain normal biologic width and increase crown length for retention of prosthesis. Various techniques have been proposed to perform CLP, such as gingivectomy, undisplaced flap with or without osseous reduction, apically repositioned flap with or without bone reduction, and orthodontic forced eruption with or without fibrotomy. Selection of one of this CLP technique depends upon esthetics, clinical ratio of crown to root, structure of root, location of furcation, position of tooth and the capacity of the tooth to be restored. This case report illustrate two different methods of doing crown lengthening procedure the selection of case depends upon various soft tissue and hard tissue parameters. Owing to the various advantages, disadvantages and associated limitation with different methods, we opted for surgical CLP with scalpel method. Uneventful healing was observed in both our cases. No post-operative complications was observed in both cases. Thus to conclude success rate of CLP is high but appropriate selection of case is required. In our case report both the methods of CLP shows significant result in increasing the crown length and maintaining the biological width.

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INTRODUCTION

American Academy of Periodontology Practice Profile Survey in 2003 said that crown lengthening procedure (CLP) is one of the most commonly performed periodontal surgery. (American Academy of Periodontology, 2003) In CLP it is often essential to gain both adequate resistance and retention form by achieving supracrestal tooth length (Palomo and Kopczyk, 1978; Lundergan and Hughes, 1996; Rosenberg et al., 1980, 1999). Re-establishment of the biologic width is achieved to avoid impingement of restoration margins on the attachment apparatus. (Carnevale et al., 1983; Oakley et al., 1999)

Various techniques have been proposed to perform CLP, such as gingivectomy, undisplaced flap with or without osseous reduction, apically repositioned flap with or without bone reduction, and orthodontic forced eruption with or without fibrotomy. Selection of one of this CLP technique depends upon esthetics, clinical ratio of crown to root, structure of root, location of furcation, position of tooth and the capacity of the tooth to be restored. (Anoop, 2018)

(Garguilo, 1961) described the biologic width as “the zone of the root surface coronal to the alveolar crest to which the junctional epithelium and connective tissue are attached” which is approximately 2.04 mm. The dimension of the biologic width can
vary based on the position of a tooth, from tooth to
tooth, and from surface to surface on the same tooth.
Crown margins which are located below gingiva can
cause inflammation of gingiva leading to damage
of biologic width, whereas crown margins present
supra-gingivally did not cause gingival inflamma-
tion. (Ganji and John, 2012)

Thus, CLP must be done so as to allow easy restora-
tive treatment of the teeth which have short crown
length. CLP also results in access for appropri-
ate restorative measures having deep subgingival
pathologies by giving adequate retention form.

This case report describes two methods of crown
lengthening procedures in which normal biologic
width is maintained and crown length is increased
for retention of prosthesis.

Case 1
A 24-year-old systemically healthy male patient
was referred to the department of Periodontics for
crown lengthening procedure with #46. Patient
had undergone endodontic treatment with #46 in
department of Conservative dentistry, 1 week prior.
Tooth had 1–2 mm PPD on mid-lingual surface and
2-3 mm in mid-mesial, mid-distal and mid-buccal
region. CAL was 1–2 mm on mid-lingual surface and
2-3 mm in mid-mesial, mid-distal and mid-buccal
region. Tooth was firm with no involvement of furca-
tion area. Clinical crown length was 2 mm on the lin-
gual side (Figure 1) and on mesial, distal and buccal
side it is 4-5mm. IOPA showed a normal interproxi-
mal bone level (Figure 2), and adequate root length.
On the bases of CAL and radiograph, the amount
of bone present was estimated to be 85% – 90 %.
Prognosis of tooth # 46 was determined to be fair.
Overall prognosis was good with mild chronic gingi-
val inflammation. Oral prophylaxis was done includ-
ing scaling and polishing. Patient was instructed for
proper oral hygiene measures and further, patient
was appointed for CLP.

Surgical procedure
Under local anesthesia (Rathi et al., 2019; Pawar
et al., 2017) a crevicular incision was made on the
buccal and the lingual side of tooth # 46. Full thick-
ness flap reflection was done on both sides (Fig-
ure 3). To maintain a biologic width post-operatively
(during crown placement), 3–4 mm osseous reduc-
ton on the lingual side was made with the help
of micromotor and round carbide bur with 0.23
mm diameter (HM1T-023) under copious irrigation
of normal saline (Figure 4). Following the proce-
dure, desirable crown length was achieved. After
attaining haemostasis, flaps were positioned api-
cally using interrupted and periosteal sutures at api-
Table 1: Different instruments by which CLP is done their advantage and disadvantage.

| Instrument  | Advantage                  | Disadvantage                                                                 |
|-------------|----------------------------|-------------------------------------------------------------------------------|
| Scalpel     | Readily available          | Time consuming                                                               |
|             | Easy Handling              | Bleeding during and after surgery.                                            |
| Electrocautery | Less time consuming   | If cautery touches bone it can cause damage to root and bone                  |
|             | Less bleeding              | expensive equipment                                                           |
|             |                            | Skilled professionals.                                                        |
| Laser       | Less postoperative complica- | Need for additional education (especially in physics).                        |
|             | tions                     | Expensive equipment                                                           |
|             | Less discomfort            | Not readily available in market                                               |
|             |                            | Do not eliminate the need for anaesthesia.                                    |
|             |                            | Implementation of safety measures                                            |

Figure 4: Osseous reduction.
Figure 5: Sutures placed.
Figure 6: Suture removal done after 7 days.
Figure 7: Clinical crown length.
Figure 8: Pocket marked with pocket marker.

Figure 9: Incision given.

Figure 10: Normal festooned pattern of gingiva produced.

Figure 11: Placement of periodontal pack.

Figure 12: Follow up after 7 days.

Periodontal pack and suture removal was done after 7 days of surgery (Figure 6). Post-operative evaluation after 7 days revealed uneventful healing and 4 mm of desirable crown length with tooth # 46, sufficient for crown placement. Patient's re-evaluation was done after 21 days to check for complete healing. Furthermore, patient was referred to department of Prosthodontics after 12 weeks (Oakley et al., 1999; Reddy et al., 2019) for placement of PFM crown with 46.

Case 2

A 25-year-old male patient was referred to the department of Periodontics for crown lengthening procedure with #16. On intra-oral examination, it was observed that endodontic treatment was performed with tooth #16. Tooth had 3-4 mm PPD on the mid-palatal surface (Figure 7) and 2-3 mm in mid-mesial, mid-distal and mid-buccal region. Tooth was firm with no involvement of furcation.
area. CAL was 1–2 mm on mid-palatal surface and 2–3 mm in mid-mesial, mid-distal and mid-buccal region. Clinical crown length was 2 mm on the palatal side (Figure 1) and on mesial, distal and buccal side it is 4-5mm.

Reduction of only soft tissue was indicated in this case as there was adequate attached gingiva and more than 3 mm of the soft tissue was present above the crest of the bone.

Under local anesthesia the pocket on palatal side was marked with the help of pocket marker (Figure 8). Incision with blade no # 15 was given starting 1 mm apical to the marking and is directed coronally to the point between the base of the pocket to the crest of the alveolar bone (Figure 9). The incision given was close to the crest of bone but did not expose it (Figure 10). Soft tissue above the bone was removed. Adequate crown length for prosthetic replacement, considering the biologic width was achieved. Periodontal pack was given to protect the raw wound (Figure 11).

Periodontal pack removal was done 7 days after surgery. Post operative evaluation after 7 days (Figure 12) revealed uneventful healing and 4 mm of desirable crown length with tooth # 16. Patient’s re-evaluation was done after 21 days to check for complete healing. Furthermore, patient was referred to the department of Prosthodontics 12 weeks post-operatively for placement of PFM crown with # 16. (Oakley et al, 1999)

**DISCUSSION**

The concept of CLP was given by D.W. Cohen (1962). (Pawar et al., 2017) The purpose of CLP is to avoid the violation of biologic width that may occur due to placement of subgingival margin of crown in order to get adequate retention form in short clinical crown cases. Violation of biologic width results into injury to the periodontium, leading to inflammation of gingiva, loss of attachment level and resorption of bone. (Reddy et al., 2019)

The objective of CLP is to provide sufficient clinical crown for tooth restoration. The indications of CLP are subgingival fracture, naturally short clinical crown due to non-exposure of anatomic crown, teeth shortened by extensive caries or fracture and subgingival/ root caries. (Gupta et al., 2015)

In a clinical and radiographic study, it was seen that surgical extrusion technique have few advantages over the other conventional CLP techniques like preservation of the position of gingival margin and interproximal papilla. (Nethravathy et al., 2013) However, (Andreasen, 1970) reported that surgical extrusion can cause marginal bone loss and apical root resorption.

CLP can be carried out by various instruments such as scalpels, cautery and lasers which have their own advantages, disadvantages (Table 1). (Ashwini et al., 2018; Kelman et al., 2009)

Owing to the above mentioned advantages, disadvantages and associated limitation with different methods, we opted for surgical CLP with scalpel method. Uneventful healing was observed in both our cases. No post-operative complications was observed in both cases.

**CONCLUSIONS**

When a crown placement is to be done, the maintenance of an intact, healthy periodontium and appropriate crown length is necessary to maintain the tooth. CLP is practical to perform which facilitate restorative therapy and improves the esthetic appearance. Success rate of CLP is high but appropriate selection of case is required. In our case reports, both the cases showed significant result in increasing the clinical crown length while maintaining the biological width post crown placement.

**Conflict of interest**

The authors declare that they have no conflict of interest for this study.

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