

Original Research Article

Patient-customized Site Specific Crown Lengthening

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Abstract: Short clinical crowns result in poor retention form and thereby leads to improper tooth preparation and ultimately failure of restoration. The purpose of this case report was performing patient customized site specific surgical crown lengthening of grossly decayed tooth structure in left mandibular 2nd premolar area. The tooth was root canal treated with width of keratinized gingiva about 2mm on buccal side, with fibrotic gingival enlargement on interdental area and lingually. Apically displaced flap on buccal side with osseous resection of 3mm and undisplaced flap on interdental and lingual side with osseous resection of 3mm was done. Optimal clinical crown length was achieved and was maintained at 3months and 6 months follow up.

Keywords: Crown lengthening.

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INTRODUCTION

Grossly decayed teeth pose problems in tooth preparation and retention due to unavailability of sufficient clinical crown. Therefore, surgical crown lengthening procedure is done to increase the clinical crown length without violating biological width in.

The concept of crown lengthening was first introduced by D.W. Cohen (1962) (Cohen *et al.* 1962) and is presently a procedure that often employs tissue reduction or removal with or without osseous surgery, and/or orthodontics for tooth exposure. The amount of tooth structure exposed above the osseous crest must be enough to provide for a stable dentogingival complex (Kois JC, 1994), thereby maintaining the biologic width (Gargiulo *et al.*, 1961) and to permit proper tooth preparation. Several techniques have been proposed for crown lengthening which includes gingivectomy, apically displaced flap with or without osseous resective surgery and orthodontic extrusion. The present case report describes patient-customized site specific crown lengthening including apically displaced flap and undisplaced flap with osseous resection at different sites of the same tooth.

CASE REPORT

A 56 year old healthy, non-smoking female was referred to the department of periodontics, PGIDS,

Rohtak. Her chief complaint was missing posterior teeth in the mandibular left quadrant. Clinical examination revealed, missing 36, 37 and 35 was grossly decayed. IOPA X-ray examination revealed 35 was root canal treated with adequate surrounding bone. UNC-15 probe was used to measure the width of keratinized gingiva around 35 and a width of 2mm of keratinized gingiva on buccal aspect of 35 was recorded. Interdental and lingual gingiva was fibrotically enlarged and clinical crown length of almost 0.5mm was visible. Sulcus depth of 1mm was recorded all around the tooth.

MATERIAL AND METHOD

Grossly decayed left mandibular 2nd premolar with suboptimal crown structure and uneven gingival margins with excessive gingival display was planned for surgical crown lengthening procedure. The amount of keratinized gingiva on buccal side was approximately 2mm with probing pocket depth about 1mm all around the tooth. On lingual and interdental sites width of keratinized gingiva was approximately 4mm. So keeping in view the less width of keratinized gingiva on buccal side, apically displaced flap (Friedman, 1962) was planned and on lingual and interdental sites undisplaced flap was performed. Osseous resection of about 3mm was done all around the tooth by keeping in view the supracrestal gingival tissue dimensions.

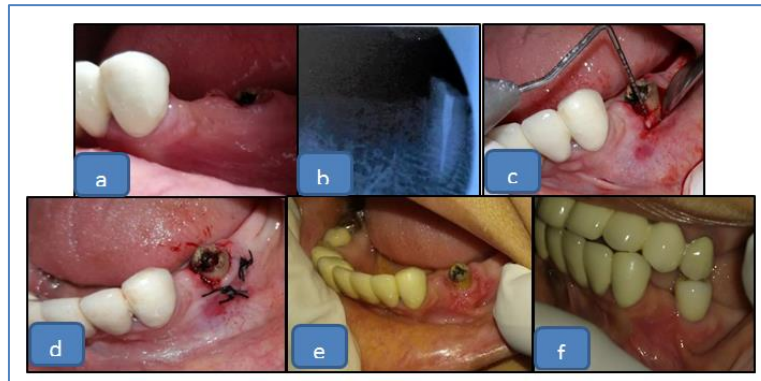
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Surgical Procedure

Extra oral antisepsis was performed with gauze pieces soaked in betadine. Intra oral antisepsis was performed by rinsing with 0.12% chlorhexidine digluconate for 30 seconds. Adequate local anaesthesia was achieved with 2% lignocaine hydrochloride. On buccal side of 35, an intracrevicular incision was given with two vertical incisions. On interdental and lingual

side undisplaced flap procedure was followed. After flap reflection, granulation tissue was removed and osseous resection of about 3mm was done all around the tooth. Considering the adequate vestibular depth buccal flap was apically repositioned. Periosteal sutures and then closing sutures were given. Supracrestal gingival tissue was maintained 3mm from alveolar crest at buccal surface and 4mm at interdental region.



- a) Pre-operative view b)Pre-operative IOPA c)Intra-operative view d)Immediate post-operative view e)1 week follow up f)6 months follow up

The surgical area was protected with periodontal dressing (Coe-pack). Analgesics (ibuprofen 400mg thrice daily for 3 days) were prescribed. Post-operative healing was uneventful with minimal pain. Review of patient on 10th day revealed gain in clinical crown length of about 2mm and width of keratinized gingiva 2mm was maintained.

RESULT

At 3 months and 6 months follow up, sufficient crown length was achieved with stable supracrestal gingival tissue and width of keratinized gingiva. No tissue rebound was evident.

DISCUSSION

Planning for crown lengthening surgery entails consideration of presurgical assessment of various factors influencing the treatment outcome. Key points include assessment of width of keratinized gingiva, distance of finished restoration margin to alveolar bone crest, crown-to-root ratio, supracrestal gingival tissue (SGT), gingival biotype, root anatomy and thickness of the buccal alveolar bone (Majzoub ZAK *et al.*, 2014; Smukler H *et al.*, 1997; Lanning SK *et al.*, 2003).

Surgical crown lengthening can be achieved using soft tissue excisional procedures via gingivectomy or apically displaced flap without osseous resection if the underlying bone crest is at 3mm or more from level of gingival resection. Apically displaced flap with bone resection should be used to accommodate adequate dimensions for supracrestal gingival tissue, to

reform and avoid significant post-surgical tissue rebound and to achieve sufficient width of attached gingiva for maintaining gingival health. Osseous resection in surgical crown lengthening is considered to be a significant factor. Osteotomy is best performed according to the amount needed to accommodate the reconstructed supraosseous gingival tissue equivalent to the preoperative SGT measurements (Deas DE *et al.*, 2004).

The present study corroborate with the clinical study of Lanning et al, wherein.the results achieved in terms of tissue rebound and stability of gingival margin were similar to the current study. There was no tissue rebound and the gingival margin remained stable at 6 months..In both the studies , bone removal of 3mm resulted in preservation of the achieved position of the margin .From the results obtained, a conclusion was drawn that provision of adequate space for the supracrestal tissues results in early and long term maintenance of the position of gingival margin that the position of the gingival margin(Deas DE *et al.*, 2004).

A careful presurgical analysis of the local anatomy and the distance from gingival margin to bone crest allows us to anticipate the postoperative SGT dimension of a particular tooth by knowledge of its preoperative measurement. When SGT measurements at surgical site are not feasible because of tissue inflammation associated with deep subgingival fracture/caries/preparation margins, measurements of SGT contralaterally prior to crown lengthening may serve as a guide as to the amount of bone removal required and predict final postoperative location of gingival margin. The apical margin of the restorative preparation if placed within the biologic width leads to a zone of chronic inflammation. It has been proposed that if there is an insufficient space for a “normal”

length of junctional epithelium to develop; the junctional epithelium is short, weak, and does not exert an effective sealing of the dentogingival unit. Furthermore, the area is easily injured by mechanical oral hygiene procedures and chronic inflammation continues or is easily induced. It has also been believed that deeply placed subgingival restorative margin, close to the alveolar bone crest, impairs proper plaque control promoting inflammatory changes uncondusive to a healthy periodontal environment. (Gunay H *et al.*, 2000; Schroeder HE *et al.*, 1971; Holmes JR *et al.*,1992)

An adequate apico-coronal height of keratinized gingiva, especially in presence of thin gingival biotype, sub gingival restorations, short roots and /or poor crown-to-root ratio should be considered for surgical crown lengthening. Crown lengthening procedures with supporting bone removal further reduces the periodontal attachment and has a negative influence on crown-to-root ratio, tooth mobility, and long-term tooth stability. Therefore, preliminary periapical radiograph is essential for planning this procedure.

The ultimate goal of crown lengthening after considering all the key factors, is to provide a tooth crown dimension sufficient for a stable dentogingival complex and for the placement of a restorative margin ,so as to achieve the best marginal seal and an aesthetically pleasing final restoration. In the present case after evaluating all the factors, a gain of 2mm in crown length was achieved and maintained at 6 month follow up. Patient was also satisfied with the final esthetic result and did not need any further intervention.

CONCLUSION

Crown lengthening surgery is a viable option for aiding restorative therapy. However,for planning a crown lengthening procedure, complete periodontal condition of the patients and their hygiene habits should be evaluated. Additionally, an accurate diagnostic and interdisciplinary approach is must for attaining improved, conservative, and expectable results of crown lengthening procedure.

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