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RESEARCH ARTICLE

PRE-PROSTHETIC CROWN LENGTHENING PROCEDURE: A CASE REPORT

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ABSTRACT

Crown lengthening procedure is widely used technique in dentistry, especially in esthetic zone. Pre-prosthetic crown lengthening is performed in such cases where there is insufficient crown length for fabrication of prosthesis. The principal of crown lengthening is based of the concept of preservation of biologic width. Violation of biologic width may result in gingival inflammation, recession, pocket formation, bone loss. Surgical procedure of crown lengthening may require gingivectomy or apically repositioned flap surgery with or without ostectomy. Proper case selection and execution is required for the success of the treatment.

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INTRODUCTION

Crown Lengthening procedure (CLP) is a periodontal plastic surgery which has great importance in clinical practice. According to the definition of the American Academy of Periodontology, crown lengthening is "a surgical procedure designed to increase the extent of the supragingival tooth structure for restorative or esthetic purposes by apically positioning the gingival margin, removing supporting bone or both" (Tseng, 1995; Commonly Used Terms, 2009). A recent American Academy of Periodontology survey reported that approximately 10% of all periodontal surgical procedures are performed in order to achieve gain in crown length (American Academy of Periodontology, 2003). The concept of crown lengthening was first introduced by D.W. Cohen (1962) (Cohen, 1962) and is presently a procedure commonly indicated in many cases like inadequate crown height for prosthetic crown fabrication, subgingival caries, root fractures, gummy smile.

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A successful prosthetic restoration requires adequate crown length to prepare prosthetic crown margin and ferrule. Inadequate crown height might lead to failure of the prosthesis. Here lies the indication for pre-prosthetic crown lengthening procedure to increase the length of clinical crown. Few factors like biologic width, crown-root ratio, attached gingiva are very important to evaluate for case selection properly and and has immense importance in success of the treatment. The concept of biologic width came from the classic histologic study by Gargiulo *et al*. (1961) who measured the average dimension of the junctional epithelium (0.97 mm) and connective tissue attachment (1.07 mm) in humans. The biologic width includes the junctional epitheliaum and supracrestal connective tissue, yielding an average dimension of 2.04 mm. The violation of biologic width may lead to bone resorption, gingival recession, inflammation or hypertrophy (Marzadori *et al*., 2000). Two main surgical procedures are followed for CLP- i) Internal Bevel Gingivectomy (Undisplaced Flap) with or without ostectomy , ii) Apically Repositioned Flap with or without ostectomy. First technique is preferred in cases having thin biotype and sufficient attached gingiva present and second technique is done in cases with inadequate attached gingiva.

Case Report: A 21 year old female patient came to the Department of Prosthodontics, Haldia Institute of Dental Sciences and Research with chief complaint of poor aesthetics due to discoloration of tooth and small tooth size. The Department of Prosthodontics took the decision of rehabilitation of full mouth. For rehabilitation of maxillary anterior tooth, pre-prosthetic crown lengthening was required due to short clinical crown and hence was referred to the Department of Periodontics.

Pre-operative: After thorough clinical and periodontal examination, oral prophylaxis was done. The maximum length of the clinical crown was 5 mm. Cast was made which helped in determining and planning the amount of crown exposure needed for prosthetic restoration (Fig.1 and Fig.2). Accordingly, template was fabricated.

Intra-operative: Local anaesthesia (2% lignocaine with 1: 100,000 epinephrine) was administered. With template the incision line was marked (Fig.3). Internal Bevel, crevicular and interdental incision was given with no. # 15 scalpel B.P blade and Orban's knife following the normal scalloping of gingiva in both the buccal and palatal area (Fig.4).

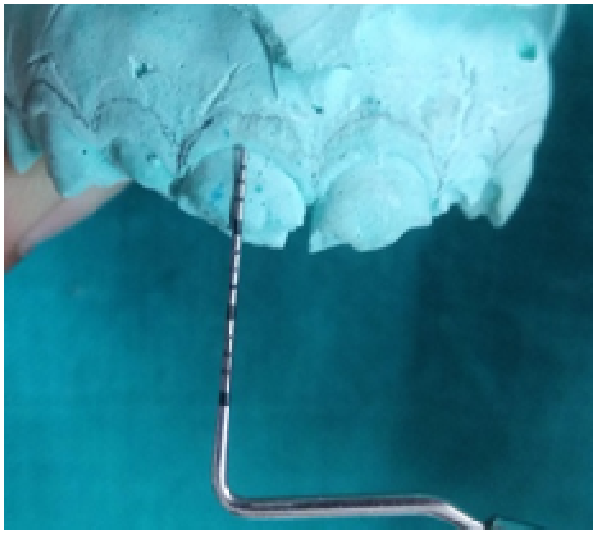

Fig. 1. MaximumClinical crown height - 5mm

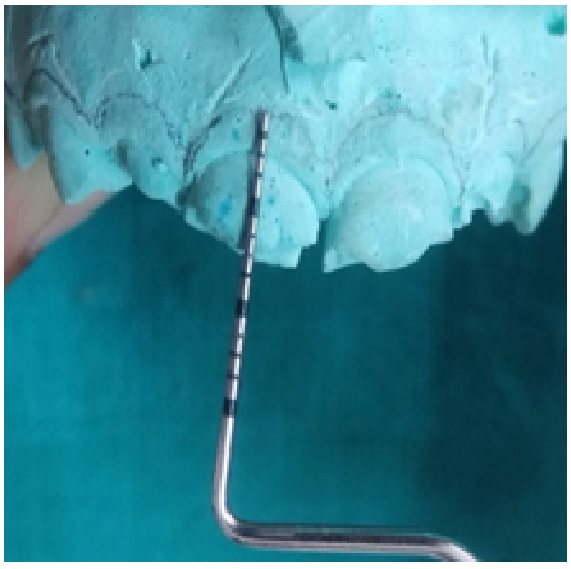

Fig. 2. Needed Clinical crown height – 7mm

Fig.3. Template placed

Fig.4. Incisions given

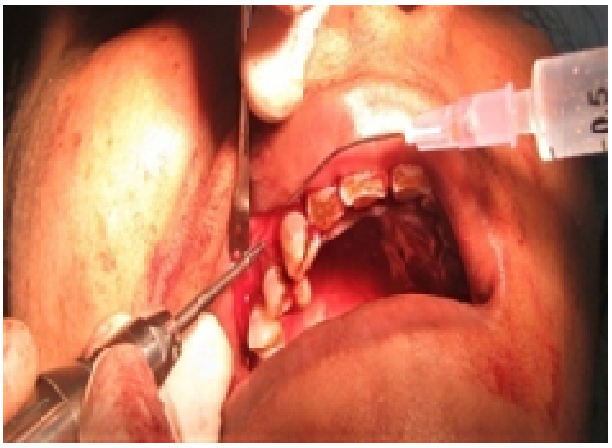

Fig. 5. Ostectomy and Osteoplasty done

The excess tissue was removed by curettes. Full thickness flap was reflected with periosteal elevators. Ostectomy was done with round bur attached to micromotor handpiece during which 2 mm of bone was removed buccally and palataly. Osteoplasty was performed in order to get a positive bone architecture (Fig.5). Water was used as coolant during the procedure. At that moment, the measure of anticipated prosthetic margin to the new crest of alveolar bone was taken into account, thus preserving the biologic width. The length of the clinical crown gained was 7 mm in total. Abundant irrigation with sterile saline solution was done to remove all the debris. Flap margin was adjusted against the resculpted bone for optimal primary closure. Simple interrupted suture was placed (Fig.6). Medications and post-operative instructions were given.

Fig.6. Simple Interrupted Suture placed

Fig.7. Crown reduction done

Fig.8. Provisional prosthesis placed

Fig.9. Final prosthesis placed

Post-operative: Patient was recalled after 1 week for suture removal. Patient was instructed to use soft toothbrush and maintain oral hygiene properly. After 3 weeks, the length of the clinical crown was 7 mm as was gained at the time of surgery. Hence, crown reduction was done and provisional crown was placed (Fig.7 and 8). This procedure was necessary to prevent the fallback of gingiva to its original place. Precautions were taken to minimally irritate the gingiva while crown reduction and the margin of the provisional crown were made as smooth as possible so that it does not impinge the gingiva. After 4 months, provisional crown was removed and final prosthesis was given (Fig.9).

DISCUSSION

Flap elevation in CLP is a controversial topic. Both the full thickness (Arora *et al*., 2013; Polack, 2013) and partial thickness (Ariaudo, 1957) approaches are documented in literature. Full thickness flap elevation was preferred in this present case as full-thickness approach has the advantages of being easier to perform and of gaining direct access to the bone. Also this technique would preserve the periosteum, otherwise it would have been lost during ostectomy. Researchers are much concerned about the soft tissue rebound. In this present case, soft tissue rebound didn't occur after 3 weeks and even after 4 months. The regrowth of soft tissue after the crown-lengthening procedure has been investigated by many investigators. Bragger *et al*. (1992) has done a study on 25 patients. They assessed changes in the soft-tissue level after a crown-lengthening procedure with a 6-month follow-up. After 6 months, they observed stable periodontal tissues with minimal changes in the gingival margin. The similar results was reported by Lanning *et al*. (2003). They performed a study on 18 patients reporting no significant change in the position of the free gingival margin between 3- and 6-month time points. Conversely, Pontoriero and Carnevale (Pontoriero, 2001), in a study on 30 patients, reported significant coronal displacement of the newly formed soft-tissue margin from the immediate postsurgical level. Also they found the importance of tissue biotype on healing response. They observed the coronal regrowth at interproximal and buccal/lingual sites being significantly more pronounced in patients with a thick tissue biotype than in patients with a thin tissue biotype. The tendency for a coronal shift of the soft-tissue margin during healing was also reported by Perez *et al*. (2007), Arora *et al*. (2013), and Deas *et al*. (2014) on studies with 6 months of follow-up. Three procedures can be adopted based on the time point when the teeth are prepared and on the position of the margins of the prosthesis with respect to the gingival margin: (i) intra-operative tooth preparation and relining of the provisional restoration; (ii) early tooth preparation and relining of the provisional restoration; and (iii) delayed tooth preparation and relining of the provisional restoration.

In first technique, tooth preparation is carried out during surgery and provisional restoration is given. The intra-operative preparation have the following advantages: elimination of undercuts; root proximity correction; and smoothing and cleansing of root surfaces by removing calculus and necrotic cement remnants. In second technique, tooth preparation occurs after 3 weeks from the surgery. This technique is based on the concept of performing the provisional prosthetic steps after the initial healing has taken place and following restoration of the connective tissue attachment.

The early tooth preparation offers the following advantages (Zucchelli *et al*., 2015): less aggressive abutment preparation; the provisional prosthetic phase does not interfere with the re-establishment of the biologic width. In the present case, the second technique was performed. The rationale of the third technique is not to interfere with healing of the soft tissues (Fradeani, 2004). After the crown-lengthening procedure, the margins of the provisional restoration are maintained at the presurgical level until soft-tissue stability is achieved (9–12 months). At that time, the final abutment preparation is performed and the final prosthesis is delivered.

Conclusion

Crown lengthening procedure presently is commonly performed clinical procedure in anterior esthetic zone. The proper case selection and execution will increase the success rate. Regrowth of soft tissue after the crown-lengthening procedure is dependent on individual patient factors and the timing of the placement of the final restoration should be chosen accordingly (Marzadori *et al*., 2006).

Conflict of interest: None

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