

Clinical Crown Lengthening Procedure: A Case Series**Babita Sahu¹, Avinash Baliramji Taksande², Bhupendra Gathe³**¹Associate Professor, Dept of Dentistry, Raipur Institute of Medical Sciences, Raipur (CG).²Professor, Department of Physiology, JNMC Sawangi Meghe, Wardha DMIMS DU³Professor and Head Dept of Physiology, Raipur Institute of Medical Sciences, Raipur (CG).

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Conflict of interest: Nil

Abstract:

The crown portion of the tooth is the only visible part in the oral cavity which also acts as an abutment in the prosthesis. It is essential to maintain sufficient crown height for retention stability, and aesthetics of the prosthetic crown. The crown lengthening is a surgical procedure commonly used to maintain the supporting tissue of the tooth in optimal conditions and improve aesthetics while smile designing. The biological width and width of keratinized gingival are two important key factors for the harmony of supporting tissue of teeth and for the longevity of the restoration. The aims of the current case reports are to show some light on the importance of the implications of crown lengthening in routine dental practice.

Keywords: Crown Lengthening, Biological Width, Gingivectomy, Apically Positioned Flap, Keratinized Gingiva.

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Introduction

Clinical crown lengthening is defined as a surgical procedure that aims at exposing sound tooth structure for restorative purposes via apical repositioning of the gingival tissue with or without removal of alveolar bone [1]. Crown lengthening is a viable procedure that enables to restore teeth having a short clinical crown, extensive subgingival caries, subgingival tooth fractures at dentogingival junction, when performed in ideal clinical conditions, crown lengthening gives satisfactory results both from a functional as well as aesthetic [2, 3]. Crown lengthening is one of routine procedure of dental operator. There are several techniques for crown lengthening such as gingivectomy, gingivectomy with osseous contouring, undisplaced flap with or without osseous surgery, apically positioned flap with or without osseous surgery [4]. The most important thing we need to take care is biological width while doing crown lengthening procedure. There should not be any violation of biological width while doing this procedure. Maintenance of biological width is very essential for preservation of periodontal health. The signs of biological width violation are: Chronic progressive gingival inflammation around the restoration, bleeding on probing, localized gingival hyperplasia with minimal bone loss, gingival recession, periodontal pocket formation, clinical attachment loss, and alveolar bone loss [5]. The ultimate goal of crown lengthening is to provide a tooth crown dimension

adequate 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 [6]. This article presented a case of aesthetic and clinical crown lengthening procedure here with detail. This case report describes the importance of clinical crown lengthening procedure before prosthetic tooth crown insertion.

Case presentation:**Case -1**

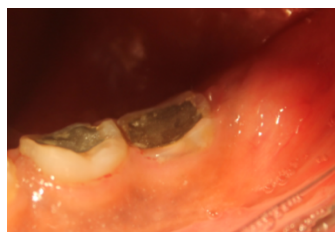
A 20-year-old male patient presented to the Raipur Institute of medical Sciences and Research for crown placement on lower back teeth. Intra oral examination revealed that 36, 37 teeth had been treated endodontically. His medical history was noncontributory, and he denied a history of smoking or alcohol consumption. Extra oral examination revealed no significant findings. His face was symmetric and had a straight profile. Clinical examination revealed shallow probing depths, no mobility and presence of adequate amounts of keratinized attached gingiva. The crestal bone level was within normal limits, and the crown to root ratio was favorable. Crown-lengthening procedure was recommended to allow a healthy, optimal relationship between the teeth and the periodontium. The periodontal probe was used to perform bone sounding after administration

of local anesthesia to rule out the necessity of osseous surgery. Pockets were marked using a pocket marker. Bard-parker blades no. 15 was used for the incisions on the facial surfaces. Three incisions are given, internal bevel incision, crevicular incision, interdental incision sequentially. The first incision was started apical to the gingival margin and was directed coronally. Crevicular incision and interdental incision were given and a full thickness flap was reflected on labial and lingual side. A retained deciduous tooth was extracted which was going to hamper prosthesis. Osseous resection performed on the buccal and lingual surface, exposed 3 mm of root surface from the gingival margin to the alveolar crest which allows attachment of the junctional epithelium and connective tissue. The underlying bone was reduced using a diamond bur with ample of irrigation with saline so as to achieve a proper dimension of biological width and to expose the

required tooth length in a scalloped fashion to follow the desired contour of the overlying gingiva. The radicular and interdental bone was contoured without violating the biological width. Gingiva was also recontoured using a scissor then flap was apically repositioned and sutured with interrupted suture technique with 4-0 ethicon non-absorbable suture. Chlorhexidine rinse 0.12% bid was prescribed for 2 weeks with appropriate postoperative instructions and was recalled after 24 hours for follow-up. Patient has mild inflammation and mild pain at the site of surgery. Patient was recalled after 10 days for suture removal. The increase in the extent of supragingival tooth structure was about 1-2mm. After 7 day of suture removal the crown was prepared tooth 36, 37 and impression had been taken. The final prosthetic crown insertion has been performed to patient after 2 days (detailed pictorial presentation of case 1 from picture 1a to picture 1p)



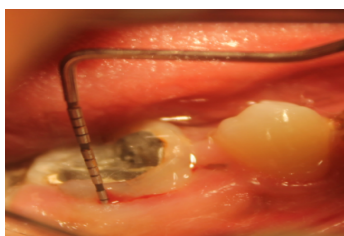
Pic 1a: 36,37 from buccal aspect



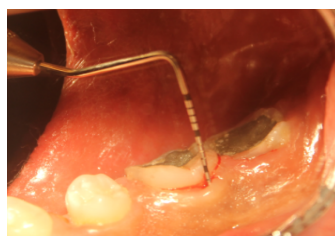
Pic 1b: 36,37 from lingual aspect



Pic 1c: radiographic view of 36,37



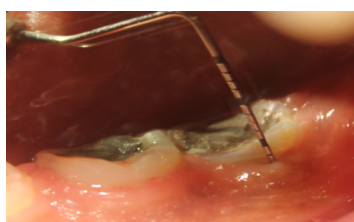
Pic 1d:gingival sulcus 3mm on 36 Buccal aspect



Pic 1 e gingival sulcus 3mm on 36 lingual aspect



Pic 1f: gingival sulcus 3mm on 36 buccal aspect



Pic 1g:gingival sulcus 3mm on 37 lingual aspect



Pic 1h:width of keratinized gingiva 36 lingual aspect



Pic 1i: width of keratinized gingiva 37 buccal aspect



Pic 1j:three incisions given



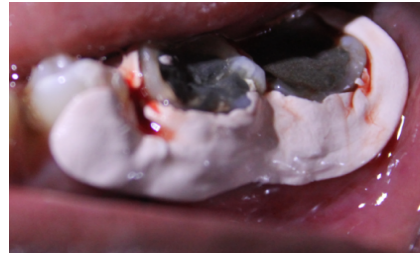
Pic 1k :full thickness flap elevated



Pic 1l: extracted Retained deciduous tooth



Pic 1m: suturing done



Pic 1n: periodontal dressing after crown lengthening surgery



Pic 1o after 3 weeks



Pic 1p: after 3 weeks

Case 2: A 59 year old male patient came to Department of Dentistry of Raipur Institute of Medical Science, Raipur with complaint of repeated removal of crown from left upper front tooth. The patient was examined in dental OPD for biological width and crown root ratio and found less abutment height for retention of crown. Patient was occasional smoker and treated for full mouth rehabilitation 2 year ago. Patient was hypertensive and under medication for the same since last 8 years. Extra oral examination revealed no significant findings with a normal lip line and no gingival display while smiling. Dental examination revealed inadequate clinical crown height with 22. Periodontal examination revealed periodontal pocket involvement associated with 16,17,26,27 regions. Patient has been treated for flap surgery on maxillary right and left quadrant as pocket associated with 16,17,26,27. The gingiva was pigmented and firm; interdental papillae were intact. Clinical examination revealed probing depths of 2-3mm with no pathologic mobility on 22. Radiographic examination of 22 revealed root canal obturation material and mild horizontal alveolar bone loss. Patient was previously treated with endodontic therapy and prosthetic crown on 22 earlier but because of short height of abutment, crown was dislodged repeatedly. A patient was explained about detailed oral prophylaxis instruction and crown lengthening procedure and consent is taken regarding this. Patient was advised for his physician consent before surgical procedure as blood pressure was high on the day of examination. Patient reported after one week after consent with his physician. The surgery was planned after finding all vital signs normal and patient was premedicated with antibiotic and analgesics. Careful evaluation of the location and

thickness of the underlying bone was completed prior to beginning this procedure. The periodontal probe was used to perform bone sounding after administration of local anesthesia to rule out the necessity of osseous surgery. Pockets were marked using a pocket marker. Bard-parker blades no. 11 and 12 was used for the incisions on the facial surfaces. Three incisions are given internal bevel incision, crevicular incision, interdental incision sequentially. The first incision was started apical to the gingival margin and was directed coronally. The incision was as close as possible to the bone without exposing it, to remove the soft tissue coronal to the bone. The incision was beveled at approximately 45 degrees to the tooth surface and should recreate as far as possible the normal pattern of the gingiva. As the distance from the finished restorative margin to the alveolar bone was less than 2 mm, hence there was need for osseous reduction. Crevicular incision and interdental incision were given and a full thickness flap was reflected. The underlying bone was reduced using a diamond bur with ample of irrigation with saline so as to achieve a proper dimension of biological width and to expose the required tooth length in a scalloped fashion to follow the desired contour of the overlying gingiva. The radicular and interdental bone was contoured without violating the biological width. Gingiva was also recontoured using a scissor then flap was apically repositioned and sutured with interrupted suture technique with 4-0 ethicon non-absorbable suture. Chlorhexidine rinse 0.12% bid was prescribed for 2 weeks with appropriate postoperative instructions and was recalled after 24 hours for follow-up. Patient has mild inflammation and mild pain at the site of surgery. Patient was recalled after 10 days for suture removal. The increase in the extent of

supragingival tooth structure was about 1-2mm. After 7 days of suture removal the crown was prepared with post and core of tooth 22 and impression had been taken. The final prosthetic

crown insertion has been performed to patient after 2 days. (Pictorial presentation of case 2 from picture 2a-2d)



Pic 1 : tooth 22 with only root stumps



Pic 2: tooth 22 after crown lengthening surgery more than 2 mm of tooth crown achieved



Pic 3 : cementation of prosthetic crown after 12 days



Pic 4: follow up after 1 month

Case 3: Patient aged 31 years, came to OPD of department of dentistry in Raipur Institute of

Medical Science, Raipur. He got endodontic treatment previously on tooth 41, 42, 31. Patient

was examined extra orally and intraorally. Extra oral examination revealed no significant findings with a normal lip line and no gingival display while smiling. Dental examination revealed inadequate clinical crown height with 41, 42, and 31. Periodontal and gingival health is optimal. The gingiva was pigmented and firm; interdental papillae were intact. Clinical examination revealed probing depths of 2-3mm with no pathologic mobility on 41, 42, and 31. Patient was explained about treatment plan: surgical lengthening of clinical crown and prosthetic reconstruction with the use of prosthetic fixed partial prosthesis as 32 is missing. So 41, 42, 31 and 32 fixed prosthesis is planned. This treatment plan was accepted by the patient. Patient was non-smoker and no history of diabetes and hypertension and any other systemic disease. After taking consent from patient we have

planned for Clinical crown lengthening. Full thickness flap is raised on labial and lingual side. Osseous resection performed on the buccal and lingual surface, exposed 3 mm of root surface from the gingival margin to the alveolar crest; this allowed for attachment of the junctional epithelium and connective tissue. The flap was apically repositioned and suture. Chlorhexidine rinse 0.2% bid was prescribed for 2 weeks, and the patient was given appropriate postoperative instructions. The patient was recalled after 10 days for suture removal. Patient came after 7 days of suture removal for preparation of tooth. The extent of supragingival tooth structure was found 2-3mm. we had followed same steps of surgical procedure as case 1 and case 2. (Pictorial presentation of case 3 from picture 3a-3c)



Pic 3a insufficient crown height of 31,41,42



Pic 3b: periodontal dressing after crown lengthening surgery



Pic 3c: after 10 days of crown lengthening surgery on the day of suture removal

Discussion

The crown lengthening is one of the most common and essential procedure while doing tooth

preparation for proper functioning of periodontium and aesthetics. Procedure depends on multifactor such as biological width, margin placement,

clinical condition, attached gingival etc [7]. Cigarette smoking is a contraindication for this surgery, although not an absolute contraindication for periodontal surgery, cigarette smoking can impair wound healing and is detrimental to the success of the surgery [8]. Hence, patients who smoke may experience unpredictable surgical outcomes. Other factors such as patient compliance, oral hygiene and history of periodontal disease can also influence surgical outcome. Crown lengthening treatment is based on two principles: the establishment of biological width (BW) and maintenance of adequate keratinized gingiva (KG) around the tooth. The biological width is defined as the dimension of the soft tissue, which is attached to the portion of the tooth coronal to the crest of the alveolar bone [9]. The Biological width has following mean dimensions: A sulcus depth of 0.69 mm, an epithelial attachment of 0.97 mm, and a connective tissue attachment of 1.07. So the biologic width is commonly stated to be 2.04 mm, which represents the sum of the epithelial and connective tissue measurements [10]. In 1977, Ingber *et al.* described “Biologic Width” and credited D. Walter Cohen for first coining the term [11]. Studies show that a minimum of 3 mm of space between restorative margins and alveolar bone would be adequate for periodontal health, allowing for 2 mm of BW space and 1 mm for sulcus depth [12]. Keratinized gingival width should also be maintained which should be more than or equal to 2mm for preserving gingival health. Bone loss and gingival recession are two most common consequences of violating biological width. Crown lengthening can be categorized into restorative, functional, aesthetic. In this article we have presented three similar types of cases which were indicated for crown lengthening. All three cases needed crown lengthening for restorative, functional and esthetic purpose. We have achieved 2-3 mm of crown in all cases for crown cementation without violating gingival height which also provide long term restoration by maintaining harmony of gingival and periodontal health.

Conclusion

Crown lengthening is a viable procedure performed for restoration of teeth having a short clinical crown, teeth having subgingival caries, and subgingival tooth fractures at dentogingival junction and to correct gingival asymmetries. In

conclusion, crown lengthening surgery is a interdisciplinary approach in dental operator to facilitate restorative, aesthetic and functional therapy in harmony of periodontium.

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