

Research Paper: Evaluation of Periodontal Indices Before and After Crown Lengthening Surgery



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ABSTRACT

Introduction: Biological Width is needed to maintain the health of gingiva around teeth that need restoration. Crown Lengthening (CL) surgery can be used to prevent invading the BW by sub-gingival restoration. The aim of this study was to evaluate gingival indices before and after CL surgery.

Materials and Methods: In this analytical-longitudinal study, 23 teeth of 18 patients referred to the School of Dentistry of Guilan University of Medical Sciences were analyzed. Patients underwent CL surgery. Plaque Index (PI), Probing Depth (PD), Gingival Index (GI) and Papillary Bleeding Index (PBI) were measured and recorded at the beginning of the study (before CL surgery), 1 week, 1 month and 3 months after the surgery. Patients were referred to restorative dentist at the end of the study. All tests were performed using SPSS software version 24 at the significance level of 0.05.

Results: in this study PD consistently decreased significantly. ($P = 0.001$) PI increased in the first 1 month after surgery and decreased from the first to the third month after surgery. PI was significantly reduced during the study. ($P < 0.001$) GI increased in the first 1 week after surgery and decreased from the first week to the third month after surgery. GI was significantly reduced during the study. ($P < 0.001$) PBI increased in the first 1 week after surgery and decreased from the first week to the third month after surgery. PBI was significantly reduced during the study. ($P < 0.001$)

Conclusion: All measured indices decreased significantly after crown lengthening surgery. Therefore, it can be concluded that CL helps to improve and stabilize periodontal indices.

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Introduction

Biological width was first introduced by Gargiulo and Wentz and is referred to the distance between the most apical point of sulcus and crestal bone. The amount of biological width varies in different patients according to age, gender, race and other factors; however the mean of BW is considered to be 2.04 mm. (1-3)

Preserving the BW is important to maintain the health of gingiva specially around the teeth with restorations and to guarantee the long-term success of restorations. (2,4,5)

Sub-gingival extension of restoration is necessary in teeth with sub-gingival caries, fracture and previous sub-gingival restoration. To prevent BW invasion, the gingiva and/ or bone should be displaced apically through crown lengthening (CL) surgery. (6-9)

Bragger et al. assessed the soft tissue 6 months after the crown lengthening surgery. According to the results of their study, the gingival margin was apically displaced through CL surgery for the mean of 1.32 mm and this result was stable for 6 months. Lanning et al. also reported that the results from the CL surgery was stable after 3 months and 6 months. Unlike previous studies, Carnevale et al. and Pontoriero et al. claimed that the results of CL surgery relapsed 12 months after the procedure. (10-15)

As there are controversy among the studies and as a result that CL surgery notably affects the prognosis and the success of the restoration, this study aimed to assess and compare the clinical parameters before and after the CL surgery.

Materials and methods

In this study, 23 teeth of 18 patients whose maxillary first or second premolars required crown lengthening surgery were analyzed. Inclusion criteria were having sub-gingival decay or fracture, inadequate crown's length, good or fair prognosis and appropriate crown/root ratio. Patients with systemic diseases like diabetes, history of periodontal diseases or periodontal treatment, smoking habits, use of corticoste-

roids, NSAIDs and anti-biotics were not included in the study. Patients with poor cooperation and poor oral hygiene who did not attend the follow-up sessions were excluded.

This study obtained the confirmation from the ethics committee of the university (IR.GUMS.REC.1400.414). A written consent was given from the patients.

Prior to the surgery, patients received oral hygiene instructions and underwent scaling and root planning. The surgery was performed by one periodontist. The local anesthesia was obtained with lidocaine/ epinephrine (XYLOPEN lidocaine 2% and epinephrin 80.000, Tehran, Iran). Following an internal bevel incision, a full thickness flap was elevated and ostectomy and osteoplasty was performed. After the surgery, the flap was placed in the correct position and sutured with 3-0 silk suture (LINX, 000 silk suture, Tehran, Iran) using simple suturing technique. 500mg amoxicillin, 400mg ibuprofen and 0.2% chlorohexidine mouthwash were prescribed for the patients. The sutures were removed after 7 days.

The following periodontal indices were assessed at baseline, 1 week, 1 month and 3 months post- surgery. Patients were referred to restorative dentist at the end of the study.

First of all, Plaque Index (PI) was examined at 4 points (mid-buccal, mesial, mid-lingual, and distal) and each was given a score from 0 to 3. Score of 0 meant no plaque, score of 1 meant the presence of a mild plaque in the gingival margin after using probe (CP-12/thin Williams color-coded probe, Hu-Friedy, Chicago, IL, USA), score of 2 meant the presence of a moderate plaque around the teeth or gingival margin that is visible to the naked eye and score of 3 meant that there was abundant plaque around the teeth or gingival margin. The average of the obtained numbers was calculated and reported.

After that, Papillary Bleeding Index (PBI) was measured by inserting a probe into the gingival sulcus at the base of the mesial papilla. It was then moved coronally to the tip of the papilla. The same procedure was done in the distal papilla. The severity of bleeding was scored

from 0 to 4. Score of 0 meant no bleeding, score of 1 meant a single point bleeding, score of 2 meant a number of separate bleeding points or a line of bleeding, score of 3 meant that the interdental triangle was filled with blood shortly after probing, score of 4 meant severe bleeding immediately after probing. The average of the obtained numbers for mesial and distal was calculated and reported.

Then for measuring probing depth (PD), the Michigan “O” periodontal probe with William’s marking was inserted in the gingival sulcus, and the depth was measured at 4 points (mid-buccal, mesial, mid-lingual, and distal). The mean of measured PD was reported in millimeters.

Finally, Gingival Index (GI) was assessed at 4 points (mid-buccal, mesial, mid-lingual, and distal), and each was given a score from 0 to 3. Score of 0 meant no inflammation, score of 1 meant mild inflammation without bleeding on probing, score of 2 meant moderate inflammation with bleeding on probing, and score of 3 meant severe inflammation with a tendency to spontaneous bleeding. The average of the obtained numbers was calculated and reported.

The data was analyzed using SPSS version 24. ANOVA and post hoc Tukey tests were applied at the significance level of 0.05.

Results

In this study, the data of 23 teeth of 18 patients were analyzed. The mean age of patients was $38/11 \pm 91/26$. 47.8% (11) of patients were female and 52.2% (12) were male. 47.8% (11) of teeth were first premolars and 52.2% (12) were second premolars. 47.8% (11) of teeth were located in left quadrant of maxilla and 52.2% (12) were located in the right quadrant of maxilla.

The means of PD, PI, GI and PBI at the baseline, 1 week, 1 month and 3 months post-surgery are presented in Table 1. According to the statistical analysis, PD, PI, GI and PBI significantly decreased from the baseline to the 3 months post-surgery. ($P=0.001$, $P<0.001$, $P<0.001$ and $P<0.001$, respectively)

Table 1: The means of PI, PD, GI and PBI at the baseline, 1 week, 1 month and 3 months post-surgery

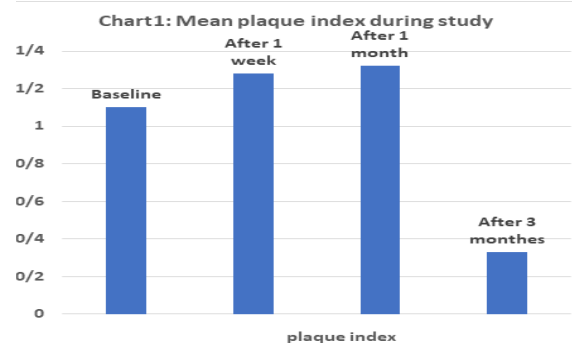
| | PI | PD | GI | PBI |
|-----------------------|-----------|-----------|-----------|-----------|
| At baseline | 1.1±0.41 | 1.97±0.45 | 1.53±0.46 | 1.71±0.7 |
| 1-week post-surgery | 1.28±0.26 | 1.92±0.23 | 1.86±0.21 | 1.97±0.23 |
| 1-month post-surgery | 1.32±0.14 | 1.07±0.97 | 0.92±0.38 | 1.15±0.35 |
| 3-months post-surgery | 0.33±0.26 | 1.06±0.96 | 0.31±0.24 | 0.47±0.38 |

* PI: Plaque Index/ PD: Probing depth/GI: Gingival Index/ PBI: Papillary Bleeding Index

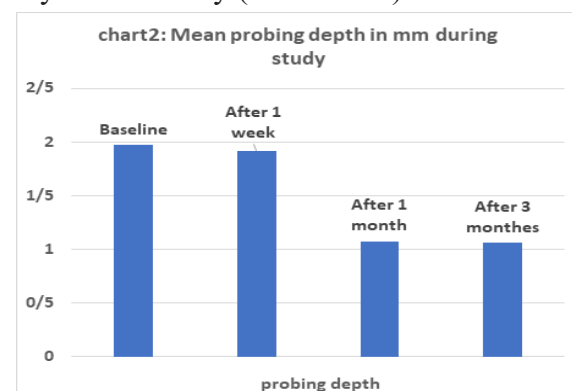
Discussion

In this study, the changes of gingival indices were evaluated and compared before and after the CL surgery (at baseline, 1 week, 1 month and 3 months post-surgery).

Plaque index increased from baseline to the 1st month post-surgery and decreased from the 1st to the 3rd month after surgery (chart no 1).

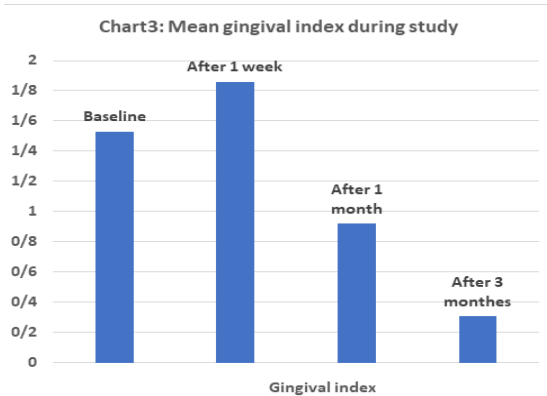


PI was 1.1 at the baseline and 0.33 after 3 months. Probing depth decreased during the study continuously (chart no 2).

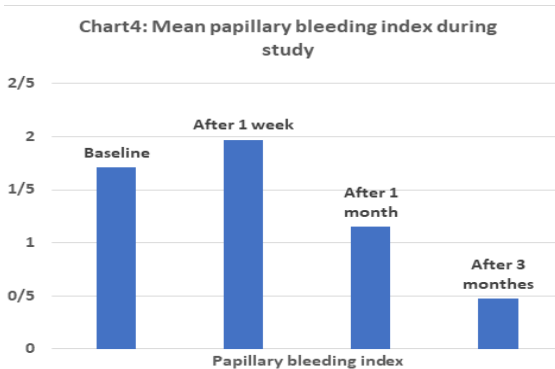


The PD was 1.97 mm at baseline and 1.06 mm 3 months post-surgery. Gingival index increased during the 1st week after the surgery

and then had a decreasing tendency from the 1st week to the 3 months post-surgery (chart no 3).



The GI was 1.53 at the baseline and was 0.31 three months after the surgery. Papillary bleeding index had an increasing tendency during the 1st week and then a decreasing tendency from the 1st week to the 3rd month after the CL surgery. (chart no 4)



Vaziri et al. assessed the effect of CL surgery on the periodontal parameters at baseline, 1 month and 3 months post-surgery. Similar to the current study, Vaziri et al. stated that PI had decreased during the study (from 2.32 to 1.17). According to their results GI decreased during the first 3 months after the surgery. (From 1.35 to 1.0) The results of Vaziri et al. were in line with the current study. (4)

Bai et al. in 2020 evaluated the probing depth, plaque index and bleeding index at baseline, 1 week, 1 month, 2 months and 3 months after the CL surgery. The results of their study showed that PD, PI and BI significantly decreased during the first 3 months after the CL surgery. So that, PD was 3.36 mm at the baseline and was 2.26 mm at the end of the study. Also, PI and BI were 0.92 and 1.29 respectively at the

baseline and were 0.48 and 0.75 three months after the CL surgery. The findings of Bai et al were consistent with this study. (6)

Similar to the current study, Abdollah et al. assessed PI, GI and PD at baseline and three months after the CL procedure. Abdollah et al. stated that mentioned parameters significantly decreased after the surgery. Cruz et al. claimed that PD, PI and GBI significantly reduced during the 13-month period after the CL surgery. Deas et al. concluded that PD, PI and GBI had a decreasing tendency 6 months post-CL surgery. Herrero et al. reported similar findings. According to Herrero et al. PI, GI and GBI reduced notably 8 weeks post-surgery compared to the baseline. (16-19)

It can be concluded that CL surgery improves the periodontal health and the condition of the gingiva by significantly decreasing the plaque index, probing depth, gingival index and papillary bleeding index. The results obtained after the CL procedure were stable after 3 months of follow-up.

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None

Authors' contributions

Bardia Vadiati Saberi: Conceptualization, Methodology, Writing - Review & Editing
Maryam Haddadian: Writing - Original Draft, Data Curation, Supervision

Conflict of Interests

The authors declare no conflict of interest.

Ethical declarations

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Availability of data and material

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

References

1. Montero J, Fernández-Ruiz A, Pardal-Peláez B, Jiménez-Guerra A, Velasco-Ortega E, Nicolás-Silvente Ai, Et Al. Effect Of Rough Surface Platforms On The

- Mucosal Attachment And The Marginal Bone Loss Of Implants: A Dog Study. *Materials (Basel)*. 2020;13(3):1-<https://doi.org/10.3390/ma13030802> PMID:32050603 PMCID:PMC7040816
2. Londe V, Messias Mctb, De Sousa Hc. Vegetation Restoration Is Associated With Increasing Forest Width. *New For [Internet]*. 2021;52(1):129-44. Available From: <https://doi.org/10.1007/S11056-020-09786-2>
 3. Al-Abdaly Mmaa. The Effects Of Surgical Crown Lengthening (Scl) On Biological. 2019;(January 2013).
 4. Vaziri F, Haerian A, Lotfi Kamran Mh, Abrishami M. Evaluation Of The Effect Of Surgical Crown Lengthening On Periodontal Parameters. *Mashhad Univ Med Sci [Internet]*. 2015;4(3):143-8. Available From: http://jdm.mums.ac.ir/article_4597.html
 5. Razi Ma, Debnath S, Chandra S, Hazra A. Biologic Width - Considering Periodontium In Restorative Dentistry. *Int J Contemp Med Res [Ijcmr]*. 2019;6(3):2-8 <https://doi.org/10.21276/ijcmr.2019.6.3.15>
 6. Bai L. Effects Of Crown Lengthening On Bi , Pli And Pd Levels In Patients With Different Periodontal Biotypes. 2019;4(5):17-20. <https://doi.org/10.26689/jcnr.v4i5.1477>
 7. Al-Sowygh Zh. Does Surgical Crown Lengthening Procedure Produce Stable Clinical Outcomes For Restorative Treatment? A Meta-Analysis. *J Prosthodont*. 2019;28(1):E103-9. <https://doi.org/10.1111/jopr.12909> PMID:29876998
 8. Zhen M, Wang C, Hu Wj, Zhang H, Li Ls, Wei Yp, Et Al. Periodontal Evaluation Of Crown-Root Fractured Teeth Following Modified Crown Lengthening Surgery. *Br Dent J*. 2017;222(1):21-5. <https://doi.org/10.1038/sj.bdj.2017.25> PMID:28084388
 9. Pham Ht, Nguyen Pa, Pham Tav. Periodontal Status Of Anterior Teeth Following Clinical Crown Lengthening By Minimally Tr Aumatic Controlled Surgical Extrusion. *Dent Traumatol*. 2018;34(6):455-63. <https://doi.org/10.1111/edt.12438> PMID:30207629
 10. Brägger U, Lauchenauer D Ln. Surgical Lengthening Of The Clinical Crown. *J Clin Periodontol*. 1992;19(1):58-63. <https://doi.org/10.1111/j.1600-051X.1992.tb01150.x> PMID:1732311
 11. Lanning Sk, Waldrop Tc, Gunsolley Jc, Maynard Jg. Surgical Crown Lengthening: Evaluation Of The Biological Width. *J Periodontol*. 2003;74(4):468-74. <https://doi.org/10.1902/jop.2003.74.4.468> PMID:12747451
 12. Murthykumar K, Rajasekar A, Kaarthikeyan G. Assessment Of Healing After Periodontal Flap Surgery With And Without Periodontal Pack. *Int J Pharm Res*. 2020;12(August):125-30. <https://doi.org/10.31838/ijpr/2020.SP1.020>
 13. Marzadori M, Stefanini M, Sangiorgi M, Mounssif I, Monaco C, Zucchelli G. Crown Lengthening And Restorative Procedures In The Esthetic Zone. *Periodontol* 2000. 2018;77(1):84-92.<https://doi.org/10.1111/prd.12208> PMID:29493814
 14. Wang Y, Ding Xh, Yao Ll, Huang Zs Bh. Evaluation Of The Clinical Effect Of The Teeth With Subgingivally Involved Defect Conserved By Crown Lengthening Surgery. *Shanghai Kou Qiang Yi Xue*. 2005;14(1):24-7.
 15. Ghosh S, Kudva Pb. Evaluation And Comparison Of Clinical Biologic Width In Subjects With Healthy Periodontium , Chronic Generalized Periodontitis , And Generalized Aggressive Periodontitis - A Clinicrodiographical Study. 2018;5(1):100-2.
 16. Abdullah MM. The Effects of Surgical Crown Lengthening (SCL) on Biological Width and Periodontal Tissues after Prosthodontic Procedures. *Dental Journal*. 2013 Apr;59(1543):1548.
 17. Márcio K da Cruz, Josué Martos, Luiz Fernando Machado Silveira, Poliana M Duarte, and João Batista César Neto. Odontoplasty associated with clinical crown lengthening in management of extensive crown destruction. *J Conserv Dent* 2012; 15(1):56-60.<https://doi.org/10.4103/0972-0707.92608> PMID:22368337 PMCID:PMC3284016
 18. Deas DE, Moritz AJ, McDonnell HT, Powell CA, Mealey BL. Osseous surgery for crown lengthening: a 6-month clinical study. *J Periodontol* 2004;75(9):1288-94.<https://doi.org/10.1902/jop.2004.75.9.1288> PMID:15515347
 19. Herrero F, Scott JB, Maropis PS, Yukna RA. Clinical comparison of desired versus actual amount of surgical crown lengthening. *J Periodontol* 1995;66(7):568-71. <https://doi.org/10.1902/jop.1995.66.7.568> PMID:7562348