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Original Article

Evaluation of Root Coverage Using Subepithelial Connective Tissue Graft in Combination with Tunnel Technique

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ABSTRACT

Objective: To evaluate the frequency of complete root coverage when using a graft of subepithelial connective tissue inserted with tunneling technique in patients with gingival recession.

Study Design: Prospective longitudinal study.

Place and Duration of Study: Department of Oral and Maxillofacial Surgery, de'Montmorency College of Dentistry, Punjab Dental Hospital, Lahore, Pakistan, from Apr to Oct 2022.

Methodology: A total of 80 cases, male and female, diagnosed with gingival recession classified as Millers Classes I or II, between the ages of 18 to 65 years, were enrolled in this study. Patients who smoked, had pre-existing medical comorbidities, exhibited parafunctional habits (bruxism, nail biting, clenching) or had preexisting periodontal disease were excluded. Probing depth at the site of gingival recession was assessed on the 1st, 7th, 21st and 90th day post-operatively. The success of the procedure was determined by the presence or absence of complete root coverage after 90 days.

Results: Mean age was found to be 35.16±9.47 years, with 15(18.8%) male patients and 65(81.3%) female patients. Complete root coverage was present in 57(71.3%) patients. The mean preoperative periodontal depth was 1.17±0.28 mm which improved to mean 1.03±0.25 mm at 90th post-op day, this was found to be statistically significant.

Conclusion: Root coverage with subepithelial connective tissue graft using tunnel technique showed comparable results to already existing techniques.

Keywords: Gingival recession, Subepithelial connective tissue graft, Tunnel technique.

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INTRODUCTION

Gum recession is a major dental esthetic concerns in older people,[1] which occurs when the root of the tooth is exposed with margin of the gingiva moving apical to the cemento–enamel junction.[2] About 40% of young adults and 88% of older adults were found to have recession at minimum of one site,[3] leading to tooth hypersensitivity, cavities, esthetic disfigurement, and reduced attachment of gingiva,[4] with patients primary concern usually being the prominent appearance of recession.[5] Gingival recession can be caused altered tooth position, bone dehiscence, excessive pull by the frenum, thinner gingival biotype and lack of keratinized mucosa along with excessive brushing, smoking and oral piercings.[6] The treatment modalities currently in use, other than subepithelial connective tissue graft (SCTG or bilaminar technique), include flaps like coronal advancement flaps and free gingival grafts, and allografts like acellular dermal matrix and guided tissue regeneration with Tunnel technique proposed as a modification of the coronal advancement flap,[7] with complete root coverage noted in 85% patients in one trial with classified as Miller's Class I and II patients.[8] The rationale for this research is to assess tunnel technique for the placement of subepithelial connective tissue graft as an alternative to the conventional methods. The study aims to create local evidence regarding the procedure due to the genetic, social and cultural differences present in our population.

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METHODOLOGY

This study was performed at Department of Oral and Maxillofacial Surgery, Punjab Dental Hospital, de'Montmorency College of Dentistry, Lahore, Pakistan. Ethical approval was obtained vide letter No. 221/DCD dated 24-01-2024. A sample size of 80 cases was enrolled through non-probability consecutive sampling which was calculated at 5% level of significance and 8% margin of error and taking expected %age of CRC (Complete Root Coverage) in patients with gingival recession as 85%.[8]

Inclusion Criteria: Patients from either genders, with age ranging from 18 to 65 years, presenting in Outpatient Department with recession classified as Millers Class I or II were enrolled.

Exclusion Criteria: Patients with diabetes mellitus, hypertension, any cardiac disease, neurological or hematological disorder, mouth opening of less than 30mm, history of smoking or with currently untreated periodontal disease were excluded.

A detailed history, as well as clinical and radiographic exam was performed on the patient, after taking informed written consent. Patient demographics (age, gender, address) were taken on a structured proforma. Scaling and root planning or curettage were performed as required, based on clinical examination. The patients were called for follow-up after one week. For the procedure, the donor site was selected on the lateral palate, and local anesthesia was infiltrated. For the graft harvest, first transmucosal probing was used to ensure adequate connective tissue thickness. Free gingival margin was assessed, and incision site was chosen 5-6 mm apical to it. The length of the flap was kept according to the mesiodistal width of the recipient site, which was measured using a periodontal probe. Care was taken to ensure the horizontal incision did not extend beyond the canine or second molar on either side. Another incision was then given parallel to the first but in a more coronal position, about 3mm apical to the gingival margin. Apically it reached the same area as the initially placed incision. The graft was then released by placing the final horizontal incision at the apical border. Intrasulcular incisions were given in the area of interest and microsurgical blade used for separating sulcular epithelium. A full thickness flap was then raised up to 2 mm apical to receded gingiva. A partial-thickness flap was elevated in the areas where papillae were kept attached. Pouches prepared apical to adjacent teeth in this way were connected and a tunnel was thus created. The teeth mesial and distal to the experimental region were also given sulcular incisions so as to place the tunnel flap coronally in a more convenient fashion. A partial-thickness flap was elevated apically from the mucogingival junction for coronal advancement of the flap without any excessive pull. The area apical to the cementoenamel junction was planed and prepared till about 1 millimeter from the crestal area, once the tunnel was completed. The harvested flap of subepithelial tissue from the palate was to be placed now at the recipient site. A 5'0 PDS suture was passed from one end of the harvested flap for guiding and slipping it without kinking into the prepared tunnel. It was further guided and flattened with a packing instrument. Then, sling sutures from the teeth were passed, causing coronal positioning of the gingiva-papillary complex. In this manner, most of the connective tissue was concealed under the gingiva. Once the procedure was completed, all the subjects were prescribed corticosteroids, broad spectrum antibiotics and analgesics for five days. The post operative instructions given to the patient included abstinence from any activity that could abrade the graft (e.g. using a toothbrush, swishing water/ mouthwash, avoidance of hot or hard food) till first post-op day, and to use chlorhexidine mouth wash twice daily for up to ten days after surgery. The procedure prescribed was carried out by the researcher under supervision of senior consultants. The patients were called for follow up examinations after 7 days, 21 days and 90 days. A periodontal probe was used for assessing root coverage. Data analysis was done using Statistical Package for Social Sciences (SPSS) version 22.0 (SPSS, Inc., Chicago, IL, USA). Categorical variables like gender and root coverage was presented in terms of %ages and frequencies while quantitative variables (e.g. age and duration of symptoms), mean and standard deviation were calculated. Post stratification Chi-square test and Anova were applied by taking *p*-value of ≤0.05 as significant.

RESULTS

A total of 80 patients were included in the analysis, between the ages of 20 and 59 years having an average age of 35.16±9.47 years with 15(18.8%) male and 65(81.3%) female patients. The mean duration of symptoms was 7.06±2.57 weeks. The mean periodontal probing depth of the patients with gingival recession preoperatively was 1.17±0.28 mm, increasing to 1.46±0.28 mm at first post-op day with a decrease seen at the 7th post-op day to 1.35±0.29 mm, further decrease in the depth of 1.25±0.29 mm at 21st post-op day while at 90th post-op day, the mean periodontal probing depth was 1.03±0.25 mm, which was noted to be significant, as shown in Table-I.

As the main outcome of this research was to assess the %age of complete root coverage, a success rate of 71.3 % was found as 57 patients were found to have complete root coverage at the end of 90 days, but

23 patients (28.8%) failed to do so, as shown in Table-II.

Table-I: Follow Up Measurements of Periodontal Probing Depth (n=80)

Parameter	Study Groups					*p*-value
	Pre Treatment (n=80)	1st Post-op Day (n=80)	7th Post-op Day (n=80)	21st Post-op Day (n=80)	90th Post-op Day (n=80)	
Probing Depth (mm)	1.17±0.28	1.46±0.28	1.35±0.29	1.25±0.29	1.03±0.24	<0.001

Comparing the site of recession, the mandibular recessions had a success rate (complete root coverage on 90th day, assessed subjectively) of 81.8% with 36 out of 44 patients showing complete root coverage while the success rate in maxilla was only 58.3% as 21 patients out of 36 patients having maxillary gingival recessions ended up with complete root coverage which was statistically significant, as shown in Table-III.

Table-II: Complete Root Coverage (n=80)

Complete Root Coverage	n(%)
Yes	57(71.3%)
No	23(28.8%)

Table-III: Association of Root Coverage in Maxilla and Mandible (n=80)

Complete Root Coverage	Groups n (%)		*p*-value
	Maxilla (n=36)	Mandible (n=44)	
Present	21(58.3%)	36(81.8%)	0.002
Not Present	15(41.7%)	8(18.2%)	

DISCUSSION

Gingival recession is among the most common periodontal conditions clinicians encounter in routine dental practice.[9] Other associated problems of gingival recession include tooth sensitivity, inflammation and bleeding gums, and root caries.[10] Management of gingival recession through non-invasive options include scaling and root planning, desensitizing agents, bonding agents and cervical restorations,[11] while surgical options are free gingival grafting, coronal advancement flap, lateral sliding flap, guided regeneration of osseous and non-osseous tissues and connective tissue graft.[12] The average age of the subjects in our study was similar to another study,[13] however, mean age of the patients in another study was 28.2±5.8 years, ranging from 21-30 years,[14] while mean age in another study was 25.75±7.12 years.[15] In these studies, the younger mean age of the patients was likely because only younger aged patients were enrolled. In our study, female gender has shown predominance with female to male ratio of 4.3:1, which is in accordance with most of the contemporary studies.[13,16,17] The reason is probably increased esthetic consciousness among females and higher incidence of smoking documented in males,[18] due to which a large %age of male population is excluded from researches. Most studies in the literature also support the higher %age of females showing gingival recession. However, in contrast to majority of literature, some studies like that by Gobatto et all, expresses a higher male %age.[14] The likely reason is that the patients that have a history of taking inflammatory drugs or antibiotics within last 6 months before the study were excluded from the research. Females are known to have a high rate of NSAID administration, and hence, a larger proportion of the female population was excluded from the study. In our study, complete root coverage (CRC) was present in 71.3% of the patients at 90th post-operative day after grafting with subepithelial connective tissue using Langer's technique and was statistically significant. One study showed CRC in 66.7% of their patients, whereas, mean root coverage was found to be 90%.[19] SCTG was compared with coronal advancement flap in another study conducted where the 6 month post-operative results showed that complete root coverage was present in 50% of patients in CTG study group, but in 0.0% of areas with coronal advancement flap.[20] One study comparing the results of coronal advancement flap and grafting with subepithelial connective tissue established the success rate of 58.3% CRC when grafting with epithelial connective tissue was employed, but 38.5% CRC in the group treated with coronal advancement graft alone.[21] The result of another study noted 90% and 94% success rate in terms of CRC at the end of 3rd and 6th post-operative month, respectively, following connective tissue graft placement. The reason for the success rate to be lower in our research could be that the patients in our region tend to ignore the post-operative instructions given to them due to the lower literacy rate in the local population, compared to the international studies, as well as the fact that patients in our region are also unlikely to maintain meticulous oral hygiene leading to graft failure.[22] The patients who are conscious about their oral health are seen to follow the local customs very religiously, such as the use of tooth powder and abrasive dentifrices as well as miswak,[23] immediately after the surgical procedure.

LIMITATION OF STUDY

The study's relatively short 90-day follow-up period may be insufficient to assess long-term graft stability and root coverage maintenance, as tissue remodeling and potential recession recurrence can occur beyond this timeframe. The single-center design limits generalizability of findings to other populations and clinical settings. Additionally, the lack of a control group comparing the tunneling technique to other established root coverage procedures.

CONCLUSION

Complete root coverage was successfully attained in subjects classified as Miller's Class I and II gingival recession with subepithelial connective tissue graft inserted using tunneling technique.

Conflict of Interest: None.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

JZ & MA: Data acquisition, data analysis, critical review, approval of the final version to be published.

HMK & AIM: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

ZA & WJT: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Mitsopoulos E, Karakostas P, Tsalikis L. Assessment of patients' satisfaction following coverage of gingival recessions: Questionnaire-based case series. Balk J Dent Med 2021; 25(3): 92–99. https://doi.org/10.2478/bjdm-2021-0015
2. Yadav VS, Gumber B, Makker K, Gupta V, Tewari N, Khanduja P, et al. Global prevalence of gingival recession: A systematic review and meta-analysis. Oral Dis 2022; 29(8): 2993–3002. https://doi.org/10.1111/odi.14289
3. Romano F, Perotto S, Baima G, Macrì G, Picollo F, Romandini M, et al. Estimates and multivariable risk assessment of mid-buccal gingival recessions in an Italian adult population according to the 2018 World Workshop Classification System. Clin Oral Investig 2022; 26(7): 4769–4780. https://doi.org/10.1007/s00784-022-04441-w
4. Bhat MYS, Alqahtani NA, Khader MA, Javali MA, Alqahtani A. Knowledge and interest in treating gingival recession among dental practitioners in Saudi Arabia. Open Access Maced J Med Sci 2019; 7(1): 139–142. https://doi.org/10.3889/oamjms.2019.033
5. Graziano A, Cirillo N, Pallotti S, Cricenti L, Romano F, Aimetti M et al. Unexpected resilience to experimental gingivitis of subepithelial connective tissue grafts in gingival recession defects: a clinical-molecular evaluation. J Periodontal Res 2013; 49(4): 527–535. https://doi.org/10.1111/jre.12133
6. Fragkioudakis I, Tassou D, Sideri M, Vouros I. Prevalence and clinical characteristics of gingival recession in Greek young adults: A cross-sectional study. Clin Exp Dent Res 2021; 7(5): 672–678. https://doi.org/10.1002/cre2.427
7. Imber J, Kašaj A. Treatment of gingival recession: When and how? Int Dent J 2021; 71(3): 178–187. https://doi.org/10.1111/idj.12617
8. Graziani F, Gennai S, Roldan S, Discepoli N, Buti J, Madianos P, et al. Efficacy of periodontal plastic procedures in the treatment of multiple gingival recessions. J Clin Periodontol 2014; 41(Suppl 15): S63–76.
9. Wang T, Zhao R, Yang R, Li Y, Lien H, Li M, et al. Perceptions of NZ orthodontists and periodontists on the management of gingival recession in orthodontic patients. Aust Dent J 2022; 67(Suppl 1): S41–9. https://doi.org/10.1111/adj.12914
10. Chen J, Lv J, Zhang F, Zhang W, Wang Y, Xu Y, et al. Efficacy of periodontal soft tissue augmentation prior to orthodontic treatment on preventing gingival recession: Study protocol for a randomized controlled trial. BMJ Open 2022; 12(12): e058942. https://doi.org/10.1136/bmjopen-2021-058942
11. Kus-Bartoszek A, Lipski M, Jarząbek A, Manowiec J, Marek E, Droździk A et al. Evaluation of gingival phenotype in the early transitional dentition phase in children—Comparison of three non-invasive methods. J Clin Med 2023; 12(18): 5897. https://doi.org/10.3390/jcm12185897
12. Zhan Y, Wang M, Cao X, Liu F. Effectiveness of acellular dermal matrix graft with a coronally advanced flap for the treatment of Miller Class I/II single gingival recession with thin gingival phenotype: Study protocol for a split-mouth randomized controlled trial. BMJ Open 2022; 12(1): e047703. https://doi.org/10.1136/bmjopen-2020-047703
13. Azaripour A, Kissinger M, Farina V, Van Noorden C, Gerhold-Ay A, Willershausen B, et al. Root coverage with connective tissue graft associated with coronally advanced flap or tunnel technique: A randomized, double-blind, mono-centre clinical trial. J Clin Periodontol 2016; 43(12): 1142–1150.
14. Gobbato L, Nart J, Bressan E, Mazzocco F, Paniz G, Lops D. Patient morbidity and root coverage outcomes after subepithelial connective tissue graft in combination with coronally advanced flap or tunneling technique: A randomized controlled clinical trial. Clin Oral Investig 2016; 20(8): 2191–2202.
15. Sculean A, Allen E. The laterally closed tunnel for the treatment of deep isolated mandibular recessions: Surgical technique and a report of 24 cases. Int J Periodontics Restorative Dent 2018; 38(4): 479–487. https://doi.org/10.11607/prd.3680
16. Bednarz W, Żurek J, Gedrange T, Dominiak M. A preliminary clinical comparison of fascia lata allograft and autogenous connective tissue graft in multiple gingival recession coverage using the tunnel technique. Adv Clin Exp Med 2016; 25(3): 587–598.
17. Cieślik-Wegemund M, Candotto V, Wierucka-Młynarczyk B, Tanasiewicz M, Gilowski L, Duda M, Lauritano D, Ormianer Z. Coverage of multiple recessions using tunnel technique and collagen matrix in the maxilla or mandible: A 6-month study. J Biol Regul Homeost Agents 2018; 32(2 Suppl 1): 1–10.
18. Zubair F, Husnain MIU, Zhao T, Ahmad H, Khanam R. A gender-specific assessment of tobacco use risk factors: Evidence from the latest Pakistan demographic and health survey. BMC Public Health. 2022; 22(1): 1133. https://doi.org/10.1186/s12889-022-13574-2

19. Korkmaz B, Ballı U. Clinical evaluation of treatment of multiple gingival recessions with connective tissue graft or concentrated growth factor using tunnel technique: A randomized controlled clinical trial. Clin Oral Investig 2021; 25(11): 6347–6356. https://doi.org/10.1007/s00784-021-03935-3
20. Zuhr O, Akakpo D, Eickholz P, Vach K, Hürzeler MB, Petsos H. Tunnel technique with connective tissue graft versus coronally advanced flap with enamel matrix derivative for root coverage: 5-year results of an RCT using 3D digital measurement technology. J Clin Periodontol 2021; 48(7): 949–961. https://doi.org/10.1111/jcpe.13470
21. Rasperini G, Acunzo R, Pellegrini G, Pagni G, Tonetti M, Prato GPP, et al. Predictor factors for long-term stability of coronally advanced flap with or without connective tissue graft in single maxillary gingival recessions: 9-year results of an RCT. J Clin Periodontol 2018; 45: 1107–1117.
22. Sohail A, Amjad A, Jabbar M, Munawar M, Nauman A, Zahid N et al. Awareness and practices of patients regarding oral hygiene visiting dental OPD Sharif Medical and Dental College, Lahore. Pak J Med Health Sci 2022; 16(3): 36–38. https://doi.org/10.53350/pjmhs2216336
23. Mir HA, Sharif M, Ali A, Shamim M, Qureshi M, Akhtar A. Effectiveness of miswak compared with toothbrush: a cross-sectional study. Pak Armed Forces Med J 2021; 71(5): 1582–1584.https://doi.org/10.51253/pafmj.v71i5.7295