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Original Article

The comparison of papilla preservation technique and semilunar incision with sub- epithelial connective tissue graft in dark triangle treatment

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Abstract

Introduction: Ability to reconstruct the papilla in anterior maxilla is important aspect of perio-plastic surgery. In most articles, connective tissue is used with different designs of incisions. The aim of this study was to use sub-epithelial connective tissue graft (SCTG) with two types of incisions called papilla preservation and semilunar.

Materials & Methods: This basic randomized clinical study was performed on 10 sites in two patients. The patients were selected through inclusion and exclusion criteria. Papilla preservation and semilunar techniques were performed on four and six sites, respectively in the anterior maxilla. In both techniques SCTG was gained from palate .The apico-coronal and mesiodistal changes of the dark triangles were measured after 3 and 6 months. Landry(Healing) index was measured after 14 days and one month,Visual Analogue Scale (Esthetic) index was estimated in 3 and 6 month after surgery and Visual Analogue Scale (VAS) index was analysed as well . Data were analysed using SPSS. Mann- Whitney, Wilcoxon and Paired t- Test were measured.

Results: Mean±SD of mesiodistal distance in the time of surgery was 2.00±0.000 in semilunar and 2.1±0.629 in papilla preservation technique whereas after 3 months, it was 1.33±0.016 and 1.37±0.478 for semilunar and papilla preservation, respectively and after 6 month was 1.00±0.000 for semilunar and 1.25±0.500 for papilla preservation. Mean±SD of apicocornal changes by semilunar incision in the time of surgery ,3 month after and 6 months later was 2.67±0.516 ,2.25±0.612and1.91±0.204 whereas by papilla preservation was 2.50±0.577,2.25±0.500 and 2±0.000, respectively.

Conclusion: Both techniques had positive effect on papilla reconstruction and the outcome was the same in both groups.

Keywords: Connective tissue, Dental Papilla, Esthetics

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مقایسه روش حفظ پاپیلا و برش نیمه هلالی همراه با SCTG در درمان مثلث سیاه

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چکیده

مقدمه: توانایی بازسازی پاپیلا در قدام ماگزیلا در عمل جراحی پریو پلاستیک اهمیت بسزایی دارد. در اکثر مقالات از بافت همبند با طرح برش مختلف استفاده شده است. هدف این مطالعه، استفاده از CT با دو نوع برش حفظ پاپیلا و نیمه هلالی است.

مواد و روش ها: این مطالعه بالینی تصادفی روی ۱۰ ناحیه در دو بیمار انجام شد. بیماران براساس معیارهای ورود و خروج انتخاب شدند. تکنیک حفاظت پاپیلا روی ۴ و نیمه هلالی روی ۶ ناحیه انجام شد که همگی در قدام ماگزیلا بودند.در هر دو تکنیک بافت همبند از کام برادشته شدند. تغییرات اپیکوکرونالی و مزیودیستالی مثلث های سیاه بعد از سه و شش ماه اندازه گیری شدند.ایندکس (landryترمیم)بعد از ۱۴ روز و یک ماه اندازه گیری شد.ایندکس VAS(زیبایی)۳و ۶ ماه بعد از جراحی مورد بررسی قرار گرفت و ایندکس landry (درد)نیز بررسی گردید. داده ها با استفاده از SPSS و آزمون های Paired T- test, Wilcoxon, Mann- Whitney مورد سنجش قرار گرفتند.

یافته ها: Mean±SD فاصله مزیودیستال در زمان جراحی در برش نیمه هلالی ۲/۰۰±۰/۰۰۰ و در حفظ پاپیلا برابر با ۲/۱±۰/۶۲۹ بود در حالیکه سه ماه بعدبه ترتیب برای برش نیمه هلالی و برش حفظ پاپیلا ۱/۳۳ ±۰/۰۱۶ و۰/۴۷۸ ± ۱/۳۷ وشش ماه بعد ۰/۰۰۰ ± ۱/۰۰برای برش نیمه هلالی و ۱/۲۵ ±۰/۵۰۰ برای برش حفظ پاپیلا بود. Mean±SD تغییرات اپیکوکرونالی با برش نیمه هلالی در زمان عمل جراحی ، ۳و۶ماه بعد به ترتیب ۰/۵۱۶ ± ۲/۶۷ ، ۰/۶۱۲ ±۲/۲۵و ۱/۹۱±۰/۲۰۴ و با برش حفظ پاپیلا به ترتیب۵۷۷ /۰ ± ۲/۵۰ ، ۰/۵۰۰ ± ۲/۲۵و ۰/۰۰۰ ± ۲ بود.

نتیجه گیری: هر دو تکنیک تأثیرات مثبت روی بازسازی پاپیلا داشتند و بین دو گروه تفاوت بارزی وجود نداشت.

واژگان کلیدی: ، بافت همبند، پاپیلای دندانی ، زیبایی

Introduction

Dark triangle is the absence of papilla with dark spaces. Prevalence of dark triangle is more in patients with diastema, traumatic method of hygiene, malformed crowns and periodontal diseases. Dark triangles can result in some problems such as food retention, phonetic, functional difficulties and aesthetics. [1] Therefore, reconstruction of papilla can treat these problems. The main problem causing dark triangle is not only soft tissue but also supporting bone, tooth contact, gingival biotype and shape of the crown; therefore, surgical procedures may not completely solve the problem.[2] If the distance between the bone crest and the contact is ≤5mm and papilla height is ≤4mm, the surgical procedures are sufficient but for more distances, orthodontics and restorative treatments should be added. Different treatment procedures are performed to treat dark triangle including better hygienic methods, restorative treatment, repeated curettage [3], sub-epithelial CT graft [1,4] orthodontics [5, 6] and hyaluronic acid injection. [7] Although reconstruction of papilla with sub-epithelial graft is a sensitive technique, by delicate case selection a good outcome is achieved. [1,3,8] Surgical procedures such as pedicle flap, semilunar coronally repositioned flap, envelope type flap are used for different incisions. Moreover, restorative methods are occasionally applied but sometimes its outcome is not satisfactory. [3] Recently, Hall have proposed microsurgery methods for less trauma and if they were used with microscope, they would have more advantages. [8] In all surgical procedures, vascularization is an important factor; therefore, techniques such as papilla preservation and semilunar are used for better vascularization .[2] Han et al. suggested a method for papilla reconstruction which was semilunar coronally repositioned papilla with free connective tissue graft that had good result.[9] Azzi et al. proposed envelope

flap with CT graft. [10] Carranza and Zogbi. used epithelial graft with sulcular and two vertical incisions on each side of papilla, which had improvement from both coronal and facial views with no colour mismatch. [4] Palatingal and Mahendra used sub-epithelial CT graft with semilunar incisions as a result the height of papilla improved 1 mm, and the interdental papilla was completely filled. [1] Currently, there is no predictable surgical procedure to retrieve the interdental papilla. [11] Papilla preservation and semilunar are mostly used in other studies because of less interference with blood supply so in this study, we decided to compare these two techniques.

Materials & Methods

This randomized clinical trial study was conducted on 10 sites of two patients. The cases were selected from 5 sites of each patient referred to Periodontology Department Faculty of Dentistry, Babol University of Medical Sciences using both procedures. The number of cases was selected according to the previous study and approved by statics consultant.[12] It was registered in the ethics committee of the university (NO: 3810). After describing the details of the intervention, an informed written consent was signed by all the patients. The inclusion criteria were: a) dark triangle should be present in anterior maxilla, b) all dark triangles should be sub-type I, II of Tarnow's classification, c) the teeth should be vital and without bleeding on probing and d) the patient should be above 18 and good oral hygiene (O'Leary plague score ≤20%).[13] The exclusion criteria were: a) pregnancy, b) hematologic disorders medications interfering with wound healing, c) medications interfering with platelet formation d) smoking e) any systemic or local disease, f) traumatic tooth brushing, g) use of antibiotics in the past 3 month (for 2 weeks), h) allergic reaction to materials used in surgery, i) active infections disease (TB/HBV/HIV) and i) drug-induced enlargement. SRP was done for all patients. After a 2-month period, the patient was visited again. The measured parameters were as follows:

Apicocoronal and mesiodistal distance of the dark triangle, Landry index[13] Visual Analogue Scale (Esthetic) index[12] , Visual Analogue Scale (Pain) index.[13] The sites were anesthetized with 2% lidocaine with 1/80000 epinephrine (Fig1, A&2, A). The semilunar incision was done 3 mm(measured with Williams probe of Hu-friedy) below MGJ and sulcular incisions were carried out without invading the papilla (Fig1, B). In the other cases, the routine papilla preservation technique was performed (Fig2, B). The CT was harvested from the palate at premolar portion. A partial thickness horizontal incision was made about 3 mm apical to the marginal gingiva of the first premolar extending to the first molar (Fig 1, c). After two vertical incisions, the flap was reflected and with a perpendicular incision around the edge of the flap, the connective tissue was obtained (Fig1, D&2, C). Then, the site was sutured with 4-0 silk (Fig1, E). The donor sub- epithelial CT graft was coronally pushed within the prepared flap to support and provide bulk to the coronally positioned interdental papilla. The gingivopapillary unit with CT itself was then sutured using a 4-0 silk suture and after that, a periodontal dressing was applied (Fig1, F). It was followed up for six months (Fig 1, G).

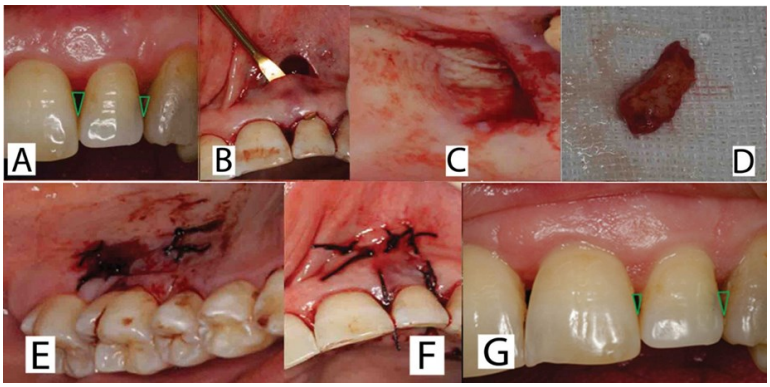

Figure1. Semilunar Technique (A) Initial Clinical appearance ,(B) Semilunar incision, (C) Donor Site, (D) Connective tissue graft, (E) Suturing donor site, (F) Suturing surgical site, (G) After six months

In papilla preservation technique, all procedures were the same except for the initial incision which was done on palatal side and sulcular incision on labial portion.

The CT was harvested with the same procedure mentioned above (Fig 2, C) and the flap with CT was sutured using 4-0 silk suture (Fig 2, D & E). It was followed up for six months (Fig 2, F).

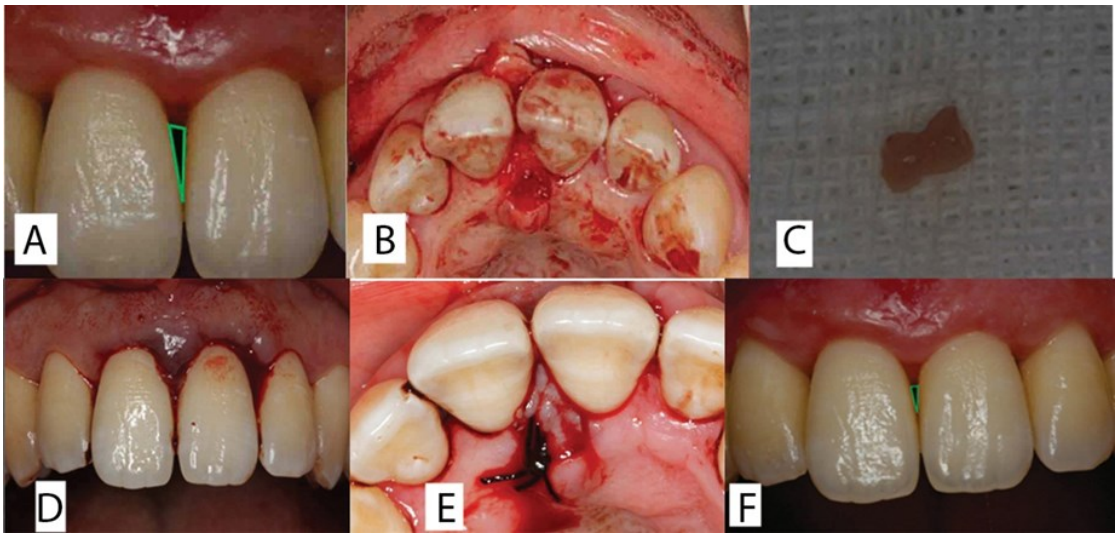

Figure2. Papilla Preservation Technique (A) Initial clinical appearance, (B) Papilla preservation Incision, (C) Connective tissue graft, (D) Connective tissue graft in surgical site, (E) Suturing, (F) After six months

The patients were prescribed analgesics (Ibuprofen 400mg QID for one week),amoxicillin (500mg TID for one week) and 0.2% CHX for two weeks. In both procedures, the sutures were removed after 2 weeks. The Landry index and VAS index (pain) were taken at the time of suture removal. The Landry index was taken on 30th day, too.

The surgical site was evaluated on follow-up visits on the 90thand180th postoperative days (Figure L,M). All the clinical parameters, VAS index (Esthetic) and clinical photographs were taken. The measurement at the baseline (0-day) and on the14th, 30th, 90th and 180th days were taken into consideration for clinical and statistical analysis.

Data were analysed using SPSS. The intragroup paired t-Test and Wilcoxon test, and intergroup Mann-Whitney were used for both procedures. Then, $p<0.05$ was statistically considered significant.

Results

The mesiodistal distance of dark triangle was 2.00±0.000 mm in semilunar cases in day-0, 1.33±0.516 mm after 3 months and 1±0.000 mm after 6 months, whereas in the papilla preservation technique, it was 2.1±0.629 mm in day-0, 1.37±0.478 mm after 3 months and 1.25±0.500 mm after 6 months.

The apicocoronal distance of the dark triangle was 2.6±0.516 mm in semilunar cases in day-0, 2.25±0.012 mm after 3 months and 1.4±0.241 mm after 6 months and in the papilla preservation technique, it was 2.5±0.577 mm at the time of surgery, 2.25±0.500 mm after 3 months and 2.0±0.000 mm after 6 months, which was statically significant. The VAS indexes (pain) in semilunar technique was 2.6±2.000 and 3.50±1.00 for papilla preservation technique. The VAS index (Esthetic) was 7.3±1.033 in the third month and 8.00±0.000 in the sixth month. For papilla preservation, it was 6.50±1.000 after 3 months and 7.75±0.500 after 6 months. The Landry index in semilunar technique was 2.5 and 4 at the time of suture removal (14 days) and after one month, and papilla preservation was 3 and 4 at the time of suture removal and after one month, respectively (Table1). The intergroup analysis (Mann-Whitney) indicated no significant difference between the two groups.

Table1. Mean, standard deviation, P-value of the measured parameters

Group Index	Semilunar (Mean±SD)	Papilla Preservation (Mean±SD)	Pvalue
Vas Index (Pain)	2.67±2.066	3.50±1.00	0.421
Vas Index (Aesthetic)*	8.00±0.000	7.75±0.500	0.245
Landry Index**	4.00±0.000	4.00±0.000	1
Mesio distal distance (Day of surgery)	2.00±0.000	2.125±0.692	-
Mesio distal distance (6 month later)	1.00±0.000	1.25±0.500	0.391
Apico coronal distance (Day of surgery)	2.67±0.516	2.50±0.577	-
Apico coronal distance (6 month later)	1.917±0.2041	2.00±0.000	0.447

*6 month after surgry /** 1 month after surgery

Discussion

In the current study, papilla preservation was compared to semilunar technique in the treatment of dark triangles. For both techniques, the papilla showed more changes in the first 3 months and remained unchanged in the second 3 months. In addition, only two cases of semilunar and one case of papilla preservation had more significant improvement during six months. The VAS index (pain) indicated that the patients experienced more pain in the papilla preservation technique than semilunar one.

The VAS index (Esthetic) suggested a better result for both the third and sixth months in semilunar incision, probably because the papilla was not reflected at all. Landry index changes were 1 point (3 to 4) in papilla preservation and 1.4 (2.6 to 4) in semilunar during two weeks after suture removal. There was no similar study which measures the above indices. The changes in semilunar incision were more due to less trauma and better blood supply, but the difference between the groups was not statistically significant. In both techniques, the changes were 0.5–1 mm. Esthetic changes showed no difference between the two groups except for the scar after the semilunar incision. Landry index was the same after 1 month and VAS index (pain) was higher in papilla preservation technique, but it was not statistically significant.

The mesiodistal changes in semilunar cases were 1 point (2.00±0.000 to 1.00±0.000) and 0.7 point apicocoronally (2.67±0.510 to 1.91±0.20), but were 0.9 point (2.12±0.624 to 1.25±0.500) mesiodistally and 0.5 point apicocoronally (2.50± 0.577 to 2.00±0.000) in papilla preservation technique during 6 months. These results were the same as those of Azzi et al. In their study, unlike us, they did not measure any indices but the overall outcome of their study was satisfactory.[10]

Palathingal and Mahendra. were evaluated the PSI index which was improved 1 point after 6 months and papilla fill was fully completed with a gain of 1 mm. The form of the crown of their case was rectangular and this factor can be one of the reasons of a complete papilla fill. Only in their study, the PSI index was measured and their result was the same as the current study.[1] Carranza et and Zogbi illustrated a complete fill of papilla, but they did not use any measurable index in their study.[4] As described above, all the other studies claimed that they reach almost complete papilla fill, while they did not use any indices and also the measurement was only in apicocoronal dimension. In the present study, complete gain was not achieved due to some parameters as follows:

-The form of the crown: in rectangular crown forms, a complete fill can be predicted

-The underlying bone

-Blood supply: most surgical graft techniques represent low success because of limited blood supply. The blood supply of interdental papilla is from different sources, but the direction of all the sources is towards the base where they anastomose with each other, forming a plexus at the level of papilla.

-Tarnow classification and the dimension of the dark triangle

- Compliance and hygiene of the patient

For a better outcome, it is suggested to repeat this procedure once more after 6 months.

Conclusion

According to this study, although soft tissue gain was observed in both techniques, there was no

significant difference between semilunar and papilla preservation to improve the dark triangle.

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Conflict of interest: There was no conflict of interest.

Authors' Contributions

The study was designed by Morteza Rahimi Rad. The study data were collected by Morteza Rahimi Rad and Pasha Ghahari. Analysis and interpretation of data, drafting of the manuscript, and critical revision of the manuscript for important intellectual content were performed by Ali Bijani. Study supervision was conducted by Niloofar Jenabian

References

1. Palathingal P, Mahendra J. Treatment of black triangle by using a sub-epithelial connective tissue graft. J Clin Diagn Res 2011; 5:1688-91.
2. Damodharan D , Ahathya RS, Raja S,Kumar A.Surgical reconstruction of lost interdental papilla:a case report. PERIO 2007:4:229-34.
3. Singh VP, Uppoor AS, Nayak DG, Shah D. Black triangle dilemma and its management in esthetic dentistry. Dent Res J (Isfahan) 2013; 10:296-301.
4. Carranza N, Zogbi C. Reconstruction of the interdental papilla with an underlying subepithelial connective tissue graft: technical considerations and case reports. Int J Periodontics Restorative Dent 2011; 31:e45-50.
5. de Oliveeira JD, Storrer CM, Sousa AM, Lopes TR, Vieira Jde S, Deliberador TM.Papillary regeneration :anatomical aspects and treatment approaches. RSBO 2012; 9:448-56.
6. Sharma AA, Park JH. Esthetic considerations in Interdental papillae: remediation and regeneration. J Esthet Restor Dent 2010; 22:18-28.
7. Becker W, Gabitov I, Stepanov M, Kois J, Smidt A, Becker BE. Minimally invasive treatment for papillae deficiencies in the esthetic zone: a pilot study. Clin Implant Dent Relat Res 2010; 12:1-8.
8. Hall WB. Pure mucogingival problems : etiology, treatment, and prevention. Chicago: Quintessence; 1984.p. p.43-74.
9. Han TJ, Takei HH. Progress in gingival papilla reconstruction. Periodontol 2000; 11:65-8.
10. Azzi R, Etienne D, Carranza F. Surgical reconstruction of the interdental papilla. Int J Periodontics Restorative Dent 1998; 18:466-73.
11. Ravon NA, Handelsman M, Levine D. Multidisciplinary care: periodontal aspects to treatment planning the anterior esthetic zone. J Calif Dent Assoc 2008; 36:575-84.
12. Haghpanah M JN. Clinical comparison of accecular dermal matrix allograft(Cenoderm) and connective tissue graft in gingival recession treatment.[DDS Thesis]. Babol: Babol University of Medical Science; 2013-2014.
13. O'Leary TJ, Drake RB, Naylor JE. The plaque control record. J Periodontol 1972; 43:38.