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ROOT COVERAGE WITH CONNECTIVE TISSUE GRAFT ASSOCIATED WITH VISTA VERSUS TUNNEL TECHNIQUE IN MILLER CLASS I AND II RECESSION DEFECTS: A RANDOMIZED CONTROLLED CLINICAL TRIAL

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ABSTRACT

Background: Multiple gingival recessions are usually more challenging over single recession ones. Tunnelling technique aims to preserve esthetics, papillary integrity and avoid scar formation by excluding vertical incisions. But being a sensitive blind technique with increased trauma to sulcular epithelium led to the proposal of VISTA technique which avoids some of the potential complications occurring with intrasulcular incisions.
Materials and methods: 20 patients (12 females and 8 males) with multiple Miller class I and II recession defects were treated with SCTG in conjugation with either VISTA or Tunneling technique. Patients were randomly assigned to VISTA (n=10) or Tunneling technique (n=10). The esthetic outcomes were evaluated by assessing the root coverage esthetic score and percentage of root coverage while patient reported outcomes as pain and edema were assessed through VAS based questionnaires.
Results: After 6 months there was a statistically significant difference between (VISTA+SCTG) and (Tunneling+SCTG) regarding pain and edema scores in favor of the VISTA group. No statistically significant difference exited between the two groups regarding the percentage of root coverage or the root coverage esthetic score.
Conclusion: Both VISTA and Tunneling are reliable techniques for treatment of multiple recession defects. However, VISTA approach could be more acceptable for being less technique sensitive and its ability to provide less patient morbidity.
Key words: treatment of gingival recession, root coverage, soft tissue augmentation, gingival augmentation Tunneling, VISTA, vestibular incision sub-periosteal tunnel access, SCTG.

INTRODUCTION

Gingival recession is a common clinical finding especially within old age groups. It is a highly prevalent condition worldwide with percentage of patients affected ranged from 30% to 100% depending on the population **(Matas, Sentís and Mendieta, 2011).** Gingival recession may be caused by progressive periodontal disease, inadequate oral hygiene, high frenal attachment, bone dehiscence, improper restorations, and tooth malposition. It might also occur in populations with high standard of oral hygiene due to traumatic brushing and in populations of

low standards of oral hygiene due to chronic calculus deposition **(Serino *et al.*, 1994).**

Gingival recession may affect single surface, single tooth or multiple adjacent teeth resulting in attachment loss and root exposure. This can lead to clinical complications such as root surface hypersensitivity, root caries, cervical root abrasions and hinders plaque control, which all in turn will result in esthetic and functional problems **(Kassab and Cohen, 2003).** To overcome the problems faced as a sequalae of gingival recession, multiple root coverage approaches were proposed in the literature. However, root coverage was primarily indicated when there was any esthetic concern. Although, in some other scenarios it may be advised to manage root hypersensitivity and provide needed plaque control. That would ideally be done by augmentation of the keratinized tissue **(Zucchelli and Mounssif, 2015a).** These proposed surgical approaches were all well-documented and practiced with satisfactory results. Like any other treatment, each technique had its own advantages, disadvantages and indications. However, each case should be assessed individually to weigh the different factors that may govern the final decision and to choose the most suitable technique in each case. These factors may be surgeon experience related, or patient related or finally related to the dimensions and distribution of gingival recession defects **(Zucchelli and De Sanctis, 2000).**

Nowadays, the aim and scope of research is to propose surgical approaches with high predictability and guaranteeing the required esthetic demands. Nevertheless, be as much conservative and non-invasive as possible to fulfill the patient's major concerns **(Zucchelli and De Sanctis, 2005).** That was the major stimulant for the continuous modification and arousal of new surgical techniques, which aimed for reproducibility. One of these attempts was to eliminate the vertical releasing incisions step in the advancing pedicle flaps in the modified coronally advanced flap and the modified microsurgical tunnel technique **(Zuhr *et al.*, 2007).**

Coronally advanced flap techniques were the most commonly reported techniques in the literature for treatment of root coverage. Other techniques were not tested yet or in other words there are lack of research in testing other approaches like tunneling technique. So, this has led to controversy regarding which technique would be the best for root coverage. Since the emergence of the Tunnel technique in the 90s, several modifications have been described. The aim was always focusing on preserving esthetics, avoiding relapse and maintaining papillary volume and integrity. Other aims were to avoid scar formation and delayed healing which were sequalae of vertical releasing incisions **(Wennström and Zucchelli, 1996).**

As any other technique, tunneling had its main advantage of eliminating the vertical incisions however it had the drawbacks of being a technique sensitive, blind one that could lead to more trauma to sulcular epithelium leading to unfavorable healing process. This led to the emergence of new technique, which is known as Vestibular Incision Subperiosteal Tunnel Access (VISTA). It was described to overcome the anticipated complications that would occur in the intrasulcular tunneling techniques **(Zadeh, 2011).**

However, as it is considered a new approach, the literature didn't cover that part thoroughly and still the evidence is minimal on the results of VISTA technique. Also, there are no enough research and clinical trials that compares patient morbidity and root coverage between intrasulcular tunneling technique and vestibular tunneling technique. Therefore, this study aimed to evaluate the efficacy and performance of VISTA technique in treating of multiple gingival recession and whether it would provide superior outcomes if compared to tunneling technique.

MATERIALS AND METHODS:

1. Study setting:

The present randomized, controlled, parallel-grouped clinical trial included 20 patients (8 males and 12 Females), age range from (30-45), each patient had multiple gingival recession defects (Miller class I & II) affecting the incisors, cuspids or bicuspids which required root coverage. Patients were randomly assigned into two equal groups: The control group: patients received Tunneling technique and subepithelial connective tissue graft (Tunnel + SCTG). while in the test group, patients received

VISTA technique with subepithelial connective tissue graft (VISTA + SCTG).

Subjects were selected from the outpatient clinic, Department of Oral Medicine and Periodontology, Faculty of Dentistry, Cairo University between October 2018 and September 2019. Screening of patients was continued until the target sample was achieved. Identifying and recruiting potential subjects was achieved through patients' database.

2. PICOTS elements:

Population: Patients with Miller class I and II gingival recession.

Intervention: Root coverage using VISTA technique and subepithelial connective tissue graft.

Control: Root coverage using tunneling technique and subepithelial connective tissue graft.

Primary Outcome: post-operative edema using VAS score

Secondary outcomes: post-operative pain, percentage of root coverage, root coverage esthetic score (RES).

Time frame: 6 months

Study design: Single center, prospective, single-blinded, randomized two-arm controlled clinical trial with parallel group set up and 1:1 allocation ratio.

3. Treatment protocol:

.1 Preoperative preparation:

A thorough preoperative assessment of all patients was carried out including history taking, clinical examination and radiographic examination to confirm that they met the eligibility criteria. All patients recruited in the study were treated first by phase I therapy for periodontal treatment through supragingival scaling using ultrasonic device with supragingival scaling inserts followed by subgingival debridement with universal and Gracey curettes .

Strict oral hygiene instructions as tooth brushing twice per day and interdental cleaning with dental floss were prescribed for patients. A chlorhexidine HCL (0.12 %) mouth rinse was prescribed for all patients twice daily for 2 weeks. The patients were assessed after a period of 4 weeks.

2 Surgical procedures:

Control group (Tunneling + SCTG):

Tunneling technique was performed according to **(Zuhr *et al.*, 2007)** as follows:

- Local anaesthesia Septocaine was administrated by buccal and palatal infiltration prior to the surgical procedure.
- Initial preparation of recipient teeth included odontoplasty to reduce any cervical prominences of roots that extend beyond the confines of the alveolar housing. Odontoplasty was performed using rotary finishing burs or ultrasonics with diamond-coated inserts . The roots were then conditioned for 2 minutes with 24% EDTA to eliminate the smear layer before flap reflection to treat only exposed root surface.
- A tunnelling knife with a rounded tip and sharp on both sides (beaver tail) was used till reaching the buccal bone crest with intrasulcular cuts. Then flap elevation was continued by full-thickness preparation for the next 3–4 mm.
- A sharp horizontal dissection of the periosteum was performed, and subsequent split-thickness preparation of the tissues was extended well into the mucosa to reach a split–full– split–thickness design of the flap.
- Adjacent papillary tissues were carefully detached using a split-thickness preparation. It is not recommended to elevate the flap up into the tips of the papillae, as this poses a high risk of papillary height loss after the surgery. Therefore, preparation of the papillae was just done in their apical aspects just to provide sufficient mobility for the desired coronal advancement of the buccal tissues.
- Once coronal advancement of the mucogingival complex was achieved, insertion

of SCTG was carried out using positioning suture to fix it to the overlaying flap. Two separate sutures were utilised for sliding connective tissue graft. First suture was started from the mesial aspect of the tunnel and the second from the distal aspect. The needles were passed below the undermined papillae and both needles exit centrally. Then mucogingival complex was advanced coronally to be stabilized in the new position with a coronally anchored suturing technique.

Test group: (VISTA + SCTG) technique:

- VISTA technique is a modification of the double layer tunneling technique that requires a single incision serving in the creation of the subperiosteal tunnel flap and an opening for the SCTG. This technique was explained by **(Zadeh, 2011)** as follows:
- A vestibular access incision was performed via a vertical incision made on the mucous membrane and the periosteum with a lancet 15c. The incision was 8-10 mm long, beginning from the mobile mucosa and reaching the apical end of the keratinized gingiva. The location of the access incision depended on the sites being treated. In the maxillary anterior region, the midline frenum is an optimal location that could provide access to the entire anterior maxilla.
- The incision was made through the periosteum to elevate a subperiosteal tunnel, exposing the facial osseous plate as well as root dehiscence. A microsurgical periosteal elevator (VISTA 1) was used to create the subperiosteal tunnel. The VISTA 1 elevator was introduced through the vestibular access incision and inserted between the periosteum and bone to elevate the periosteum, creating the subperiosteal tunnel.
- The elevator with bayonet curves (VISTA 2 and 3, Dowell Dental Products) was used to facilitate access to the gingival sulcus and interproximal areas from the vestibular access. The subperiosteal tunnel was extended interproximally under each papilla as far as the embrasure space permits, without making any surface incisions through the papillae.
- The tunnel elevation was extended sufficiently beyond the mucogingival margin as well as through the gingival sulci of the teeth being augmented to allow for low-tension coronal repositioning of the gingiva. This tunnel was extended at least one or two teeth beyond the teeth requiring root coverage to mobilize gingival margins and facilitate coronal repositioning.
- Once coronal advancement of the mucogingival complex was achieved, insertion of SCTG was carried out using positioning suture to fix it to the overlaying flap. Then mucogingival complex was advanced coronally to be stabilized in the new position with a coronally anchored suturing technique as explained before finally, midline incision was then approximated and sutured primarily with multiple 6.0 polypropylene sutures.

- **Postoperative Care:**

Sutures at the access vestibular incision in the test group (VISTA+SCTG) were removed after 1 week. While the coronally anchored bonded sutures in both groups were removed after 3 weeks postoperatively to allow for immobilization of the gingival margin during the initial phases of healing.

- **Postoperative medication (Zucchelli *et al.*, 2010b):**

Antibiotics (1 gm Amoxicillin + clavulanic acid) starting with 2 gm taken 1 hour before surgery as prophylaxis followed by 1 gm 6 hours after the surgical procedure and continued over the following 5 days with 2 gm daily (1gm every 12 hours).

RESULTS

1. Demographic data:

The study population in the present randomized, parallel-grouped clinical trial included 20 patients (8 males and 12 Females), with age range from (30 - 45). Each patient had multiple gingival recession defects (Miller class I & II) affecting the incisors, cuspids or bicuspids which required root coverage. Patients were randomly assigned into two equal groups; control group; where Tunneling technique with subepithelial connective tissue graft (Tunneling + SCTG) was performed and the test group, where VISTA with subepithelial connective tissue graft (VISTA + SCTG) was performed.

Patients treated with VISTA+ SCTG had mean (±SD) age of 35.1 (±4.5) years while those treated with Tunneling+ SCTG had mean (±SD) age of 37 (±5.4) years. There was no statistically significant difference between gender distributions (P=1) as well as between mean age values (P=0.403) in the two studied groups.

2. Postoperative Pain (VAS):

Changes by time within each group:

Control group (Tunneling + SCTG):

There was a statistically significant change in median (range) pain scores by time (*P*-value <0.001, Effect size = 0.904). Pair-wise comparisons between time periods revealed that there was a statistically significant increase in median (range) pain scores after one day followed by non-statistically significant change from day 1 to day 2 as well as day 2 to day 3. From day 3 to day 4, there was a statistically significant decrease in median (range) pain score followed by non-statistically significant change in pain scores till day 6. From day 6 to day 7, there was a statistically significant decrease in pain scores followed by non-statistically significant change from day 7 to day 8. From day 8 to day 9, there was a statistically significant decrease in pain scores followed by non-statistically significant change from day 9 to day 10. From day 10 to day 11 as well as from day 11 to day 12, there was a statistically significant decrease in median pain scores followed by non-statistically significant change from day 12 to 13 and 13 to 14 days (table 1).

Test group (VISTA+ SCTG):

In the test group, there was a statistically significant change in median (range) pain scores by time (*P*-value <0.001, Effect size = 0.762). Pair-wise comparisons between time intervals revealed that there was a statistically significant increase in median pain scores after one day followed by non-statistically significant change from day 1 to day 2. From day 2 to day 3, there was a statistically significant decrease in median (range) pain score followed by non-statistically significant change in pain scores till day 5. From day 5 to day 6, there was a statistically significant decrease in pain scores followed by non-statistically significant change from day 6 to days 7, 8 as well as day 9. From day 9 to day 10, there was a statistically significant decrease in pain scores followed by non-statistically significant change till day 14 (table 1).

Table (1): Descriptive statistics and results of Friedman's test for comparison between pain scores at different times within each group:

Time	Tunneling + SCTG group (n = 10)	VISTA+ SCTG group (n = 10)
	Median (Range)	Median (Range)
Base line	5 (4-7) [C]	5 (4-6) [B]
Day 1	7 (5-10) [A]	6 (3-7) [A]
Day 2	7 (5-10) [A]	6.5 (3-8) [A]
Day 3	7 (4-10) [A]	5 (2-8) [B]

Day 4	6.5 (4-9) [B]	5 (2-7) [B]
Day 5	6 (4-9) [B]	5 (0-7) [B]
Day 6	6 (3-9) [B]	3 (0-7) [C]
Day 7	5 (2-8) [C]	2.5 (0-7) [C]
Day 8	5 (2-8) [C]	2 (0-7) [C]
Day 9	3 (0-8) [D]	2 (0-7) [C]
Day 10	3 (0-8) [D]	0.5 (0-7) [D]
Day 11	1.5 (0-7) [E]	0 (0-7) [D]
Day 12	0 (0-7) [F]	0 (0-7) [D]
Day 13	0 (0-7) [F]	0 (0-7) [D]
Day 14	0 (0-7) [F]	0 (0-7) [D]
***P*-value**	<0.001*	<0.001*
Effect size (*w*)	0.904	0.762

**: Significant at P ≤ 0.05, Different superscripts in the same column indicate statistically significant changes by time.*

Comparison between both groups:

On comparing both groups, there was no statistically significant difference between median (range) pain scores at all observation periods except at day 1 post-surgically where the control group (Tunneling + SCTG) showed statistically significantly higher median (range) pain score than the test group (VISTA+SCTG) (*P*-value = 0.020) (table 2).

Table (2): Descriptive statistics and results of Mann-Whitney U test for comparison between pain (VAS) scores in the two groups:

Time	Tunneling + SCTG group (n = 10) Median (Range)	VISTA+ SCTG group (n = 10) Median (Range)	95% CI for the mean difference	*P*-value
Base line	5 (4-7)	5 (4-6)	0.343 [-1.1, 0.3]	0.351
Day 1	7 (5-10)	6 (3-7)	1.151 [-2.9, -0.3]	0.020*
Day 2	7 (5-10)	6.5 (3-8)	0.45 [-2.6, 0.6]	0.315
Day 3	7 (4-10)	5 (2-8)	0.866 [-3.6, -0.03]	0.071
Day 4	6.5 (4-9)	5 (2-7)	0.866 [-3.3, -0.1]	0.070
Day 5	6 (4-9)	5 (0-7)	0.718 [-3.9, 0.1]	0.124
Day 6	6 (3-9)	3 (0-7)	0.933 [-4.2, 0.01]	0.054
Day 7	5 (2-8)	2.5 (0-7)	0.759 [-4.1, 0.3]	0.108
Day 8	5 (2-8)	2 (0-7)	0.844 [-4.4, 0.2]	0.079

Day 9	3 (0-8)	2 (0-7)	0.487 [-3.7, 1.1]	0.282
Day 10	3 (0-8)	0.5 (0-7)	0.45 [-3.6, 1.4]	0.308
Day 11	1.5 (0-7)	0 (0-7)	0.343 [-3.3, 1.7]	0.418
Day 12	0 (0-7)	0 (0-7)	0.187 [-3.2, 1.6]	0.584
Day 13	0 (0-7)	0 (0-7)	0.308 [-3.2, 1.4]	0.330
Day 14	0 (0-7)	0 (0-7)	0.308 [-3.2, 1.4]	0.330

**: Significant at P ≤ 0.05*

3. Postoperative Edema:

Changes by time within each group:

The control group (Tunneling + SCTG):

There was a statistically significant change in median (range) edema scores by time in the control group (*P*-value <0.001, Effect size = 0.999). Pair-wise comparisons between time periods revealed that there was a statistically significant increase in median (range) edema scores after one day followed by non-statistically significant change from day 1 to day 2. From day 2 to day 3, there was a statistically significant decrease in median (range) edema score followed by non-statistically significant change from day 3 to day 4. From day 4 to day 5, there was a statistically significant decrease in median edema score followed by non-statistically significant change from day 5 to day 6. However, from day 6 to day 7, there was a statistically significant decrease in edema scores followed by non-statistically significant change from day 7 to day 8. From day 8 to day 9, there was a statistically significant decrease in edema scores followed by non-statistically significant change from day 9 to days 10 and 11. From day 11 to day 12 as well as from day 12 to day 13, there was a statistically significant decrease in median edema scores followed by non-statistically significant change from day 13 to day 14 (table 3).

The test group (VISTA + SCTG):

Regarding the test group, there was a statistically significant change in median edema scores by time (*P*-value <0.001, Effect size = 0.662). Pair-wise comparisons between time periods revealed that there was no statistically significant change in median edema scores after one day, from day 1 to day 2, day 2 to day 3, day 3 to day 4 as well as from day 4 to day 5. However, the median (range) edema score after 3, 4 and 5 days showed statistically significantly lower value compared to day 1 score. From day 5 to day 6, there was a statistically significant decrease in edema score followed by non-statistically significant change from day 6 to day 7 as well as from day 7 to day 8. From day 8 to days 9 and 10, there was a statistically significant decrease in edema score followed by non-statistically significant change through the remaining follow up periods (table 3).

Table (3): Descriptive statistics and results of Friedman's test for comparison between edema scores at different times within each group:

Time	**Tunneling + SCTG group (n = 10)**	**VISTA+ SCTG group (n = 10)**
	Median (Range)	Median (Range)
Base line	5 (4-7) ^{B}	5 (4-6) ^{AB}
Day 1	7 (5-9) ^{A}	5.5 (3-7) ^{A}
Day 2	7 (6-9) ^{A}	5 (3-8) ^{AB}
Day 3	6 (5-9) ^{B}	4.5 (2-7) ^{B}

Day 4	6 (5-9) [B]	4 (0-7) [B]
Day 5	5 (4-8) [C]	4 (0-7) [B]
Day 6	5 (3-8) [C]	3 (0-7) [C]
Day 7	4 (0-8) [D]	2.5 (0-7) [C]
Day 8	4 (0-6) [D]	2.5 (0-7) [C]
Day 9	3 (0-6) [E]	1.5 (0-7) [D]
Day 10	3 (0-5) [E]	0 (0-7) [E]
Day 11	3 (0-4) [E]	0 (0-7) [E]
Day 12	1 (0-4) [F]	0 (0-7) [E]
Day 13	0 (0-4) [G]	0 (0-7) [E]
Day 14	0 (0-3) [G]	0 (0-14) [E]
***P*-value**	<0.001*	<0.001*
Effect size (*w*)	0.999	0.662

**: Significant at P ≤ 0.05, Different superscripts in the same column indicate statistically significant changes by time.*

Comparison between both groups:

On comparing both groups, there was no statistically significant difference between median (range) edema scores in the two groups at all observation periods except at days 1, 2, 3 and 4 where the test group (VISTA + SCTG) showed statistically significantly lower median (range) edema scores than the control group (Tunneling + VSCTG) (*P*-value = 0.030, 0.007, 0.015, 0.026) respectively (table 4).

Table (4): Descriptive statistics and results of Mann-Whitney U test for comparison between edema scores in the two groups:

Time	Tunneling + SCTG group (n = 10) Median (Range)	VISTA+ SCTG group (n = 10) Median (Range)	95% CI for the mean difference	*P*-value
Base line	5 (4-7)	5 (4-6)	0.153 [-0.9, 0.5]	0.688
Day 1	7 (5-9)	5.5 (3-7)	1.05 [-2.6, -0.2]	0.030*
Day 2	7 (6-9)	5 (3-8)	1.468 [-3.5, -0.7]	0.007*
Day 3	6 (5-9)	4.5 (2-7)	1.258 [-3.5, -0.5]	0.015*
Day 4	6 (5-9)	4 (0-7)	1.125 [-4.1, -0.5]	0.026*
Day 5	5 (4-8)	4 (0-7)	0.718 [-3.4, 0.2]	0.125
Day 6	5 (3-8)	3 (0-7)	0.979 [-3.6, -0.02]	0.052
Day 7	4 (0-8)	2.5 (0-7)	0.639 [-4.1, 0.7]	0.166

Day 8	4 (0-6)	2.5 (0-7)	0.822 [-3.4, 0.4]	0.083
Day 9	3 (0-6)	1.5 (0-7)	0.273 [-2.8, 1.6]	0.516
Day 10	3 (0-5)	0 (0-7)	0.718 [-3.3, 0.7]	0.087
Day 11	3 (0-4)	0 (0-7)	0.801 [-3, 0.6]	0.105
Day 12	1 (0-4)	0 (0-7)	0.619 [-2.6, 1]	0.102
Day 13	0 (0-4)	0 (0-7)	0.45 [-2.3, 1.3]	0.196
Day 14	0 (0-3)	0 (0-14)	0.204 [-2.2, 4.4]	0.576

**: Significant at P ≤ 0.05*

4.Root coverage esthetic score:

In each of the two groups, there was no statistically significant change in median (range) root coverage esthetic score after six months (*P*-value = 0.655, Effect size = 0.141) for the VISTA group and (*P*-value = 1, Effect size = 0) for the Tunneling group (table 5).

The VISTA group obtained a median (range) RES score of 7.8 (7-9), while the Tunneling group showed a median (range) RES score of 7.5 (7-10) as shown in table (5). The objective measurements of esthetic outcomes by RES score 6 months postoperatively showed no statistically significant difference (*P*-value = 0.810, Effect size = 0.102) between the two studied groups.

Table (5): comparison between root coverage esthetic scores at different times within each group and between both groups:

Time	**Tunneling + SCTG group (n = 10)**	**VISTA+ SCTG group (n = 10)**	**95% CI for the mean difference**	***P*-value**
	Median (Range)	Median (Range)		
3 months	8 (6-10)	8 (6-9)	0.119 [-1, 1.1]	0.785
6 months	7.5 (7-10)	7.8 (7-9)	0.102 [-0.9, 0.9]	0.810
***P*-value**	1	0.655		
Effect size (*d*)	0	0.141		

**: Significant at P ≤ 0.05*

5. Percentage of Root coverage:

The percentage of root coverage within each group was calculated and represented in table (18). After 6 months, the mean percentage root coverage achieved in patients treated with VISTA was 81.2 (±17.4) %, while patients treated with Tunneling demonstrated 74.6 (±12.1) % of root coverage. After three as well as six months, there was no statistically significant difference in mean percentage root coverage between the two groups (*P*-value = 0.490, Effect size = 0.027) and (*P*-value = 0.617, Effect size = 0.014) respectively (table 6).

Table (18): Descriptive statistics and results of repeated measures ANOVA test for comparison between percentage root coverage at different times within each group and between both groups:

Time	Tunneling + SCTG group (n = 10)	VISTA+ SCTG group (n = 10)	95% CI for the mean difference	*P*-value
	Mean (±SD)	Mean (±SD)		
3 months	86.3 (±13)	81.5 (±17.2)	0.027 [-19.1, 9.5]	0.490
6 months	74.6 (±12.1)	81.2 (±17.4)	0.014 [-17.5, 10.7]	0.617
***P*-value**	0.059	0.726		
Effect size	0.184	0.007		

**: Significant at P ≤ 0.05*

DISCUSSION

Several surgical procedures have been proposed for treatment of either isolated or multiple gingival recessions. The choice of the optimum treatment modality depends mainly on the papillary gingival height, level of alveolar bone and interdental papillae, gingival phenotype besides other esthetic demands **(Shkreta *et al.*, 2018)**. Some of these different surgical techniques have gained attention due to their high success rates and patient satisfaction as coronally advanced flap (CAF), free gingival graft (FGG) epithelialized or de-epithelialized, subepithelial connective tissue grafts (SCTG) in addition to the recently introduced minimally invasive techniques as Tunneling procedures **(Zucchelli and De Sanctis, 2013)**.

The choice of the most favorable technique for coverage of multiple recession defects is multifactorial. It depends on the number of teeth or sites affected, the dimensions of the recession defects, the gingival phenotype and the surgical skill of the operator. It has been reported that CAF augmented with SCTG could achieve complete root coverage for multiple recession defects successfully, thus it was considered the gold standard. However, avoiding vertical releasing incisions and not incising the papillae was found to improve vascularization of the area. Therefore, tunneling

Tunnel technique was introduced with the aim of providing root coverage with acceptable esthetic outcome. This technique has showed encouring results in multiple gingival recession treatment by providing the advantage of excluding surface incisions together with allowing coronal advancement of a continuous mucoperiosteal tunnel over multiple exposed roots leaving of the connective tissue graft peripheries uncovered at deep sites**(Aroca *et al.*, 2010)**. Tunneling technique could deliver a properly healed gingival tissues with proper keratinized tissue alignment and color blending **(Zuhr *et al.*, 2018).** However, the only access provided in tunnelling technique is through the gingival sulcus which is difficult and might cause tearing for the gingival papillae. Also, the space allowed for graft placement is small and inaccessible which may cause either graft squeezing or flap tearing. Being a blind technique has made tunneling procedure sensitive, with longer chair side time and subsequent increased postoperative pain and edema **(Cairo *et al.*, 2009; Gobbato *et al.*, 2016).**

Although tunneling technique avoided the drawbacks of vertical and surface incisions but, it still needed skillful trained hands and special surgical armamentarium to do it efficiently without doing flap perforations which remarkably affected the final esthetic outcome. Being technique sensitive and blind, led to evolution of a more predictable and reproducible technique via a newer approach known as Vestibular Incision Subperiosteal Tunnel Access (VISTA). The VISTA technique was postulated to overcome some of the potential shortcomings associated with other intrasulcular tunneling techniques **(Zadeh, 2011)**

Preservation of circulation in an apico-coronal direction was found mandatory for treatment success. Therefore, VISTA technique could provide a wider access to the entire surgical region with improved visualization through the single vestibular incision. Moreover, the vertical vestibular incision could allow the detection of any tissue tags which would disrupt the continuity of the traditional tunnelling technique **(Reddy *et al.*, 2016; Jasser, AlKudmani and Andreana, 2017).** The single vertical incision mesial to the defect in VISTA technique could decrease the possibility of traumatizing the gingiva allowing easier accessibility for graft insertion maintain the integrity and vascularity of delicate papillae and facilitating the healing process **(Ozenci *et al.*, 2015).**

Periodontal plastic surgeries augmented with SCTG have showed a higher degree of complete root coverage as well as significant increase of KT. Thus, the literature has agreed that SCTG plays a crucial role in management of gingival recession regardless of the surgical technique used. Moreover, a thickness of 1.5-2 mm for SCTG was harvested using single incision line technique for better visibility, better assessment of the graft size, minimal bleeding and less patient discomfort **(Del Pizzo *et al.*, 2002)**. In either VISTA or Tunneling techniques, SCTG was inserted into the tunnel using positioning suture which facilitated graft insertion and immobilization **(Hürzeler and Weng, 1999; Lorenzana and Allen, 2000a)**.

On the same way, VISTA technique is still new with a very scarce data in literature, only few reports with no well formulated outcomes or intergroup comparisons with any root coverage technique either CAF or Tunneling. Therefore, our current randomized clinical trial goal is to assess the efficacy of VISTA technique in of multiple gingival recession treatment and to compare it to tunneling technique both using SCTG while monitoring patient morbidity and focusing on the root coverage outcomes.

Nowadays, in the presence of evidence-based research, a shift towards improving the patient related outcomes by periodontists has been their first priority. Despite the fact that the outcomes reported by the clinician are much more dependable than that reported by the patient, yet it may not always be that important for the patient. Researchers have been debating around different root coverage techniques and their statistical values, while the actual success is reflected by the patient satisfaction more than complete root coverage (CRC) **(McGuire, Scheyer and Nunn, 2012)**. Accordingly, in this study patient reported outcomes were mandatory and were reported via a questionnaire to assess the degree of patient satisfaction in a reliable way.

In the current randomized clinical trial, there was a statistically significant reduction in edema scores within each of the studied groups over the 2 weeks interval. However, no statistically significant difference was observed between median (range) edema scores in the two groups at all observation periods except at days one, two, three and four where (VISTA + SCTG) group showed statistically significantly lower median (range) edema scores of 5(3-7), 5(3-8), 4.5(2-7) and 4(0-7) while (Tunneling + SCTG) group showed scores of 7(5-9), 7(6-9), 6(5-9) and 6(5-9) respectively. These results were higher than those reported by **Gobbato et al. (2016)** who reported edema VAS scores of 3.8 (±1.31) for (Tunneling+SCTG) group versus 1.4 (±0.40) for (CAF+SCTG) group. The results of the current trial indicated that VISTA could provide lower edema scores than Tunneling in the first days after the surgery that might be due to minimizing the incisions in VISTA technique, which were more favorable to the patients.

The present investigation demonstrated a statistically significant increase in pain scores at the first day after the surgery within each of the two groups. However, the pain scores started to decrease significantly from day 3 in the tunneling group and from day 2 in the VISTA group. There was no statistically significant difference between median (range) pain scores in the two groups at all observation periods except at day one, where (VISTA+SCTG) group showed statistically significantly lower median (range) pain score 6 (3-7) than (Tunneling+SCTG) group 7 (5-10). These results were superior to **Gobbato et al. (2016)** who reported lower pain scores of 5.2 (1.02) for (Tunneling + SCTG) versus 4.3 (1.09) for (CAF + SCTG) group. However, the pain scores reported in the current clinical trial were better than those obtained by **Stefanini et al. (2016)** who reported their pain scores to be 8.58 (±1.86) after using CAF with collagen membrane. This proves that minimally invasive techniques either Tunneling or VISTA could minimize the pain

scores and patient morbidity. Nevertheless, at the first two days after surgery VISTA technique showed less pain than tunneling technique which could also be due to the less incisions and hence the less trauma performed to the tissues.

Complete root coverage (CRC) was considered when gingival margin was coronal to CEJ **(Pini-Prato *et al.*, 2015)**. In the current study, the improvement of mean (±SD) percentage root coverage was close in the two groups, where (VISTA+SCTG) group could reach 81.2 (±17.4) % root coverage, while (Tunneling +SCTG) group was 74.6 (±12.1) %. The results of this study were slightly inferior to a study done by **Dandu and Murthy (2016)**, who showed 87.37% root coverage after recession treatment with VISTA using Bio-guide collagen membrane. This could be due to the more possibility of coronal advancement of the flap with the thinner collagen membrane. Similarly, 78.99% root coverage was achieved in a published case series by **Poornima & Meena (2021)** examining the efficacy of VISTA in treatment of Miller Class I or II recession defects in 10 patients with a total of 28 defects in the maxillary anterior region. However, superior results were represented in a retrospective study by **Gil et al. (2018)** testing the outcomes of VISTA approach, where a 96.2 % and 84.3 % mean percentages of linear root coverage were obtained for Miller Class I/II and Class III recessions, respectively.

On the other hand, the current results are in consistence with **Bherwani et al. (2014b)** who reported 80% root coverage following treatment with Tunneling technique with SCTG in Miller Class I and II recession defects. Also, similar percentage of root coverage were showed by **Ozenci et al. (2015)** on comparing CAF with Tunneling together with ADM, where mean root coverage was 75.72% in Tunneling+ADM versus 93.81% in CAF+ADM which indicated that more root coverage percentage could be obtained with CAF procedures. Hence, the intergroup differences were found to be statistically significant for recession height and width reduction, KT increase, CAL gain, CRC and RES in favor of CAF+ADM group. Also, approximated results were expressed by **Nart and Valles (2016)** in a single arm control trial using SCTG in combination with Tunneling technique for treatment of Miller class II & III recession defects in a sample of fifteen patients, where the mean percentage of root coverage was 83.25% for all treated recessions.

In this current study, after three as well as six months; there was no statistically significant difference in RES between the two groups, where the median (range) RES in VISTA group was 7.8 (7-9) while it was 7.5 (7-10) in the Tunneling group. Although both groups showed no statistically significant difference in both percentage of root coverage and RES, VISTA technique showed higher percentage of scar formation which was not clear in results due to the higher percentage of root coverage. These results were inferior to the results presented by **Azaripour et al. (2016)** who compared the final aesthetic outcomes by RES scores between Tunnelling and CAF with SCTG, where both treatments showed higher RES of 9.2. However, the results of the current study were in agreement with those obtained by **Stefanini et al. (2016)** who reached a RES of 7.85 after performing CAF with collagen membrane. This indicates that Tunneling and VISTA techniques could be comparable to the gold standard CAF with satisfactory esthetic outcomes.

To the best of our knowledge, this is the first randomized controlled clinical trial comparing the effect of SCTG with both VISTA and Tunneling techniques for management of multiple Miller Class I and II recession defects. Despite the limitations in this study, it can be concluded that VISTA technique can be used as a reliable method for root coverage procedures of multiple recession defects with high patient acceptance. Being less technique sensitive with less patient morbidity could encourage the clinicians in widely performing VISTA technique over the Tunneling procedure when large coronal advancement of the flap is mandatory. However, the statistically significant reduction in KTW with VISTA technique should not be ignored and would require further investigations through multicenter clinical trials with longer follow up periods to assess the stability of the gingival margin and the possible enhancement of the KTW with time. Therefore, this study opens more gates for debatable points around the esthetic outcomes predicted from these minimally invasive techniques

CONCLUSION

[1] VISTA+SCTG and Tunneling+SCTG are effective techniques for treatment of multiple Miller class I and II gingival recession defects with statistically significant improvement of all clinical parameters after 6 months.
[2] VISTA+SCTG showed statistically significant lower pain and edema scores at the first few days than Tunneling+SCTG, yet this difference was not statistically significant after 14 days.
[3] Both techniques showed a statistically significant increase in gingival thickness after 6 months. However, VISTA+SCTG showed statistically significant more increase in gingival thickness over Tunelling+SCTG at 3 months post-surgically, however this difference was not statistically significant after 6 months.
[4] There was a statistically significant decrease in KTW with VISTA+SCTG after 3 and 6 months post-surgically versus a statistically significant increase with Tunelling+SCTG.
[5] Both techniques could reach an acceptable percentage of root coverage with no statistically significant difference between them.

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Figure (46): Pre-operative view.

Figure (47): Immediate Post-operative view.

Figure (48): three months follow up.

Figure (49): six months follow