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RESEARCH ARTICLE

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Does vestibular incision improve the outcomes of vestibular incision subperiosteal tunnel technique: A randomized clinical trial for treatment of multiple adjacent type 1 gingival recession

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Abstract

Objective: The purpose of this study was to compare the clinical outcomes of vestibular incision subperiosteal tunnel technique (VISTA) and tunnel approach combined with connective tissue graft (CTG) for treatment of type 1 (RT1) multiple gingival recession.

Materials and Methods: Twenty-four patients with a total of 59 nonmolar recession teeth were randomly allocated to VISTA + CTG or Tunnel + CTG group. Recession depth and width, probing depth, clinical attachment level, width of keratinized tissue, gingival thickness, flap tension, mean root coverage (MRC), complete root coverage (CRC), patient-centered, and esthetic outcomes (root coverage esthetic scores, RES) were assessed at baseline and 12 months after surgery.

Results: At 12 months, MRC of 91.13 ± 16.96% and 91.40 ± 13.53%, CRC of 70.97% and 67.86% were observed for VISTA + CTG and Tunnel + CTG group respectively, with no significant difference between the two groups ($p > 0.05$). High RES of 8.52 ± 1.46 and 8.82 ± 1.44 was obtained in VISTA + CTG and Tunnel + CTG group respectively, without showing a significant difference ($p = 0.245$), while less scar formation was observed in Tunnel + CTG group ($p < 0.01$).

Conclusions: Both procedures were effective for root coverage in RT1 multiple gingival recession at 12 months. Better esthetic result with less scar formation was obtained in tunnel approach combined with CTG without vestibular incision. (Registration number: ChiCTR-INR-16007845, registered on 19/12/2015, http://www.chictr.org.cn).

Clinical Significance: VISTA + CTG and Tunnel + CTG were both effective for root coverage in RT1 multiple gingival recession, with satisfying esthetic outcomes. However,

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it is suggested in critical esthetic areas, treatment options of making vertical incisions should be carefully considered.

KEYWORDS
connective tissue graft, multiple gingival recession, root coverage, tunnel, vestibular incision subperiosteal tunnel access

1 | INTRODUCTION

Gingival recession is the apical shift of the gingival margin with respect to the cemento-enamel junction (CEJ).[1] According to treatment-oriented classification, gingival recession can be divided into recession type 1, 2, and 3 (RT 1, 2, 3), based on the interdental clinical attachment level.[2,3] It can also be classified by single and multiple recessions. The treatment of multiple gingival recessions is usually more challenging,[4] because the surgical area was expanded and with higher anatomical variability, such as prominent roots, shallow vestibules, enamel–root abrasions, and unevenness in residual keratinized tissue.[5]

For treatment of RT1 recessions, connective tissue graft (CTG)-based procedures were considered to provide the best outcomes.[6,7] Tunnel technique, as a promising method without detachment of the papillary tissues, was commonly used with CTG.[4,8–15] The authors reported the complete root coverage of 85% and the mean root coverage of 90%, for using a tunneling flap procedure in conjunction with a CTG for treatment of multiple adjacent RT 1 recessions at 12-month.[16]

Tunnel technique originated from the envelope method.[17] At that time, connective tissue graft was exposed partially after suture.[8,9] However, the exposed graft did not match the adjacent gingiva, resulting in esthetic problems. Then, tunnel technique was modified with marginal tissue coronal positioning, which allowed complete coverage of the graft.[12,18] Clinical studies showed that the more coronal the gingival margin after suturing, the greater the probability of achieving complete root coverage.[19,20] In vestibular incision subperiosteal tunnel access (VISTA) technique, the vestibular incision was made to enhance gingival release and reduce gingival tension.[21]

However, the actual effect of additional vestibular incision on root coverage and its potential unfavorable esthetic influence have not been evaluated yet. The purpose of this study was to compare the clinical outcomes of VISTA and tunnel approach combined with CTG for treatment of RT1 multiple gingival recession. The hypotheses were that the vestibular incision would improve the mean and complete root coverage results, but with unfavorable esthetic influence.

2 | MATERIALS AND METHODS

2.1 | Subjects

The present study was a single-center, randomized, clinical, and assessor-blind clinical trial with a 12-month follow-up (Registration number: ChiCTR-INR-16007845, registered on 19/12/2015, http://www.chictr.org.cn). The study was structured according to the CONSORT statement (http://www.consort-statement.org/). The study protocol had been performed in accordance with the Declaration of Helsinki as revised in 2013 and approved by Peking University Hospital of Stomatology Institution's Human Research Committee (protocol PKUSSIRB-201519007). Written informed consent was obtained from all patients. Twenty-four patients from Peking University Hospital of Stomatology with RT1 multiple gingival recession were enrolled from January 2016 to December 2017. Participants matching the following entry criteria were recruited:

- Presence of at least two adjacent nonmolar teeth with RT1 recessions,[2] with at least one recession depth ≥2 mm
- Absence of noncarious cervical lesions (NCCLs) and nondetectable CEJ at the defect sites
- Full mouth plaque score and bleeding score ≤ 20%[22]
- Nonsmoker

Exclusion criteria were as follows:

- Presence of caries lesions or restorations in the buccal/labial cervical area
- Medical contraindications for periodontal surgical procedures (uncontrolled diabetes mellitus, hypertension, etc.)
- Current pregnancy or lactation
- History of tobacco smoking

2.2 | Sample size

The sample dimension was calculated using $\alpha = 0.05$ and the power (1-β) of 80%. The calculation was designed to detect a true mean difference of at least 0.50 mm (the minimum clinically significant value) between both treatment groups regarding recession depth after 12 months. For the variability, a value of the standard deviation (SD) of 0.45 mm was assumed.[23] Based on these data, the needed number of patients to be enrolled in this study was 12 for each group.

2.3 | Randomization and blinding

Subjects were divided randomly into the VISTA + CTG group or Tunnel + CTG group, based on computer-generated random numbers (allocation ratio of 1:1). Allocation concealment was obtained by sequentially numbered, opaque, sealed envelopes containing the treatment to the specific subject. Treatment assignment was registered by the clinician who assisted in the operations (Z.C). The

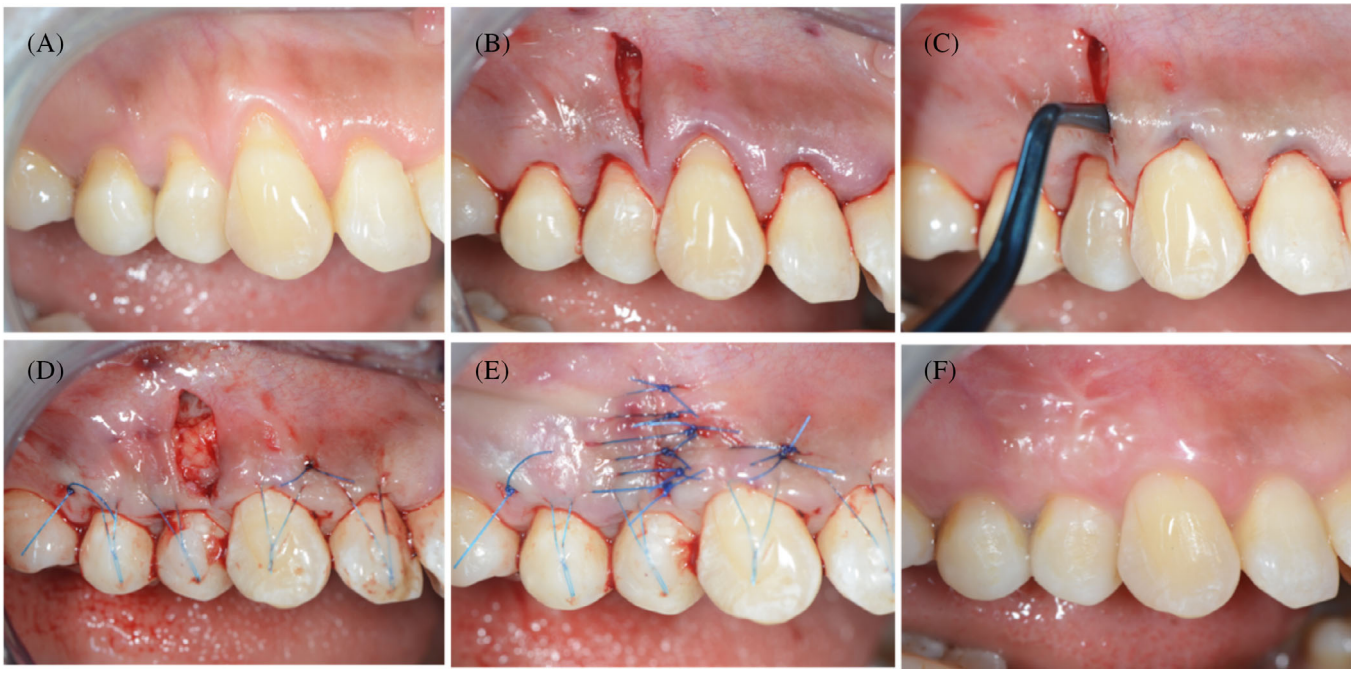

FIGURE 1 VISTA + CTG group. (A) Recession type I gingival recession from the lateral incisor to the second premolar. (B) Vertical incision at the vestibular between the canine and first premolar. (C) Releasing gingiva through the vertical incision. (D−E) Securing of the CTG. The flap was coronally advanced over CEJ and stabilized in the new position with a coronally anchored suturing. (F) 12 months postsurgery, complete root coverage was achieved. However, there was scar formation at the vertical incision.

envelopes were opened immediately after local anesthetization. An experienced periodontist performed all surgical procedures (J.Z).

2.4 | Intervention and follow up

For VISTA + CTG technique, the tunnel preparation was performed as previously described by Zadeh.[21,24] In brief, after root surface preparation, a vestibular incision was made to get tunnel access. The dissection was extended sufficiently to ensure the flap could be advanced at the most coronal position (2 mm or more coronal to CEJ). CTG, harvested from palate,[25] was inserted into the tunnel space[10] and fixed with suture (5–0 polypropylene, Ethicon LLC, Puerto Rico, USA). Then, the flap was coronally advanced over CEJ and stabilized in a new position with coronally anchored suturing technique.[21] This technique entails placing a horizontal mattress suture using a 6–0 polypropylene suture (Ethicon LLC, Puerto Rico, USA) at approximately 2–3 mm apical to the gingival margin of each tooth, spanning the width of the tooth.[21] The suture was tied so that the knot is positioned at the midcoronal point of each tooth. The suture was secured to the facial aspect of each tooth by flowable composite resin, keeping the gingival margin at the most coronal level of the interproximal papillae. The procedure was shown in Figure 1.

In the tunnel + CTG group, tunnel preparation was made through crevicular incisions. The dissection was also extended sufficiently to ensure the flap advanced at the most coronal position (2 mm or more coronal to CEJ). CTG, harvested from palate,[25] was inserted into the tunnel space[10] and fixed with suture (5–0 polypropylene, Ethicon LLC, Puerto Rico, USA). The gingival flap was coronally advanced and sutured as same as VISTA + CTG technique.[21] The whole procedure was shown in Figure 2.

All patients were advised to avoid mechanical trauma and tooth brushing and flossing at the surgical sites until suture removal. And patients were instructed to intermittently apply ice compress for the first 2–3 h. Postoperative instructions consisted of 0.12% chlorhexidine solution (Peking University Hospital of Stomatology, Beijing, China) to rinse mouth twice a day for at least 2 weeks. Patients were prescribed amoxicillin (Zhuhai United Laboratories Co., Ltd, Zhongshan, China) 500 mg three times a day for 5 days, as well as ibuprofen (GSK, Tianjin, China) 500 mg every 8 h as needed for pain control for 3 days.

The sutures were removed 2 weeks postsurgery. Patients were recalled at 1, 3, 6, and 12 months after surgery for professional oral hygiene procedures and clinical evaluations.

2.5 | Clinical evaluation

At baseline, 1, 3, 6, and 12 months, the following measurements were evaluated by a single calibrated examiner (YX), who was masked to the treatment allocation. A calibration exercise was carried out to assess the intra-examiner reproducibility. Recession depth measurements at a set of 20 recession defects were evaluated twice within 2 weeks for each

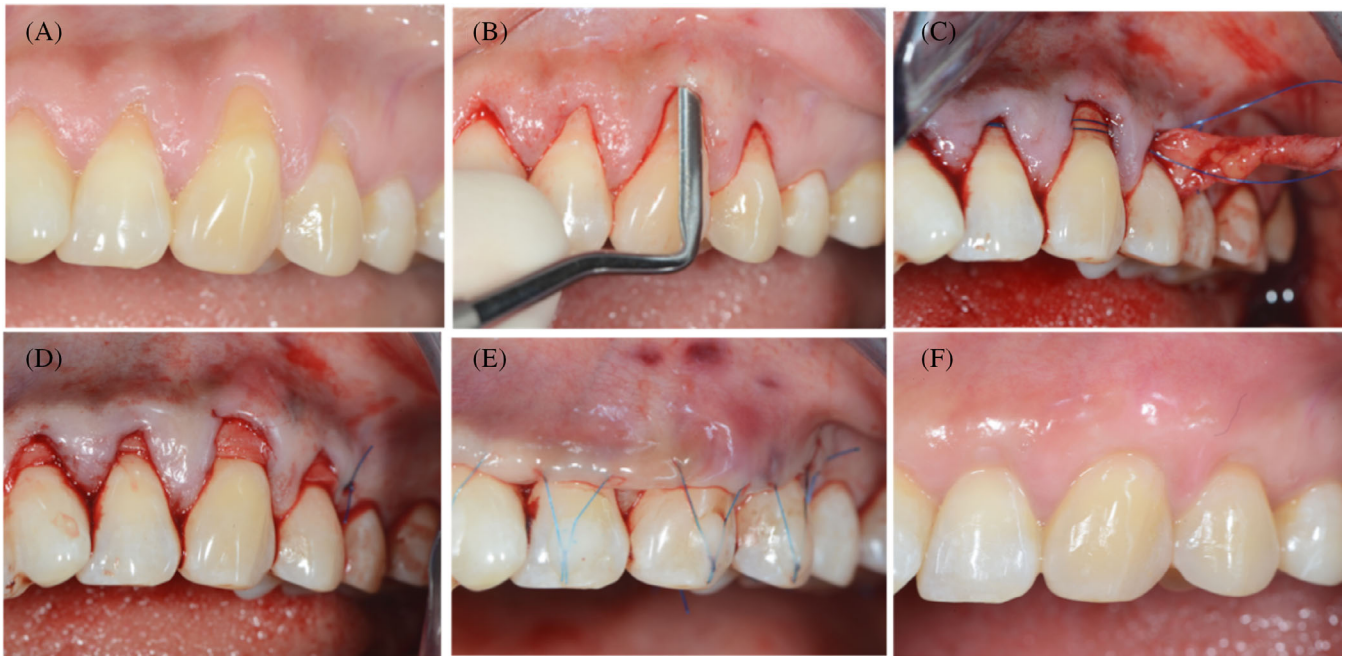

FIGURE 2 Tunnel + CTG group. (A) Recession type I gingival recession from the lateral incisor to the first premolar. (B) Crevicular incision as the surgical access and releasing gingiva through the crevicular incision. (C,D) Securing of the CTG by mattress suture. (E) The flap was coronally advanced over CEJ and stabilized in the new position with a coronally anchored suturing. (F) 12 months postsurgery, complete root coverage was achieved at the lateral incisor and the canine.

patient.[26] Calibration was accepted if measurements at baseline and the two-week appointments were similar to the millimeter at ≥90% level. Unless otherwise indicated, a periodontal probe (UNC 15, Hu-Friedy Mfg. Co., Chicago, USA) was used and the measurements were performed at the middle buccal site and rounded to the closest of 0.5 mm. The parameters were as follows:

- Recession depth (Rec): the distance from CEJ to gingival margin.
- Recession width at CEJ (RW): the horizontal distance of gingival recession between the mesial to the distal margin at CEJ level.
- Probing depth (PD)
- Clinical attachment level (CAL)
- Width of keratinized tissue (WKT)
- Gingival thickness (GT): measured after anesthesia at baseline and 12 months, with a caliper (Digital caliper, 91511, SATA, Shanghai, China) of 0.01 mm resolution and injection needle attached to silicone disk stops. According to Andrade et al. (2010), the thickness was measured at a 2-mm point from the gingival margin at the midfacial aspect.[27]
- Flap tension (FT): after the dissection, the flap was ensured to reach CEJ without tension and the final margin was advanced at the most coronal position (2–3 mm coronal to CEJ). Before the suture was secured to the facial aspect of each tooth, a dynamometer (HP-5, Aidebao, Leqing, China) was used to measure the tension of flap at the most coronal position (2–3 mm coronal to CEJ). The measurement was repeated 3 times.[28]
- The root coverage esthetic score (RES)[29,30] was evaluated at 6 and 12 months follow-up.

2.6 | Patient-reported evaluations

Immediately after surgery, a questionnaire was given to each patient to evaluate the discomfort during the surgery. And at 14 days after surgery, data on postoperative pain and possible side effects or complications were registered. Patient discomfort was measured by Visual Analogue Scale (VAS, 0 = no pain at all and 10 = extreme pain). At the 6-month and 12-month follow-up, patient reports on esthetic satisfaction (VAS) were collected (0 = completely dissatisfied and 10 = completely satisfied).

2.7 | Study outcomes

The primary endpoints were to compare the outcomes of the two methods in terms of reduction of Rec (RecRed), mean root coverage percentage (MRC), and complete root coverage percentage (CRC) at 12-month follow-up.

- Mean root coverage percentage (MRC): [(Baseline Rec)–(12 months Rec)/Baseline Rec] × 100%
- Complete root coverage percentage (CRC): [(Number of teeth with CRC)/(Number of all treated teeth)] × 100%.

The secondary outcomes were:

- To evaluate the FT, and the changes of RW, PD, CAL, WKT, and GT results between the two groups;

- To assess the difference of esthetic results of the two techniques by RES;
- To compare the difference of patient-reported results of intra- and postoperative discomfort by VAS.

2.8 | Statistical analysis

Statistical analysis was performed using SPSS 24.0 (IBM Corp. Armonk, America). A *p*-value threshold of 0.05 was set for statistical significance.

The analysis of patient-reported outcomes was performed on the patient level, and other variables were analyzed on the tooth level. Intragroup analyses of change of Rec, RW, PD, CAL, WKT, and GT were compared using the paired *t*-test (if the data was subject to normal distribution) or the Wilcoxon test (if the data was not subject to normal distribution). Intergroup analyses of RecRed, MRC, RES, VAS, FT, and the change of RW, PD, CAL, WKT, and GT were compared using an independent-samples *t*-test (if the data was subject to normal distribution and homogeneity) or corrected independent-samples *t*-test (if the data was subject to normal distribution but no homogeneity), or Mann–Whitney *U* test (if the data was not subject to normal distribution).

3 | RESULTS

3.1 | Characteristics of patients and clinical parameters at baseline

A total of 24 patients and 59 teeth were enrolled in this study. Details of characteristics at baseline were presented in Table 1. The mean Rec was 2.31 ± 0.64 mm in the VISTA + CTG group and 2.55 ± 0.75 mm in the Tunnel + CTG group ($p = 0.178$), ranging from 1.5 to 4 mm. There was no statistically significant difference between groups for all clinical parameters at baseline (Table 2).

3.2 | Clinical outcomes

Details of the clinical outcomes at 6 and 12 months are presented in Table 2. The MRC of 91.13 ± 16.96% (RecRed of 2.08 ± 0.63 mm) and 91.40 ± 13.53% (RecRed of 2.30 ± 0.67 mm) were observed at 12 months for VISTA + CTG and Tunnel + CTG group respectively, with no significant difference between the two groups ($p > 0.05$). The percentage of sites with complete root coverage (CRC) at 12 months postsurgery was detected in 70.97% of VISTA + CTG sites and 67.86% of Tunnel + CTG sites, with no significant difference between the groups ($p = 0.797$, Table 2). The average gain in keratinized tissue width at 12 months was 0.61 ± 0.64 mm and 0.54 ± 0.86 mm for VISTA + CTG and Tunnel + CTG group, respectively ($p = 0.344$, Table 2). For the average gain in gingival thickness at 12 months, Tunnel + CTG group was slightly higher than VISTA + CTG group, with statistical significance (0.69 ± 0.50 mm and 0.41 ± 0.59 mm, $p = 0.040$).

For flap tension, results showed no significant difference between the two groups ($p > 0.05$, Table 2).

High RES scores were achieved in both groups (Table 3), 8.52 ± 1.46 in the VISTA + CTG group and 8.82 ± 1.44 in the Tunnel + CTG group at 12 months, without showing a significant difference ($p = 0.245$). However, soft tissue texture score (evaluation of scar formation) was significantly higher in Tunnel + CTG group than that in VISTA + CTG group (0.96 ± 0.19 vs 0.71 ± 0.46, $p<0.01$).

3.3 | Patient-reported outcomes

The patient-reported outcomes were presented in Table 4. The intra- or postoperation perceived pain levels were both showed with no

TABLE 1 Characteristics of enrolled patients and teeth

Variables	VISTA + CTG	Tunnel + CTG	Total
Age (years)	35.33 ± 10.60 [23−53]	37.35 ± 10.99 [22−53]	36.65 ± 10.69 [22−53]
Number of patient	12	12	24
Female	8 (67.3%)	7 (58.3%)	15
Male	4 (22.7%)	5 (41.7%)	9
Number of teeth	31	28	59
Maxillary	22 (71.0%)	16 (57.1%)	38
Incisors	8 (25.8%)	4 (14.3%)	12
Canines	7 (22.6%)	6 (21.4%)	13
Premolars	7 (22.6%)	6 (21.4%)	13
Mandibular	9 (29.0%)	12 (42.9%)	21
Incisors	1 (3.2%)	1 (3.6%)	2
Canines	1 (3.2%)	1 (3.6%)	2
Premolars	7 (22.6%)	10 (35.7%)	17

Abbreviations: CTG, connective tissue graft; VISTA, vestibular incision subperiosteal tunnel access.

TABLE 2 Baseline data and clinical outcomes at 6 and 12 months (mean ± SD)

Variable	Baseline			6 months			12 months		
	VISTA + CTG ($N = 31$)	Tunnel + CTG ($N = 28$)	*p*-value	VISTA + CTG ($N = 31$)	Tunnel + CTG ($N = 28$)	*p*-value	VISTA + CTG ($N = 31$)	Tunnel + CTG ($N = 28$)	*p*-value
Rec (mm)	2.31 ± 0.64	2.55 ± 0.75	0.178	0.11 ± 0.31[b]	0.21 ± 0.42[b]	0.249	0.21 ± 0.40[b,c]	0.23 ± 0.40[b]	0.793
RecRed (mm)	–	–	–	2.19 ± 0.59	2.34 ± 0.68	0.381	2.08 ± 0.63[c]	2.30 ± 0.67	0.195
MRC (%)	–	–	–	95.97 ± 11.56	92.59 ± 13.41	0.307	91.13 ± 16.96[c]	91.40 ± 13.53	0.947
CRC (%)	–	–	–	87.10	75.00	0.238	70.97[c]	67.86	0.797
RW (mm)	3.58 ± 0.83	3.89 ± 0.86	0.162	0.31 ± 0.93[b]	0.67 ± 1.28[b]	0.189	0.55 ± 1.13[b]	0.79 ± 1.38[b]	0.558
PD (mm)	1.58 ± 0.50	1.75 ± 0.65	0.263	2.38 ± 0.73[b]	2.29 ± 0.69[b]	0.657	2.26 ± 0.63[b]	2.43 ± 0.79[b]	0.361
CAL (mm)	3.87 ± 0.87	4.29 ± 1.18	0.127	2.50 ± 0.61[b]	2.54 ± 0.75[b]	0.825	2.45 ± 0.84[b]	2.68 ± 0.64[b]	0.252
WKT (mm)	3.13 ± 1.45	2.66 ± 1.28	0.196	3.93 ± 1.64[b]	3.30 ± 1.01[b]	0.089	3.74 ± 1.32[b]	3.20 ± 1.18[b]	0.102
WKT gain (mm)	–	–	–	0.72 ± 0.84	0.60 ± 0.66	0.792	0.61 ± 0.64	0.54 ± 0.86	0.344
GT (mm)	1.36 ± 0.45	1.19 ± 0.34	0.127	–	–	–	1.70 ± 0.66[b]	1.88 ± 0.50[b]	0.390
GT gain (mm)	–	–	–	–	–	–	0.41 ± 0.59	0.69 ± 0.50	0.040[a]
FT (N)	0.77 ± 0.44	0.72 ± 0.54	0.594						

Note: $p < 0.05$, represents statistically significant difference.
Abbreviations: CAL, clinical attachment level; CRC, complete root coverage; CTG, connective tissue graft; GT: gingival thickness; FT: flap tension; GT gain: gain in gingival thickness; MRC, mean root coverage; PD, probing depth; Rec, recession depth; RecRed, recession reduction; RW, recession width at cemento-enamel junction; VISTA, Vestibular incision subperiosteal tunnel access; WKT: width of keratinized tissue; WKT gain, gain in width of keratinized tissue.
[a]Represents statistically significant intergroup difference.
[b]Represents statistically significant intragroup difference compared to the baseline data.
[c]Represents statistically significant intragroup difference compared to the 6-month data.

TABLE 3 Root coverage esthetic score (RES) results (mean and SD)

RES variables	6-month		12-month			
	VISTA + CTG	Tunnel + CTG	*p*-value	VISTA + CTG	Tunnel + CTG	*p*-value
Gingival margin level (GM)	5.03 ± 1.43	5.04 ± 1.43	0.993	4.68 ± 1.85	4.57 ± 2.20	0.709
Marginal tissue contour (MTC)	0.87 ± 0.34	0.96 ± 0.19	0.203	0.87 ± 0.34	0.93 ± 0.26	0.469
Soft tissue texture (STT)	0.71 ± 0.46	1.00 ± 0.00	0.002[a]	0.71 ± 0.46	0.96 ± 0.19	<0.010[a]
Muco-gingival junction (MGJ):	1.00 ± 0.00	1.00 ± 0.00	1.000	1.00 ± 0.00	1.00 ± 0.00	1.000
Gingival color (GC)	1.00 ± 0.00	1.00 ± 0.00	1.000	1.00 ± 0.00	1.00 ± 0.00	1.000
RES score	8.61 ± 1.45	9.00 ± 1.41	0.139	8.52 ± 1.46	8.82 ± 1.44	0.245

Abbreviations: CTG, connective tissue graft; VISTA, vestibular incision subperiosteal tunnel access.
[a]$p < 0.05$, represents statistically significant difference.

significant difference between the two groups ($p > 0.05$). Postoperative bleeding was seen only on the first day at the donor palatal site for both groups. It was observed in 1 (8.3%) and 2 (16.7%) cases for VISTA + CTG and Tunnel + CTG groups, respectively. At 12-month recall, both groups reported high subjective esthetic satisfaction score (VISTA + CTG: 8.90 ± 1.20; Tunnel + CTG: 8.80 ± 1.62, with a full scale of 10), without statistically significant difference ($p > 0.05$).

4 | DISCUSSION

The present study investigated the effect of additional vestibular incision on root coverage for treatment of RT1 multiple gingival recession. In this study, satisfying clinical outcomes were achieved in both groups. The MRC of 91.13 ± 16.96% and 91.40 ± 13.53% (CRC of 70.97% and 67.86%) were observed at 12 months for VISTA + CTG and Tunnel + CTG group respectively. It was better than the reported MRC results, which was 84.72 ± 19.72%[26] to 90 ± 18%[16] by tunnel approach combined with CTG for treatment of RT1 multiple recession at 12 months. It might relate to the different degrees of coronal advancement.[19] CRC has been reported to be positively correlated with the position of gingiva at the end of surgery.[19,20] When the gingival margin was positioned at the CEJ after suture, only 15% of patients obtained CRC at 6 months, while 100% of patients obtained CRC when gingival margin was positioned 2–2.5 mm coronally than CEJ.[19] In our surgical procedure, the gingival flap was coronally

TABLE 4 Patient-centered outcomes (mean and SD)

VAS variables	VISTA + CTG	Tunnel + CTG	*p*-value
Pain during surgery	3.38 ± 3.20	4.8 ± 4.21	0.633
Pain of recovery stage	3.17 ± 3.82	3.60 ± 3.92	0.875
6-month patient satisfaction	9.20 ± 1.32	9.64 ± 0.81	0.557
12-month patient satisfaction	8.90 ± 1.20	8.80 ± 1.62	0.912

Note: $p < 0.05$, represents statistically significant difference.
Abbreviations: CTG, connective tissue graft; VAS, visual analogue scale; VISTA, Vestibular incision subperiosteal tunnel access.

advanced and secured 2–3 mm coronal to CEJ, realized by sufficient dissection and coronally anchored suturing.

It has been advocated that the access of vestibular incision was more convenient to dissect the flap than intrasulcular tunneling, and might reduce the flap tension during coronal advancement.[21] However, the current results failed to demonstrate the extra benefits of this incision. Several factors could have contributed to this result. First, only multiple adjacent recessions were enrolled in the present study. During the operation, the tunnel preparation was extended at least two to three papillae, which reduced the flap tension.[31] When more papillae were dissected, the flap would be mobilized more easily,[31] so the potential advantage of the vertical incision would not be exhibited. Next, in the 24 recruited patients, although unintentionally selected, there was no recession deeper than 4 mm, which decreased the requirement for coronal reposition advancemnt.[4,31] It also should be noticed that the operator in this study is experienced, which might compensate for the technique sensitivity of tunneling through intrasulcular incision.[31] For inexperienced surgeons, the extra vertical incision might simplify the dissection procedure.[21]

High esthetic outcomes were achieved in both groups. The average RES score of VISTA + CTG and Tunnel + CTG group was 8.61 ± 1.45 and 8.52 ± 1.46 respectively, which was corresponding to the average of other studies, ranging from 7.3 to 9.3.[23,32–34] Our results unsurprisingly showed that vestibular vertical incision significantly increased scar formation. In the present study, 29% of the vertical incisions were accompanied with scar formation at 12 months. It is suggested that in critical esthetic area, treatment options of making vertical incisions should be carefully considered. If the incision is needed, the placement of a maxillary vestibular incision within the maxillary frenum might be an optimal option, for little to no visible scarring assisting in esthetic outcome.[21]

The average flap tension was 0.77 ± 0.44 N and 0.72 ± 0.54 N in VISTA + CTG and Tunnel + CTG group respectively, which was much higher than the reported result in the literature.[28] It was shown that the average tension was 6.5 g when the coronal margin reached CEJ.[28] The discrepancy might relate to the different flap positions when the measurements were made. In the present study, the flap was dissected sufficiently to ensure coronal advancement to CEJ without any tension, and then the flap was further coronally advanced and secured at 2–3 mm coronal to CEJ, where the final flap tension was measured.

Limitation of the study was the lack of severe recessions (Rec ≥5 mm). Deeper recessions (exceeding 3 mm) are required for a higher amount of coronal reposition,[4,31] therefore the advantage of gingival releasing of vestibular incision might not be exhibited in the present study. Another limitation of the study was the actual binding of the examiner during follow-up evaluations. Because VISTA technique was with a high possibility of scar formation at the vertical incision, the examiner would probably already know the surgical group. And digital analysis was not introduced in the present study. It would be better for future researchers to use 3-dimensional digital technologies for assessing volumetric changes.

5 | CONCLUSION

Within the limitation of this study, it was concluded that both procedures were effective for root coverage in RT1 multiple gingival recession at 12 months. However, better esthetic result with less scar formation was obtained in tunnel approach combined with CTG without vestibular incision.

CONFLICT OF INTEREST STATEMENT

The authors do not have any financial interest in the companies whose materials are included in this article.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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