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Comparative clinical outcomes of m-vista and zucchelli's technique in the management of miller's class i/ii gingival recession: A randomised clinical trial

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Abstract
Introduction: Gingival recession in the esthetic zone poses both functional and esthetic challenges, often necessitating surgical intervention to restore soft tissue harmony and patient comfort. Among the various root coverage techniques, the Modified Vestibular Incision Subperiosteal Tunnel Access (M-VISTA) and Zucchelli's coronally advanced flap technique have gained clinical acceptance for the treatment of Miller's class I and class II recession defects. This clinical study aims to evaluate and compare the clinical efficacy and patient-centered outcomes of these two techniques over a six-month follow-up period.
Materials and Method: 20 systemically healthy subjects with Miller's class I/II gingival recession defects were enrolled and randomly allocated into two groups (10 in each group): Group A was treated using the M-VISTA technique and Group B with Zucchelli's coronally advanced flap technique. Clinical parameters including Recession depth (RD), Recession width (RW), Gingival thickness, Keratinized tissue width (KTW) and Relative attachment level (RAL), were recorded at baseline, 1month, 3 month, and 6 months. Patient centered outcomes such as esthetic satisfaction (Patient esthetic score) and post-operative comfort (Verbal rating score) were also evaluated at respective intervals.
Results: Both techniques resulted in significant improvement in all clinical parameters from baseline to 6 months. Zucchelli's technique showed slightly better outcomes in terms of RD reduction, RAL gain and KTW increase. The esthetic score was higher in the Zucchelli's group throughout all follow-up intervals. Although both groups reported satisfactory healing and comfort, the verbal rating scale showed marginally better comfort in the M-VISTA group during the early healing phase.
Conclusion: Both M-VISTA and Zucchelli's techniques are effective for the management of Miller's class I/II gingival recession. However, Zucchelli's technique demonstrated slightly superior clinical and esthetic outcomes, while M-VISTA offered better post-operative comfort during the initial healing phase. These findings support the use of both techniques depending on clinical priorities and patient preferences.

Keywords: Gingival recession, m-vista technique, Zucchelli's coronally advanced flap, root coverage, clinical outcomes, periodontal surgery

Introduction
Gingival recession is the exposure of the tooth/tooth root via the apical migration of gingiva to or beyond the CEJ [1]. Gingival recession affects both the esthetic and functional aspects of oral health.[2] When such problem affects the anterior teeth; it develops anxiety about tooth loss due to progression of the destruction. It may also be associated with dentinal hypersensitivity, root caries, abrasion and/or cervical wear, erosion due to exposure of the root surface to the oral environment and an increase in accumulation of dental plaque [3].

The modification of coronally advanced flap described by Giovanni Zuchelli [4] is well-established and provides predictable outcomes for single and multiple recession defects. M-VISTA, a minimally invasive approach introduced by Chun-The Lee [5] in 2015 is a modification of VISTA technique, has gained attention for its supra-periosteal tunneling and vestibular access, aiming to reduce trauma and improve esthetic integration.
The presumed advantage of Zucchelli's technique is the lack of vertical releasing incision,

which could damage the lateral blood supply to the flap and might result in unesthetic white scars. The split-full-split thickness flap approach does not compromise the vascular supply, resulting in more predictable healing [4].

M-VISTA includes the location of incision i.e. instead of a sub-periosteal incision, a supra-periosteal incision is given. This method is specifically precise because it allows more access in the vestibule by giving a single vestibular incision providing access to an entire region. It also improves the wound healing by simplifying the tunneling process [6].

Titanium-PRF (T-PRF) was created in 2013 by Tunali H et al.[7] using biocompatible titanium tubes. T-PRF was developed to overcome the limitations of L-PRF. T-PRF has more compact and thicker fibrin network than L-PRF. Such compact fibrin structure plays an important role in prolonging intra-tissue fibrin resorption and releasing growth factors in a drop-by-drop manner over a longer period.

This present randomised clinical trial compares the clinical effectiveness and patient reported outcomes of M-VISTA and Zucchelli's technique reinforced with T-PRF, over a 6-month period in the management of Miller's class I and II gingival recession defects.

Materials and Method
This was a prospective randomized clinical trial with a sample size of 20 subjects selected
from Outpatient Department of Periodontics, Pacific Dental College and Hospital, Debari, Udaipur.
Ethical clearance was obtained from ethical committee of Sai Tirupati University, Udaipur.

Inclusion Criteria
1. Systemically healthy subjects with the age group of 20-45 years.
2. Patient with isolated and multiple gingival recession with RT I/II and Miller's class I/II type.
3. Subjects with plaque and gingival index ≤ 1.

Exclusion Criteria
1. Pregnant and lactating women.
2. Poor oral hygiene compliance.
3. Smokers and tobacco abuse.
4. Malocclusion or presence of crowding of teeth.
5. Patients undergoing any orthodontic treatment.

After complete scaling and root planing, subjects were randomly allocated using the coin toss method.
- **Group A:** 10 subjects with M-VISTA technique reinforced with T-PRF
- **Group B:** 10 subjects with ZUCCHELLI'S technique reinforced with T-PRF

Clinical parameters recorded were Recession depth, Recession width, Gingival thickness, Keratinized tissue width, Relative attachment level, Gingival index, Patient esthetic score at baseline, 1 month, 3 and 6 month and Patient comfort score (verbal rating scale) at baseline, 24th hour, 3rd, 7th and 14th day after surgery.

Surgical Technique
All surgical procedure were performed under aseptic conditions after achieving adequate anesthesia using 2% Lignocaine Hydrochloride with adrenaline (1:80,000).

M-Vista Technique (Group A)
- **Step 1:** A supra-periosteal vertical incision extending to the periosteum slightly beyond the mucogingival junction

was made in the most centred section considering the extension of the teeth to be treated. (Fig.1A)
- **Step 2:** All intra-crevicular incisions were performed. These incisions were extended to at least one of the teeth that were beyond those to be treated and towards the base of the papillae.
- **STEP 3:** A partial-thickness tunnel was prepared with the aid of specific VISTA tunneling instruments.
  VISTA 1 instrument was used to create tunnel adjacent to incision line, then to extend the tunnel VISTA 2 and 3 instruments were used and to create tunnel in interdental area VISTA 4 and 5 instruments were used. (Fig.1B, 1C)
- **Step 4:** After creating the tunnel T-PRF membrane was incorporated into the tunnel from the vertical incision. (Fig.1D)
- **Step 5:** The incision line was secured with simple interrupted sutures.
- **Step 6:** Coronal mobilization of tissue was done with subpapillary coronally advanced sutures technique using 5-0 silk nonabsorbable suture material. (Fig.1E)

Zucchelli's technique (GROUP B)
- **Step 1:** A horizontal incision as an intrasulcular incision with an oblique submarginal incision in the interdental papilla was placed at the recession defects using 15c blade. (Fig.2A)
  This incisional approach delineates surgical papilla and anatomic papilla. (Anatomical papilla: present in the interdental area, Surgical papilla: created during surgical procedure as part of the flap design).
- **Step 2:** The surgical papilla was then dissected with the blade directed parallel to the root surface, with respect to the anatomical papilla.
- **Step 3:** Periosteal elevator was used to raise split- full-split thickness manner where full thickness flap apical to the recession defects and split thickness in interdental portion. (Fig.2B)
- **Step 4:** The flap was then undermined apically to or beyond the mucogingival junction, with the blade until tension-free repositioned was achieved.
- **Step 5:** Anatomical papilla was then de-epithelialized to create a connective tissue bed for surgical papilla. (Fig.2C)
- **Step 6:** T-PRF membrane was then placed at the prepared site and then coronal mobilization of flap was done over the membrane. (Fig.2D)
- **Step 7:** coronally advanced flap was then secured with 5-0 silk non-absorbable sutures using sling suture technique. (Fig.2E)

At the 2 weeks postoperative visit, sutures were removed, and oral hygiene and plaque control was reviewed and reinforced.

Surgical Procedure for Group A (M-Vista Technique) (32-42)

Fig 1A: Supra-periosteal incision

Fig 1B: Preparation of tunnel

Fig 1C: Prepared tunnel using VISTA instruments

Fig 1D: T-PRF membrane placement

Fig 1E: Subpapillary continuous sling sutures placed

Fig 1F: 14th day after suture removal

Surgical Procedure of Group B (Zucchelli's Technique) (21-24)

Fig 2A: Placement of oblique submarginal incision

Fig 2B: Flap elevation in split full split manner

Fig 2C: De-epithelialization of anatomical papilla

Fig 2D: T-PRF membrane placement

Fig 2E: Placement of sling sutures

Fig 2F: 14th day after suture removal

T-PRF Membrane Preparation
10ml of bleed was drawn from the antecubital vein and immediately transferred to titanium tubes, then centrifuged at 2700rpm for 12 minutes (Fig. 3A). The resulting T-PRF clot was retrieved, with red cell remnants discarded (Fig. 3B). The clot was compressed between sterile gauze to form a membrane, ensuring buffy coat placement on mesial and distal aspects (Fig. 3C). The prepared T-PRF membrane was then placed on the surgical site.
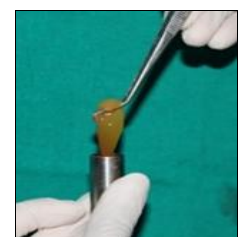

Fig 3A: withdrawal of 10 ml of blood   **Fig 3B:** prepared T-PRF clot

Fig 3C: prepared T-PRF membrane

Post Operative Instructions

Subjects were instructed not to brush the surgical sites for the first 2 weeks. Instead, during that time, patients were advised to rinse with 0.2% chlorhexidine gluconate. Subjects were advised to take 500 mg amoxicillin twice daily for 5 days and tablet ketorolac tromethamine 10mg twice daily for 3 days and then once a day if pain persists.

Comparison of Pre and Post Operative (6 Month) Clinical Pictures
For Group A:

Fig 4A: At baseline (pre op view + probing depth at baseline

Fig 4B: At 6 months (post op view + probing depth at 6 months

For Group B

Fig 5A: At baseline (pre op view + probing depth at baseline

Fig 5B: At 6 months (post op view + probing depth at 6 months

Results

This randomised clinical trial included 20 patients with Miller's class I/II gingival recession. They were equally divided into two groups. Both groups received autologous Titanium-Prepared Platelet-Rich Fibrin (T-PRF) as a biologic adjunct to enhance healing and regenerative potential. Clinical parameters were evaluated at baseline and subsequently at 1, 3 and 6 months postoperatively, to assess the short-term and intermediate-term outcomes of the two surgical techniques.

At 6 months, Recession depth and width was significantly reduced in both groups, with group B showing greater reduction in recession depth ($p \leq 0.001$); and recession width $p \leq 0.05$) (Table 1) (Graph 1). Whereas, intergroup showed no significant difference (Table 2) (Graph 3).

Keratinized gingival width increased significantly within both groups($p < 0.05$) (Table 1) (Graph 1), but the intergroup difference was not significant (Table 2) (Graph 3). Relative attachment level was improved in both groups, with group A showing a greater gain (RAL: $p = 0.001$) (Table 1) (Graph 1)., intergroup comparison of RAL was not significant (Table 3) (Graph 1).

Gingival thickness was found statistically significant in Group B (Table 1) (Graph 2), with intergroup comparison showing no significant difference. Both groups showed significant improvements in the Pink Esthetic Score (PES) (Table 1) (Graph 1,2), with no significant intergroup difference (Table 4) (Graph 3). Postoperative discomfort assessed using the Verbal Rating Score (VRS) decreased in both groups by day 14, with group A showing slightly better result (Table 1) (Graph 4).

At 6-month follow-up, both techniques demonstrated significant clinical improvement. The mean root coverage (MRC) was 55.4% in group A and 59.1% in group B (graph 5), Although group B showed a numerically higher percentage of root coverage, the difference between the two groups was statistically non-significant ($p = 0.284$).

Overall, the results indicate that both techniques were effective in achieving satisfactory root coverage, improved gingival dimensions and enhanced esthetic outcomes. While both groups benefitted equally in most parameters, Zucchelli's technique exhibited slightly superior performance in certain clinical outcomes, particularly in terms of recession depth reduction and esthetic improvement, suggesting it may offer a marginal clinical advantage in specific situations.

Table 1: intragroup comparison of all parameters from baseline to 6 months. *KWT: keratinized tissue width, RAL: relative attachment level, PES: pink esthetic score, VRS: verbal rating score.

Parameters	Group	Baseline	1 Month	3 Month	6 Month	Change (Baseline-6 month)	P Value
Recession depth	Group A	7.0±2.0	4.89±1.98	5.0±1.87	5.0±1.87	2.0±0.13	≤0.001*
	Group B	7.0±2.11	4.9±2.08	4.7±1.78	4.7±1.78	2.3±0.33	≤0.001*
Recession width	Group A	3.3±0.46	2.2±0.63	2.4±0.52	2.4±0.52	0.9±0.06	≤0.01*
	Group B	3.4±0.66	2.0±1.10	2.1±1.22	2.1±1.22	1.3±0.56	≤0.05*
KTW	Group A	2.55±0.49	3.0±0.94	3.35±0.88	3.35±0.88	0.8±0.39	0.033*
	Group B	2.6±0.84	3.6±0.7	3.5±0.53	3.5±0.53	0.9±0.31	0.019*
RAL	Group A	5.6±1.80	4.3±1.55	4.1±1.47	4.2±1.47	1.4±0.30	0.001*
	Group B	5.5±1.72	4.2±1.20	4.0±1.35	4.5±1.35	1.0±0.37	0.02*

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Gingival thickness	Group A	1.2±0.24	1.3±0.38	1.35±0.36	1.35±0.36	0.15±0.12	0.65
	Group B	1.15±0.24	1.45±0.35	1.4±0.37	1.4±0.37	0.25±0.13	0.05*
PES	Group A	9.08±1.78	11.50±1.45	11.50±1.31	11.67±1.37	2.59±0.41	0.018*
	Group B	9.3±2.31	11.2±1.32	11.8±1.69	11.9±1.73	2.6±0.58	0.012*
Group	Baseline	24th hour	3rd day	7th day	14th day	Change (baseline-6 month)	
VRS Group A	0.8±0.63	1.3±0.48	0.5±0.53	0.2±0.42	0	0.8±0.63	≤0.001*
VRS Group B	1.36±1.01	1.86±0.53	0.93±0.47	0.07±0.27	0	1.36±1.01	≤0.001*

Table 2: Intergroup comparison of clinical parameters

| Parameter	Time point	Group A (Mean±SD)	Group B (Mean±SD)	Mean difference	P value
Recession depth (RD)	Baseline	7.0±2.20	7.0±2.11	0.0	1.00
	1 month	4.89±1.98	4.9±2.08	0.01	0.98
	3 months	5.0±1.87	4.7±1.78	0.3	0.66
	6 months	5.0±1.87	4.7±1.78	0.3	0.66
Recession width (RW)	Baseline	3.3±0.64	3.0±0.66	0.3	0.29
	1 month	2.2±0.63	2.0±1.10	0.2	0.62
	3 months	2.4±0.52	2.1±1.12	0.3	0.48
	6 months	2.4±0.52	2.1±1.22	0.3	0.43
Keratinized tissue width (KTW)	Baseline	2.55±0.49	2.8±0.57	0.25	0.17
	1 month	3.3±0.94	3.6±0.67	0.3	0.42
	3 months	3.35±0.88	3.5±0.53	0.15	0.65
	6 months	3.35±0.88	3.8±0.65	0.45	0.18
Relative attachment level (RAL)	Baseline	5.6±1.80	5.5±1.72	0.1	0.93
	1 month	4.3±1.85	4.7±1.53	0.4	0.56
	3 months	4.1±1.45	4.5±1.35	0.4	0.72
	6 months	4.2±1.47	4.5±1.35	0.3	0.72
Gingival thickness (GT)	Baseline	1.2±0.24	1.15±0.24	0.05	0.63
	1 month	1.4±0.35	1.35±0.35	0.05	0.68
	3 months	1.35±0.36	1.4±0.37	0.05	0.65
	6 months	1.35±0.36	1.4±0.37	0.05	0.64

Table 3: Intergroup comparison of patient comfort scores (pink esthetic score and verbal rating score)

| Parameter	Time point	Group A (Mean±SD)	Group B (Mean±SD)	Mean difference	P value
PES	Baseline	9.08±1.78	9.3±2.31	0.22	0.51
	1 month	11.50±1.45	11.2±1.32	0.2	0.18
	3 months	11.50±1.31	11.8±1.69	0.3	0.51
	6 months	11.67±1.37	11.9±1.73	0.23	0.62
VRS	Baseline	0.8±0.63	1.36±1.01	0.56	0.16
	24 hours	1.3±0.48	1.86±0.53	0.56	0.01*
	3rd day	0.5±0.53	0.93±0.47	0.43	0.29
	7th day	0.2±0.42	0.07±0.27	0.13	0.70
	14th day	0	0	0	1.00
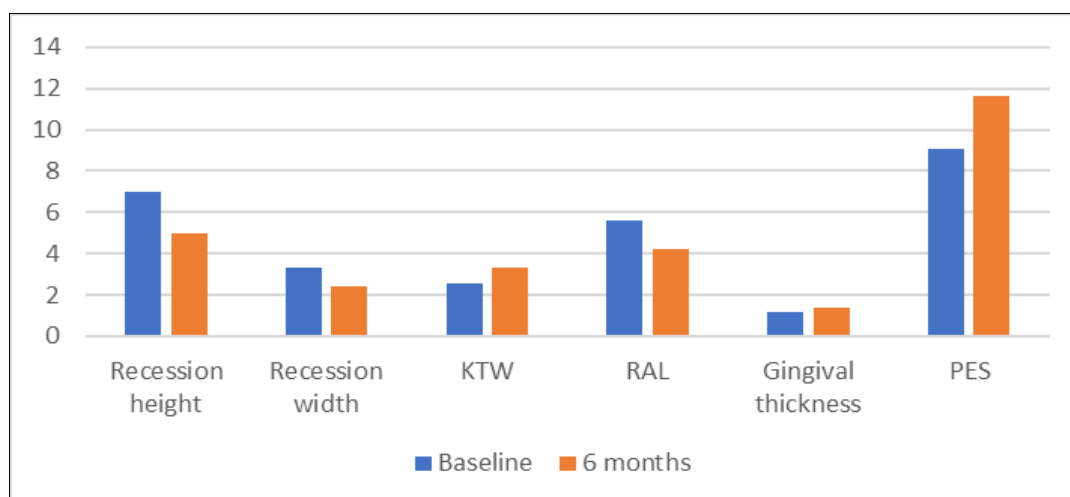
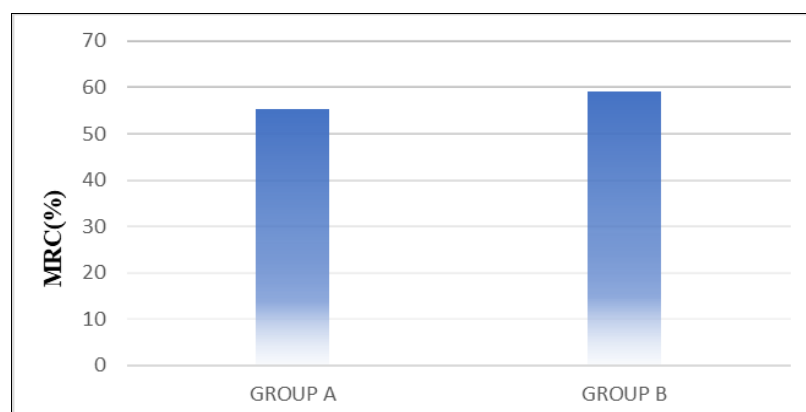**Graph 1:** Intragroup comparison of Group A
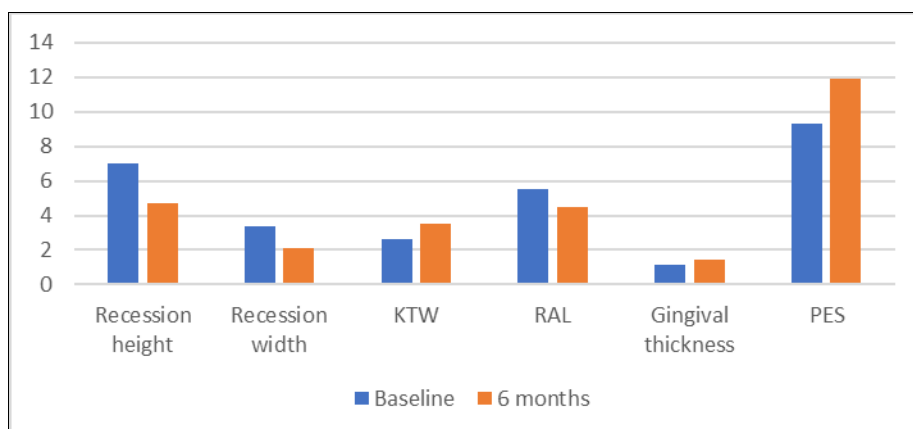
Graph 2: Intragroup comparison of Group B
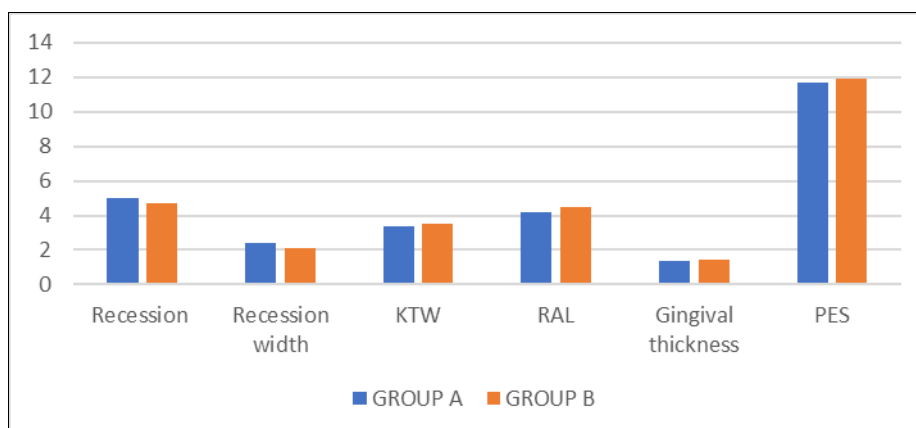
Graph 3: Intergroup comparison of clinical parameters at 6 months
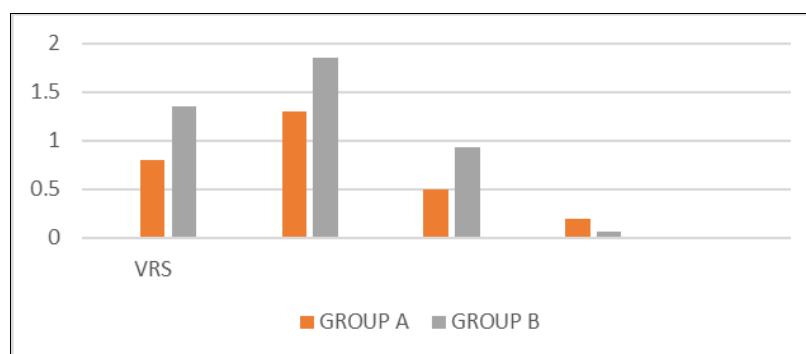
Graph 4: Intragroup comparison of VRS

Graph 5: Intergroup comparison of mean root coverage percentage

Discussion

Achieving predictable root coverage remains a clinical challenge, with success rates ranging from 56-97.8%. While connective tissue grafts are considered the gold standard, their limitations such as the need for a second surgical site and increased patient morbidity, have encouraged the development of minimally invasive techniques [8]. M-VISTA and Zucchelli's technique, both evaluated in this study, offer alternatives that emphasize tissue preservation, vascular integrity, and patient comfort [9, 5]. The adjunctive use of T-PRF, a second-generation platelet concentrates with enhanced regenerative potential, further support wound healing and soft tissue outcomes [10].

Minimally invasive techniques for root coverage have gained prominence in periodontal plastic surgery due to their focus on tissue preservation, enhanced healing, and improved patient comfort. These approaches aim to limit surgical trauma by reducing flap reflection and manipulation, thereby maintaining the integrity of the vascular supply and minimizing post-operative morbidity. The advantages include reduced intraoperative bleeding, less postoperative pain, quicker recovery times, and high patient satisfaction, all while achieving clinically effective root coverage [8].

Zucchelli's technique, which is a variation of CAF in envelope fashion, with the flap design considering the future position of the flap and thus delineating anatomic and surgical papilla, accordingly. Furthermore, the split-full-split thickness flap approach does not compromise the vascular supply, resulting in more predictable healing [9].

M-VISTA technique is a modification of the VISTA (Vestibular Incision Subperiosteal Tunnel Access) technique, designed to be less invasive while enhancing vascularity and healing. Unlike traditional tunnel techniques, M-VISTA involves creating small access incisions in the vestibule beyond the mucogingival junction, a supra-periosteal tunnel is raised, leaving the periosteum on the bone for additional vascularity. These minimal incisions reduce surgical trauma and improve postoperative comfort. The enhanced blood circulation contributes to improved wound healing, graft integration, and overall treatment outcomes [5].

Platelet-Rich Fibrin (PRF) was introduced by Dr. Joseph Choukroun[11] in 2001 as a 2nd generation platelet concentrate. PRF is obtained without anticoagulants, allowing for the natural formation of a fibrin matrix rich in platelets, growth factors, and leukocytes. Titanium-PRF (T-PRF) was introduced by Tunali M et al. in 2013 [10]. They developed this modification using titanium tubes instead of glass tubes for centrifugation, aiming to enhance fibrin polymerization leading to a denser fibrin matrix, which promotes superior wound healing and tissue regeneration and also improves the biological properties of PRF.

This present study included Miller's Class I/II defects with a mean baseline recession depth of 7.0 mm in both groups. At 6 months, both groups showed significant reductions in recession depth and width, with group B (Zucchelli's technique) demonstrating greater reduction ($p<0.05$). These results align with Yadav N et al. [12] who reported similar findings with CAF and VISTA techniques. Keratinized gingival width significantly improved in both groups, though group B(ZUCCHELLI'S) showed a grater gain in KTW. Gingival thickness increased significantly only in group B ($p=0.05$), with no significant intergroup difference. These findings are consistent with the study done by Gurushanth SM et al. [13] which demonstrated similar improvements in periodontal parameters following the use of biologically active regenerative material (T-PRF).

In the present study, both group A and B showed statistically significant improvements in relative attachment level (RAL) from baseline to 6 months on intragroup comparison (TG: $p=0.001$/CG: $p<0.05$). The findings of the present study align with those reported by Jain KS et al. [14]

Patient-centered outcomes revealed lower postoperative pain in Group A, likely due to its supra-periosteal tunnel design and minimal incision approach, consistent with findings by Rajeswari et al.[9] Esthetic outcomes, assessed via the Pink esthetic score, significantly improved in both groups, with no statistically significant intergroup difference ($p=0.284$), similar to findings by Fernandez Jimenez et al. [15] who found no significant difference between CAF and VISTA with CTG. The Mean Root Coverage Ratio (MRC%) was observed to be 59.1% in group B and 55.4% in group A over a period of 6 months from baseline which was found to be statistically non-significant ($p=0.284$). These findings were in accordance with a study by Fernández Jiménez A et al. [15]

Overall, both M-VISTA and Zucchelli's techniques demonstrated effective and comparable clinical outcomes. While Zucchelli's approach achieved marginally higher root coverage and gingival thickness, M-VISTA offered superior patient comfort with similar esthetic and clinical success.

Conclusion

Within the limitations of this randomised clinical trial, both M-VISTA and Zucchelli's technique demonstrated clinically effective and predictable outcomes in the management of Miller's class I/II gingival recession defects. However, M-VISTA showed advantages in terms of improved patient-reported outcomes, minimized surgical trauma. Zucchelli's technique, while equally effective in recession depth reduction, likely due to its well established coronally advanced flap design with tension free positioning. Therefore, both the techniques have their own merits and can be selectively used based on esthetic demands, patient related factors. Further multicentre, long-term studied with larger sample sizes are needed to validitate these findings and refine treatment protocols.

Conflict of Interest
Not available

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