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Case Report

MODIFIED CORONALLY ADVANCED TUNNEL TECHNIQUE (MCAT) FOR THE TREATMENT OF MULTIPLE ADJACENT GINGIVAL RECESSION (MAGR) USING SITE SPECIFIC DE-EPITHELIALIZED FREE GINGIVAL GRAFT (DGG): A CASE REPORT

N. Devkar[1], S. Pudke[1], D. Happy[1], A. Dhamapurkar[2], M. Deshpande[2] and A. Leggeri[3*]

[1]Department of Periodontology, Sinhgad Dental College and Hospital, Pune, India;
[2]Private Practitioner, Pune, Maharashtra, India;
[3]Department of Chemical Sciences and Technology, University of Rome Tor Vergata, Rome, Italy.

**Corresponding author:*
Andrea Leggeri,
Department of Chemical Sciences and Technology,
University of Rome Tor Vergata,
00133 Rome, Italy
e-mail: dr.andrealeggeri@gmail.com

ABSTRACT

To evaluate the clinical outcomes of Multiple Adjacent Gingival Recession (MAGR) using Modified Coronally Advanced Tunnel (MCAT) technique in conjunction with site specific De-epithelized Gingival Graft (DGG). Root coverage of MAGR in Recession Type 2 (RT2) cases presents a treatment challenge due to papilla loss. There is a demand for interdisciplinary approach including surgical and restorative approach in RT2 cases especially when non carious cervical lesion (NCCL) is involved. Various surgical techniques have been described in the literature to treat MAGR. Coronally advanced flap with sub-epithelial connective tissue graft although efficacious, has its limitations. Tunneling techniques like MCAT are used due to their advantages like reduced morbidity and maintaining papillary blood supply. This case report aims to evaluate the clinical results in a patient with multiple adjacent RT2 gingival recession and NCCL using MCAT along with site specific DGG and restorative treatment. A 68-year-old male was referred for the treatment of MAGR on the buccal surfaces of teeth #21–25, with a diagnosis of RT2. MCAT surgery included the preparation of the recipient site with a tunnelling protocol, keeping the interdental papillae intact. A free gingival graft was harvested, de-epithelialized extra-orally, and the resulting connective tissue graft was sutured. Partial root coverage around 80% was achieved at 6 months, consistent with the initial diagnosis of RT2. There was also an appreciable increase in gingival thickness, gain in keratinized tissue as well as improved final aesthetic outcome.

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The results indicate that the use of MCAT may represent an alternative to conventional CAF by reducing surgical time and patient morbidity and yields root coverage in the treatment of MAGR defects (RT2) when used in conjunction with DGG.

KEYWORDS: *connective tissue graft, gingival recessions, tunnel technique, de-epithelized gingival graft, coronally advanced flap*

INTRODUCTION

As defined by the American Academy of Periodontology (AAP), gingival recession (GR) is a term that designates the oral exposure of the root surface due to a displacement of the gingival margin apical to the cemento-enamel junction, and it is also frequently related to the decline of dental (white) and gingival (pink) aesthetics as well as buccal cervical dentine hypersensitivity.

These defects were categorized following the 2018 World Workshop into three categories: (1) recession type 1 (RT1) with no loss of interproximal attachment, (2) recession type 2 (RT2) when the amount of interproximal attachment loss is lower than of buccal attachment loss, and (3) recession type 3 (RT3) if interproximal attachment loss is greater than buccal attachment loss (1).

In RT1, complete root coverage (CRC) is achievable; for RT2, some studies confirmed the limit of interdental CRC loss within which 100% root coverage is predictable applying different surgical approaches, whereas for RT3 CRC is not possible (2, 3).

In cases of Multiple Adjacent Gingival Recession (MAGR), the surgical management is more demanding and usually requires a longer surgical time, while the wound healing process is more prone to complications and influenced by numerous factors such as, for example, the extended avascular surface area, limited blood supply, or/and unfavorable tooth position (4). RT2 MAGR frequently needs the dual approach of surgery and restorative treatment especially when non-carious cervical lesion (NCCL) is present.

Among the plethora of treatment strategies for root coverage, sub-epithelial connective tissue graft (SCTG) with coronally advanced positioned flap (CAF) was proven to be an effective treatment for multiple gingival recessions defects in areas with esthetic concerns (5). RT2 recession cases may benefit at short term when SCTG based procedures were used, but the predictability is less compared to RT1 (6).

To overcome the disadvantages of CAF like vertical incisions and disturbed papillary blood supply, new techniques like tunnelling have been proposed for the surgical treatment of MAGR. Recent literature shows that tunnelling is an effective and predictable procedure for treating MAGR (7). According to current systematic review and meta-analysis, the overall calculated average root coverage (ARC) of tunnel for MAGR is 87.87% whereas CRC could be achieved in 57.46% of defects (8).

The modified coronally advanced tunnel (MCAT) approach minimizes the surgical invasiveness and enhances wound and soft tissue stability, limiting patient morbidity and surgical chair-time (9). The procedure involves creating a partial-thickness flap by undermining the gingival tissue and alveolar mucosa without separating the interdental papillae. This technique allows clinicians to reduce the need for vertical incisions, which may enhance the esthetic outcome of the root coverage procedure. This technique has the advantage of blood supply from the overlying flap and underlying periosteal bed without compromise in vascularity due to dissection of papillae. However, this approach is technique sensitive (10).

The SCTG is a predictable and versatile technique in treatment of gingival recessions. Differences in hard palate anatomy and insufficient fibro-mucosal thickness may complicate harvesting connective tissue graft (CTG) and considering that healing by secondary intention is not associated with increased post-operative discomfort, Zucchelli and coworkers introduced the de-epitalized gingival graft (DGG) (11) in which it is harvested as a free gingival graft, then extra-orally de-epithelialized. This technique permits palatal harvesting regardless of fibromucosa thickness (12). CT obtained using the DGG technique is considered more stable primarily composed of lamina propria with large amounts of fibrous CT and contains less fatty and glandular tissue than SCTG and longer graft can be harvested (13). MCAT technique in combination with DGG, has been introduced to as a treatment to increase gingival dimensions and to cover the exposed root surface effectively and with long-term stability. Additional gingival thickness (GT) increase, root coverage, and patient-based outcomes favored MCAT, though keratinized tissue (KT) change proved greater with DGG (14).

CASE DESCRIPTION

Clinical case presentation:

A 68-year-old male patient reported to the Department of Periodontology, Sinhgad Dental College and Hospital, Pune with esthetic concern and root sensitivity complaints in December 2022. Patient was non-smoker with no systemic health diseases, and ability to maintain good oral hygiene. Patient had no history of taking antibiotics within 3 months or more than 2 weeks of duration and no gingival surgery within 12 months at the defect site. The clinical examination of the patients revealed MAGR (RT2) and NCCL with #21-25 teeth (Fig 1, 2).

Fig. 1. *Baseline RT2 Gingival Recession defects*

Clinical evaluation indicated plaque index (PI) of ≤ 15 % and gingival index (GI) of ≤ 13 % and probing depth of ≤3 mm (Table I).

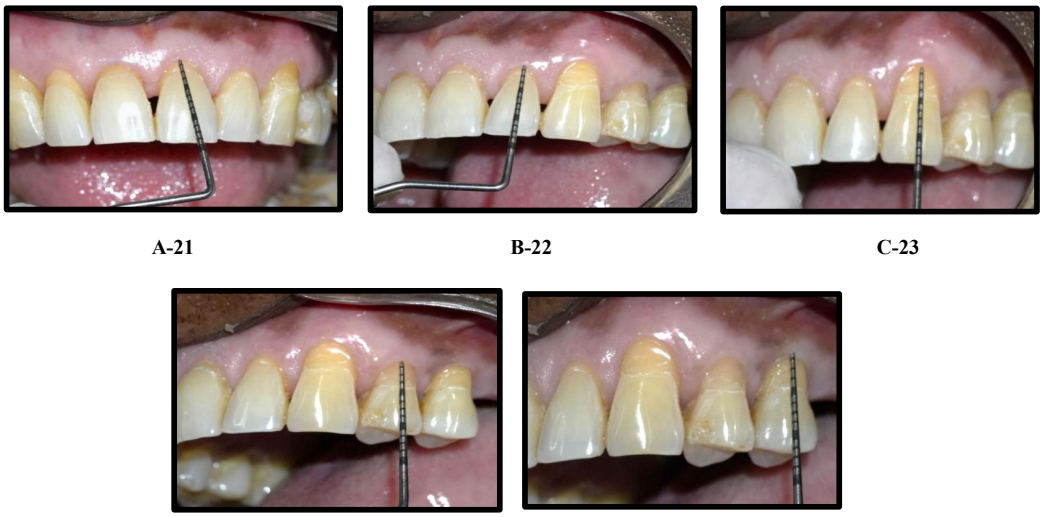

Fig. 2. *Baseline measurement of gingival recession depth using UNC-15 probe*

Table I. *Clinical parameters at baseline; CEJ- Cemento-enamel junction; RD- Recession depth; RW-Recession width; WAG- Width of attached gingiva; KTW- keratinized tissue width; GT- gingival thickness.*

Tooth no.	Class	CEJ	RD	RW	WAG	KTW	GT
21	*RT2*	*Visible*	*2 mm*	*5 mm*	*3 mm*	*4 mm*	*Thick*
22	*RT2*	*Visible*	*1 mm*	*4 mm*	*3 mm*	*4 mm*	*Thick*
23	*RT2*	*Visible*	*4 mm*	*5 mm*	*4 mm*	*5 mm*	*Thick*
24	*RT1*	*Visible with step*	*3 mm*	*5 mm*	*3 mm*	*4 mm*	*Thick*
25	*RT1*	*Visible with step*	*4 mm*	*5 mm*	*2 mm*	*3 mm*	*Thick*

The treatment plan finalized was an interdisciplinary approach of MCAT and cervical restorations after initial healing of 6 months. Patient selection, consent recordings, and surgical procedure were completed by a single clinician/Periodontist at Department of periodontology, Sinhgad Dental College and Hospital, Pune.

Pre-operative

Four weeks prior to surgery, a prophylaxis session was performed, and all teeth were supra-gingivally cleaned. Root planning of the exposed root surfaces using designated curettes was performed. To avoid further progression of the recessions, the patient was instructed to use soft tooth brush with limited pressure and Modified Stillman technique. Informed consent for the root coverage surgery was obtained.

Surgery

Local anesthesia (2% Lidocaine with 1:100000 epinephrine) was administered on both recipient and donor sites. For the recipient site preparation, sulcular incision with 15-D lance tip ophthalmic microsurgical knife was made through the gingival sulcus until the incisal tip of interdental papilla. A full-thickness mucoperiosteal flap was reflected, extending beyond the mucogingival junction with specific tunnel instruments preserving the integrity of the gingivo-papillae complex carefully (14) (Fig. 3).

The undermining of tissues was extended laterally, about 3–5 mm, to prepare the tunnel (4). The second step was site specific application of DGG at 23, 24 and 25 sites since they had more recession compared to incisors. Free gingival graft (FGG) was harvested from the palate and de-epithelialized to obtain a CTG (Fig. 4).

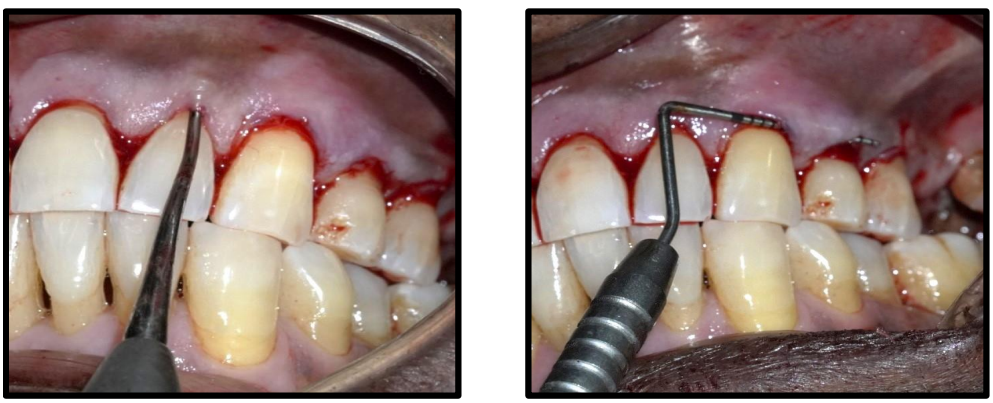

Fig. 3: *Sulcular incisions and tunnelling with specific tunnel instruments*

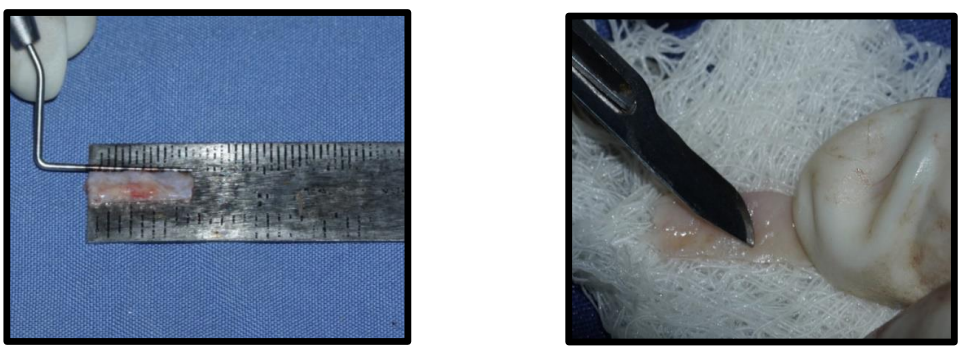

Fig. 4. *Free gingival graft harvested from the palate and de-epithelialized extra-orally*

Graft was carefully inserted into the tunnel with the help of 6-0 polyamide monofilament suture using graft positioning suture technique. Sling sutures were used to coronally reposition the flap 1 mm above CEJ (Fig. 5).

Donor site was secured with bovine collagen type I matrix (SURGICOLL-MESH Advanced Biotech Products (P) Ltd. Encoll Fremont, CA, USA) along with stabilizing sutures to reduce post-op discomfort (15) (Fig. 6).

Postoperative instructions and evaluation of morbidity

An analgesic was prescribed for post-surgical pain relief. Patient was instructed to avoid brushing and chewing in the treated area for a period of 2 weeks and rinse the mouth twice a day using 0.2% chlorhexidine solution. Palatal sutures were removed after 1 week. The recipient site sutures were removed at 2 weeks post-op (Fig. 7).

Patient was instructed to resume the brushing on the operated area using roll technique. Re-examinations were conducted at day 3 for evaluation using VAS scale which consisted of pain and swelling questionnaire in the operated areas (the scale was anchored by "no pain or swelling" as score 0 and "worst imaginable pain or swelling" as score 10).

Patient was further recalled after 1 and 2 weeks where all sites were clinically assessed for wound healing with the help of healing index (16), where the wound healing was scored from 1 (very poor) to excellent based on clinical assessment. At 1 month (Fig. 8) and 3 months (Fig. 9) and 6 months (Fig. 10), post-operative follow ups were conducted.

Fig. 5. *Graft adaptation and recipient site suturing with sling sutures using 6-0 monofilament suture*

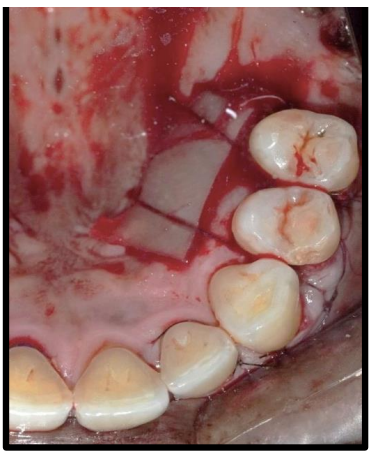

Fig. 6. *Bovine Collagen Sheet dressing to protect the donor site secured with 6-0 sutures*

Fig. 7. *2 weeks post-operative follow up*

The Root Esthetic Score (RES) was assessed at 6 months (17). The definitive restoration of the remaining cervical lesion was done after 6 months using composite resin. During the follow up visits, supragingival plaque was removed when necessary and reinforcement for the proper brushing technique and oral hygiene were implicated.

RESULTS

Healing was uneventful with slight inflammation, some discomfort and swelling for the patient. At the day of suture removal, the level of the gingival margin was still about 1 mm above the CEJ. After 2 weeks, a coverage of about 80% of the denuded root surfaces was achieved which continued till 6 months post-operatively. Increase in keratinized tissue width and gingival thickness were observed. Hypersensitivity completely diminished after the procedure. Scar tissue formation was limited and became almost completely invisible after 1 month.

The VAS median (range) values of postoperative pain after 3 days were between 2–4 and by the end of 1 week there was a decrease in the VAS median (range) values showing 0–2 score.

Fig. 8. *1-month post-operative follow up*

Fig. 9. *3-month post-operative follow up*

Fig. 10. *6-month post-operative follow up*

Healing index showed the scoring of 4 (very good) at all surgically treated sites

In RES system, five variables 6 months following the surgery were evaluated: GM, marginal tissue contour (MTC), soft tissue texture, muco-gingival junction. Alignment, and gingival color (GC). After clinical evaluation a score of 7 was recorded.

DISCUSSION

In the present article, a clinical case was reported in which the DGG was used with the MCAT technique to treat MAGR with NCCL. The primary objective of the case report was to evaluate a degree of GR reduction and soft tissue thickness gain. Improvement of clinical parameters reflecting reduced recession and increase in gingival thickness and keratinized tissue was observed.

The MCAT technique ensures sufficient blood supply to CTG and maintains its vitality and simultaneously, it maintains the gingival margin harmoniously. The tunnel technique provides an effective treatment plan, particularly in MAGR defects as it provides an excellent graft adaptation to the recipient site, produces favourable esthetic results, and increases the gingival biotype (18).

Aroca et al. reported ARC of 90% for the tunnel technique with CTG in treatment of multiple Miller classes I and II gingival recessions, and 83% in case of Miller class III gingival recessions after 12 months (7).

Treatment of MAGR with CAF resulted in 77.7% CRC when releasing incisions was used, whereas it amounted to 89.3% in the group treated without vertical releasing incisions (19).

According to Zucchelli et al. (11) a statistically greater increase in buccal soft tissue thickness may be achieved with DGG, owing to a better quality of connective tissue directly under the epithelium (11).

Regarding NCCL, whether restored with composite/ionomer materials or not, may be safely treated by SCTG+CAF and CAF. There is no evidence on the optimal timing for NCCL restoration (before, during or after root coverage procedures) (6).

The results also confirm the legitimacy of performing minimally invasive techniques of harvesting grafts from the palate as the thin grafts collected in this way are sufficient to obtain both, optimal gingival thickness and aesthetics Zucchelli et al. (20).

CONCLUSIONS

This case report demonstrated that MCAT with selective DGG might represent a promising method for root coverage in MAGR type RT2. At 6 months, this technique gives predictable results with uneventful healing of the surgical sites and has potential to increase soft tissue thickness, keratinized tissue gains and as well as to improve the final aesthetic outcomes. However, randomized controlled trials are needed using this method and focusing on evaluating the amount for root coverage, papillary gain, and the quality of the soft tissue attachment.

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