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Deepithelialized free gingival graft using micro ophthalmic blade for the treatment of gingival recessions: A case series

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Abstract
Gingival recession leads to impaired esthetics and dentinal hypersensitivity and the treatment of such defects with free gingival grafts often pose a challenge, clinically, due to difficulties in harvesting the palatal free gingival graft owing to anatomical variations. This paper will account for a series of cases using de-epithelialized FGG (de-FGG) in the treatment of inadequate width of keratinized tissue and gingival recession using micro-ophthalmic blade. The use of micro-ophthalmic blades, used with magnifying loupe has been found to offer advantages of microsurgical periodontics.

Keywords: De-epithelialized FGG, micro-ophthalmic blade, free gingival graft

Introduction
Gingival recession, resulting due to apical relocation of the marginal gingiva beyond the cementoenamel junction, leads to impaired esthetics and dentinal hypersensitivity. Carious and non-carious cervical lesions are commonly encountered with gingival recession, which pose a clinical challenge. During the treatment of such defects, correcting the anatomic factors is an important aspect. Along with that, the width of the attached gingiva is also taken into consideration. But, the adequacy of width of attached gingiva has been highly debated for decades. Miyasato *et al*. 1977 stated that a minimal or no amount of attached gingiva is sufficient if adequate plaque removal is practiced [1]. On the other hand, Lang & Löe 1992 suggested that a minimum width of 2 mm of gingiva needs to be present for gingival health to exist [2]. The current consensus is that for adequate maintenance of periodontal health, a minimum of 2mm keratinized tissue and 1mm of attached tissue is sufficient [3].
Traditionally, in the treatment of gingival recession, either a free mucosal graft (FMG) or a connective tissue graft (CTG) from the palate is used to aid in gingival augmentation and /or root coverage. CTG, though considered the gold standard, poses a challenge clinically in the harvesting of the graft owing to anatomical variations.
The masticatory mucosa of the hard palate is composed of three histologic layers: the epithelium, and the subepithelial connective tissue with the lamina propria and the submucosa. The epithelium corresponds to the outer lining of the gingiva, and is orthokeratinized and about 300 µm thick [4]. The lamina propria below the palatal epithelium is a very coarse tissue containing inter-cellular substances and its thickness is more deciding in CTG harvesting. The underlying submucosa contains numerous glands, nerves and adipose tissue, varying between patients and within the same individual [5]. The anterior palatal vault is characterized by the presence of fatty tissue, while glandular presence is evident more posteriorly. Presence of adipose or glandular tissue is often considered less advantageous in a CTG as they are of no benefit to the recipient site.
Following the placement of the palatal soft tissue graft in the recipient site, the percentage of shrinkage of connective tissue autograft was recorded as 55% against the free gingival autograft being 29% [6]. Hence to overcome this, sufficient amount of graft should be harvested to compensate for the shrinkage, which entails a sufficiently thick palatal fibromucosa.
In an evaluation of CTG histologically by Harris in 2003, it was reported that some grafts contain only lamina propria, while many other tissues showed abundance of submucosa

containing adipose tissue [7]. The portion of the lamina propria varied between 21.1 and 100% of the graft (mean 65.2%), concluding substantially varying dimensions of the different subepithelial connective tissue layers from patient to patient. Such variations pointed towards the inconsistency in the tissue quality of the connective tissue graft harvested from the palate.

This led to a technique proposed by Zuccheli *et al*. in 2010 [8] where connective tissue graft was used in the treatment of gingival recession obtained by de-epithelialization of free gingival graft.

This paper will account for a series of cases using de-epithelialized FGG (de-FGG) in the treatment of inadequate width of keratinized tissue and gingival recession using micro-ophthalmic blade. The use of micro-ophthalmic blades along with suture of 6-0 diameter, used with magnifying loupe has been found to offer advantages of microsurgical periodontics.

Case-Report

In this case series, 3 isolated Miller's Class I recession defects in mandibular anterior region were treated in 3 different patients, using micro-ophthalmic blade and sutured with 6-0 absorbable suture having 3/8" reverse cutting needles. The entire surgical procedure was done using magnifying loupe under 3x magnifications.

A female patient of 29 years of age, reported to the Department of Periodontics, with the complaint of tooth sensitivity in the mandibular anterior tooth region for the past five-six months. The patient was clinically healthy and without any medical condition.

On clinical examination, in the tooth #41, the vertical length of the recession defect was 8 mm and 1mm of keratinized gingiva was evident, apically to the gingival recession (Fig. 1a). The periodontium was healthy and with no overt inflammatory signs. The IOPAR showed no inter-radicular bone loss or any other peri-apical lesion. (Fig. 1b). Scaling and root planning was done in the entire dentition and Oral Hygiene Instructions (OHI) were given.

After two months, surgical technique to increase the width of attached gingiva along with the coverage of the gingival recession defect, with de-epithelialized free gingival graft was planned.

Fig 1a: Pre-operative view wrt 41

Fig 1b: IOPAR of 41

Fig 2a: Preparation of the recipient bed with micro ophthalmic blade

Fig 2b: De-epithelialization of the recipient bed

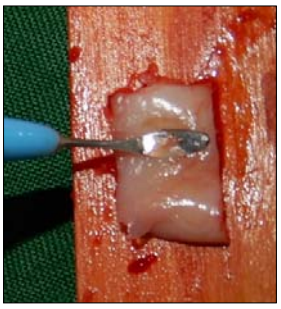

Fig 3: De-epithelialization of the FGG

Fig 4: Graft securesd with suture.

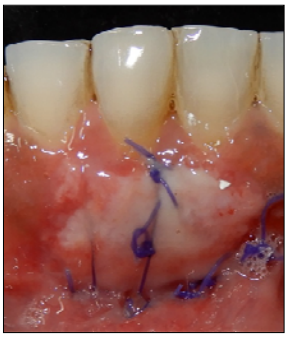

Fig 5: 1 Month Follow up

Fig 6: 3 Month Follow up

Case 2: Baseline

Case 2: 3 Month Follow up

Case 3: Baseline

Case 3: 3 Month Follow up

Surgical procedure

An informed consent was obtained from the patient prior to the surgery. The root surfaces were planed using hand curettes. An injection with local anesthetic (Lignocaine HCl with 2% epinephrine 1: 200,000) was administered.

A micro-ophthalmic blade was used to make a horizontal incision of 3 mm at the mucogingival junction (MGJ) near the base of the vestibule (Fig. 2a). Thereafter; the mucosa adjacent to the area of recession was de-epithelised, using the micro-ophthalmic blade. (Fig. 2b). Then, the labial mucosa was sutured to periosteum in order to prevent collapse of the recipient bed.

Following an injection with local anesthetic in the hard palate, the required dimensions of the epithelized graft was obtained from the thin palatal tissue and it was subsequently de-epithelialized by means of a disposable micro-ophthalmic blade (Fig. 3). The de-epithelialized FGG (de-FGG) was then stabilised to the recipient bed by means of 6-0 absorbable suture having 3/8" reverse cutting needle. (Fig. 4)

Postoperative instructions

The patient was advised to apply cold-packs over the external surface of skin. The patient was advised to take analgesic (Tab Ibuprofen 400mg TDS) for 5 days post-operatively. Use of a chlorhexidine gluconate 0.2% oral rinse was advised twice daily. Patient was advised to avoid brushing at the surgical site for six weeks.

Lukewarm or cold semifluid diet on the day of procedure, along with easy-to-chew soft food with no sharp edges for two weeks was also advised.

1 month post-operatively: The horizontal incisions showed complete healing with soft tissue maturation, minimal scarring and adequate amount of attached gingiva. (Fig. 5)

The clinical parameters including the recession length and width were recorded at baseline, 1 month (Fig. 5), and 3 months (Fig. 6) respectively.

Two other cases (represented by Case 2 and Case 3 respectively) also underwent similar surgical procedure.

Clinical Observations and Results

1 month post surgical evaluation showed adequate healing of soft tissue in all the three cases. Increase in the width of keratinized tissue with partial root coverage in relation to the respective teeth were observed in all the cases. The findings were consistent 3 month postoperatively as well. The patients were satisfied with final clinical outcome and appearance. The measurements of the clinical parameters are represented in the Table. 1.

Table 1: The measurements of the clinical parameters

Clinical parameters	Measurements		
	Baseline	01 Month	03 Months
Recession length (mm)	Case 1: 8 mm Case 2: 5 mm Case 3: 3.5 mm	Case 1: 1.5 mm Case 2: 2.8 mm Case 3: 1.5 mm	Case 1: 1 mm Case 2: 2.5 mm Case 3: 1 mm
Width of keratinised gingiva (mm)	Case 1: 1 mm Case 2: 2 mm Case 3: 3 mm	Case 1: 6.5 mm Case 2: 4 mm Case 3: 5 mm	Case 1: 7 mm Case 2: 5 mm Case 3: 5 mm
Pocket depth (mm)	Case 1: 2 mm Case 2: 2 mm Case 3: 2 mm	Case 1: 1 mm Case 2: 1 mm Case 3: 1.5 mm	Case 1: 1 mm Case 2: 1 mm Case 3: 1mm
CAL (mm)	Case 1: 10 mm Case 2: 7 mm Case 3: 5.5 mm	Case 1: 5.5 mm Case 2: 3.8 mm Case 3: 3 mm	Case 1: 6 mm Case 2: 3.5 mm Case 3: 2mm
Root coverage (%)		Case 1: 81.2 % Case 2: 44 % Case 3: 57.14 %	Case 1: 87.5 % Case 2: 50 % Case 3: 71.4 %

Discussion

Free gingival graft is the frequently advocated modality in treating the cases of gingival recession with inadequate attached gingiva. However, FGG may result in unaesthetic appearance of the recipient site and CTG is considered to be most effective and predictable in treating these defects with better color matching as well. But in the presence of a thin palatal mucosa, harvesting a connective tissue graft of sufficient thickness is a challenge and there is an increased risk of injury to the underlying neuro-vascular bundles in the proximity.

The thickness of palatal fibromucosa has been in research for the past few decades. The different techniques used to assess this have made evident that the thickness differs from person to person and from one site to another in the same patient. The thickness is found to increase from gingival margin towards palatal midline, and decrease from anterior to posterior, least being in the first molar region and then again increasing posteriorly near the second molar and tuberosity regions.[9] Furthermore, studies have proven that the thickness is significantly more in males in comparison to females and in older people in comparison to the younger individuals (Kollivayar *et al*. 2012) [10]. Cha *et al*. 2008 [11], in a study observed that the palatal thickness ranges from 2.29-6.25mm, however, Zuccheli pointed out that the average palatal mucosal thickness is 3mm, and that less than 50% of the

patients requiring mucogingival surgeries have a sufficiently thick palatal fibromucosa for CTG harvesting and hence different techniques have been used to solve this clinical difficulty [12].

This approach of de-epithelized-FGG to obtain a connective tissue graft has offered advantage to the quality of the connective tissue. Being closer to the epithelium, it was observed that the connective tissue was denser and hence more stable and less susceptible to shrinkage than a conventional CTG [12]. But this technique subjects the donor site to heal by secondary intention. However, it has been observed that when a sufficient connective tissue bed is present overlying the periosteum keeping the graft thickness <1.5mm, it can ensure minimal donor site morbidity with reduced risk of necrosis (Harris, 2003) [7].

The superior endpoint of esthetic appearance following microsurgery compared to conventional surgery has been reported by the study conducted by Burkhardt R and Lang NP [13]. In this study, the root surface coverage with a subepithelial connective tissue graft using a microsurgical approach substantially improved the vascularization of the grafts, seen with fluorescent angiograms, and resulted in increased percentage of root coverage compared with applying a conventional macroscopic approach.

In this present case series with de-FGG using micro-surgical ophthalmic blades has shown promising results. The micro-ophthalmic blades have given an upper edge as being less traumatic and at the same time increasing the operator's precision. The micro-ophthalmic blades, used primarily in ophthalmic cataract micro-surgeries have been recently adopted into the dental field for the benefits in improved graft vascularization in treatment of gingival recession in comparison to conventional approach. These instruments are extremely sharp with a circular cross-section which results in minimal tissue trauma with a clean, non-ragged incision at the same time. These are available in various sizes and designs for precise workability with 1.5mm and 2mm marking along the blade length. These micro-surgical instruments used in concurrence with magnification systems, give an advantage to the operator in adequate visual acuity for precise procedure and the use of micro-surgical suturing (6-0) ensure superior wound approximation and rapid wound healing with increased patient acceptance.

Conclusion

In the present case report, free gingival graft, de-epithelized by the micro-ophthalmic blade, was used under magnifying loupe vision for coverage of denuded root. Even though the procedure represented in this case report can be performed using normal vision, the use of magnifying loupe and microsurgical ophthalmic instruments offers definite advantages in terms of improved visual acuity, enhanced approximation of wounds, faster wound healing, reduced chances of postoperative morbidity, and increased patient acceptance. Despite the advantages stated previously, as well as those cited by various other researchers [13-16], there is still a paucity in the available literature to assess the magnitude of the real benefits of the microsurgical approach over the conventional approach.

However, further investigation through randomized controlled trials to prove its plausibility is warranted.

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