



GINGIVAL AUGMENTATION USING COLLAGEN SCAFFOLD POWERED BY GLYMATRIX TECHNOLOGY- A CASE REPORT

Dentistry

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ABSTRACT

Background: Gingival thickness is a factor which is of major concern for the progression of periodontal disease as it can lead to periodontal attachment loss and marginal tissue recession. Inadequate attached gingiva along with gingival recession causes not only aesthetic concerns but also affects the functioning of the supporting periodontal tissues.

Case description: This case addressed the functional and esthetic concerns of a female patient with sensitivity of teeth in the lower front tooth region since 3-4 months using a collagen scaffold powered by glymatrix technology.

Conclusion: The use of collagen scaffold powered by glymatrix technology provides a promising therapeutic intervention for the enhancement of gingival biotype.

Clinical significance: This case highlighted the use of OSSIX® Volumax, a collagen scaffold which mimics the natural glycation process in the body thereby restoring the deficient volume resulting in an anatomically correct esthetic profile. Thus OSSIX® Volumax, attributing to its expansion qualities, may be used as a substitute for connective tissue harvested from a donor site thereby simplifying the surgical procedure and helps in reducing morbidity.

KEYWORDS

Gingiva, gingival recession, collagen, phenotype

INTRODUCTION

Seibert and Lindhe introduced the term periodontal biotype, and categorized the gingiva into "thick-flat" and "thin scalloped" biotypes.¹ The thin gingival biotype is associated with a thin keratinized tissue band and scalloped gingival contour that indicates thin bony architecture and is more susceptible to any inflammation or trauma.² Periodontal inflammation may lead to an increased propensity for pocket formation in thick biotype and gingival recession in thin tissues.³

The opinion that the existence of a wide band of keratinized and attached mucosa surrounding the tooth is crucial for maintaining gingival health and preventing attachment loss and soft tissue recession led to the advent of surgical methods for gingival augmentation.⁴ Dorfman et al. examined the need for and effectiveness of gingival augmentation in maintaining periodontal attachment.⁵ A procedure for keratinized tissue augmentation aims to provide qualitative changes to the soft tissues that are apical to the gingival margin, particularly in the absence of qualitative changes.⁶ Various techniques used for gingival augmentation include free gingival graft,⁷ sub epithelial connective tissue graft, 'acellular dermal matrix' and growth factors like enamel matrix proteins⁷ to list a few. This case report describes the use of a collagen scaffold, OSSIX® Volumax (manufactured by Datum Dental, Ltd, Lod, Israel) for the augmentation of thin gingival biotype.

Case description

A 25 year old female patient presented with the chief complaint of sensitivity in the lower front tooth region since 3 to 4 months. On examination, there was gingival recession in relation to 31 and 41 which was contributing towards dentinal hypersensitivity. Clinical examination was carried out to classify the recession and determine the gingival biotype and width of keratinized gingiva. There was interdental tissue loss in relation to both 31 and 41. Gingival biotype was evaluated by probe translucency method (TRAN). A standardized and calibrated probe was inserted through the gingival margin while probing the sulcus at the midfacial aspect of the teeth. The underlying probe could be seen through the gingival margin, indicating a thin gingival biotype (Figure 1a, 1b).



Figure 1a, 1b. TRAN method showing gingival biotype w.r.t 41 and 31

The Tension test was used to assess the adequacy of attached gingiva wherein tension was applied to the lower lip in outward, downward, and lateral directions. The gingival margin was then observed and any movement of the free gingiva was recorded as representing a positive response to the tension test. Thus the clinical examination revealed Miller's class III gingival recession with thin gingival biotype and inadequate width of keratinized gingiva. It was decided to perform gingival enhancement using OSSIX® Volumax collagen scaffold with a coronally advanced flap. A written informed consent was obtained from the patient prior to the treatment.

Case management

Using 2% lignocaine with adrenaline, the operative site was anesthetized (1: 2,00,000). Two oblique divergent incisions were performed extending from the distal line angle of 41 to the distal line angle of 31. Later, intrasulcular incisions were performed and interproximal incisions followed. Initially, a split thickness flap was raised to move the flap coronally without tension. The root surfaces along with the most coronal alveolar bone were exposed by elevation of full-thickness mucoperiosteal flap (Figure 2).



Figure 2. Full-thickness mucoperiosteal flap to expose the coronal alveolar bone

By using sterile instruments, OSSIX® Volumax was removed aseptically from the package. A 10x12.5mm membrane was used and immersed for 30 seconds in sterile saline to allow for its expansion. Root bio modification was done on the recipient site with tetracycline (Figure 3)



Figure 3. Root bio modification done on the recipient site with tetracycline

The membrane was reshaped and trimmed with a sterile scissor. The membrane was placed in the recipient site apical to the CEJ with the help of sterile forceps (Figure 4).



Figure 4. The membrane folded and placed in the recipient site apical to the CEJ

The flap was advanced coronally to completely cover the membrane and sutures were placed to secure the flap in place (Figure 5, Figure 6).



Figure 5. Flap coronally advanced



Figure 6. Sutures placed

Periodontal dressing was placed to protect the surgical site. The patient was advised to avoid brushing at the surgical site to prevent any mechanical hindrance or trauma. The patient was also prescribed antibiotics (500 mg of amoxicillin TID for 5 days) and analgesics (diclofenac sodium BID for 5 days). Chlorhexidine solution (0.2%) twice a day was advised for 2 weeks.

On post-operative re-evaluation at 6 months, the width of keratinized tissue was found to increase by 3mm for both 31 and 41 and a full root coverage was observed on the labial aspect of 41 and a partial root coverage was observed on the labial aspect of 31. (Figure 7)



Figure 7. 6 months post-operative view

DISCUSSION

Gingival recession along with inadequate attached gingiva not only impairs esthetics but also the functioning of the supporting periodontal tissues⁸. Gingival recession can be treated in a variety of ways. Miller's class III or IV gingival recession, on the other hand, frequently has a fair to poor prognosis due to interdental soft tissue or bone loss. Several variables hinder the management of class III or IV gingival recession, including insufficient keratinized tissue, thin gingival biotype, and insufficient vestibular depth, to name a few.⁹ Given the lack of prediction in the outcome of root coverage in class III recessions¹⁰, our goal was more functional than aesthetic by enhancing the gingival thickness and width of keratinized tissue along with partial root coverage thereby prolonging the longevity of the tooth. One of the oldest treatment modalities to manage such a complicated clinical scenario is free gingival graft (FGG). With the advent of new techniques, FGG as root coverage technique has become obsolete due to its limitations such as poor esthetics and need for a second donor site.¹¹

The present case report highlighted the effectiveness and the predictability of OSSIX[®] Volumax collagen scaffold in the management of Miller's class III recession with thin gingival biotype utilizing a single-step surgical procedure. OSSIX[®] Volumax is a multi-layer, volumizing collagen scaffold that is dense and expands when wet. The FDA-approved OSSIX[®] Volumax is powered by clinically validated GLYMATRIX, a patented technology for the cross-linking of collagen, close to the natural glycation process in the human body. The technology uses sugars to cross-link collagen molecules that create a bio-programmable collagen matrix that can be tailored to provide products with different physical characteristics and personalized durability.¹² In the body, there are two separate mechanisms of collagen cross-linking. One is an enzymatic-mediated process, and the other is a non-enzymatic reaction called glycation, mediated by a reducing sugar – glucose.¹³

Over time, further re-arrangements are progressively performed by the initial products of the glycation reaction, resulting in the irreversible formation of a family of structures with cross-links. This cross-linking caused by glycation is known to be the key mechanism for extending the biological half-life of the native collagen.¹⁴

GLYMATRIX powers the OSSIX family of regenerative solutions. GLYMATRIX technology uses ribose, a natural, nontoxic sugar, to cross-link collagen fibers in a way that mimics the naturally occurring glycation process in the human body.^{15,16} The act of cross-linking collagen fibres creates biomaterials with prolonged bio durability and increased stability against degradation.¹⁷ Ossix collagen scaffold restores the deficient volume and results in an anatomically correct aesthetic profile.

CONCLUSION

The use of Ossix Volumax collagen scaffold powered by glymatrix technology provides a promising therapeutic intervention for the enhancement of gingival biotype.

Clinical significance

This augmentation procedure can be considered simpler to perform, in certain cases, than existing procedures and relatively easy as in this case it required no harvesting of graft from a remote donor site, simplifying the surgical procedure and simultaneously reducing morbidity.

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