

## Enhanced Gingival Recession Coverage by Er,Cr:YSGG Laser Root Biomodification

### Abstract

Gingival recession predisposes to functional and aesthetic concerns, for which many surgical procedures are available. Among these, till now subepithelial connective graft is considered as the gold standard technique for its higher predictability of achieving recession coverage. However, it does not heal by new attachment, thus many techniques to promote new attachment such as root biomodification are done. This case enumerates the use of Er, Cr: YSGG laser for root biomodification to treat a wide and deep gingival recession defect by subpedicle connective tissue graft. Six months results show better recession coverage inspite of a wide and deeper defect. Thus, Er, Cr: YSGG laser can be an adjunctive tool to enhance the recession coverage.

**Keywords:** Erbium, gingival recession, lasers, tooth root

### Introduction

Historically, surgical periodontal therapy was focused at the management of plaque-induced periodontal tissue destruction, however, with increased aesthetic demands of patients, periodontal plastic procedures such as gingival recession coverage, papilla reconstruction, etc., have become a common practice.<sup>[1]</sup> Gingival recession is characterized by the displacement of gingival margin apical to the cemento-enamel junction (CEJ) with exposure of root surface to the oral environment resulting in an unaesthetic appearance, dentin hypersensitivity, and risk of root caries. Even though various procedures such as free gingival grafts,<sup>[2]</sup> laterally sliding flaps,<sup>[3]</sup> subepithelial connective tissue grafts,<sup>[4]</sup> coronally advanced flaps<sup>[5-7]</sup> have attempted to treat the recession, most of it heals by long junctional epithelium rather than new attachment, which predisposes to high chance of recurrence.

To overcome this, techniques such as root biomodification were introduced which aims to detoxify, decontaminate and demineralize diseased root surface, to expose the collagen matrix, that is thought to facilitate a stable fibrin clot formation

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favoring new attachment. Agents such as ethylenediaminetetraacetic acid, citric acid, and tetracycline are currently used for this purpose with their own controversial results in smear layer removal and collagen exposure.<sup>[8]</sup>

Since the advent of hard tissue lasers (Er: YAG and Er, Cr: YSGG) its use in conservative dentistry has been widely accepted for cavity preparation, because of its ability to remove smear layer that can enhance the retention of resin bonded restorative materials.<sup>[9,10]</sup> Thus, the use of Erbium lasers in periodontal therapy (root biomodification) to remove diseased cementum and smear layer to favor new attachment and enhance periodontal regeneration can be promising.

This case report discusses the use of Er, Cr: YSGG laser for root bio-modification in gingival recession coverage using the subpedicle connective tissue graft technique.

### Clinical Presentation

A 43-year-old male reported to the out-patient department with a complaint of sensitivity in the lower front tooth region for the past 6 months while brushing and taking cold water, which is mild and localized. On clinical examination, there was Miller's Class III gingival recession (CAL 10 mm) with inadequate

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width of attached gingiva in relation to #32. The tooth was labially proclined with Grade I mobility [Figure 1]. Based on the history and clinical examination it was diagnosed as localized chronic periodontitis in relation to the #32 region.

### Case Management

A treatment plan combining nonsurgical periodontal therapy and a surgical therapy was planned and discussed with the patient (Patient was not willing for orthodontic correction). After obtaining written consent, scaling and root planing, and splinting the mandibular anterior teeth were done. The patient was recalled after 2 weeks for surgical recession coverage procedure. Since the gingival recession defect was deep and wide, with the adjacent tooth (#31 and 41) having good width and thickness of attached gingiva, recession coverage using subpedicle connective tissue graft technique with laser root biomodification (Er,Cr:YSGG)

After adequate anesthesia, root biomodification was done on the exposed root surface of #32 using Er,Cr:YSGG

(2780 nm, Waterlase \* iPlus, Biolase) laser under the following settings: Noncontact pulsed mode, 20 Hz repetition rate, 175 mJ energy, 0.75 W power, in linear motion, and following which the root appeared frosted [Figure 2].

The recipient site #32 was prepared with beveled incisions around the gingival margin to create a vascularized bed. From the adjacent region (#41, 31) a pedicle flap was elevated using submarginal incision 1.5 mm from gingiva margin and a vertical relieving incision on the distobuccal aspect of #41 [Figure 3]. After exposure of 2–3 mm of bone, a partial-thickness flap was elevated for adequate mobility and displacement of the flap [Figure 3]. A connective tissue graft of required size [Figure 4] was then procured from the right palate (#14 and 15 regions) with the trap door technique. The graft was then sutured at the recipient site (#32) with 4-0 resorbable suture (Vicryl<sup>®</sup>, Ethicon Suture Co., Sommerville, New Jersey, U. S. A) [Figure 5]. The pedicle flap was then displaced laterally and coronally to #32 region, over the connective tissue graft [Figure 6].



Figure 1: Miller's Class III gingival recession #32



Figure 2: After Laser root biomodification at #32, the root appears frosted



Figure 3: Recipient site preparation is done in #32 and subpedicle flap elevated in relation to #31, #41 with a submarginal incision

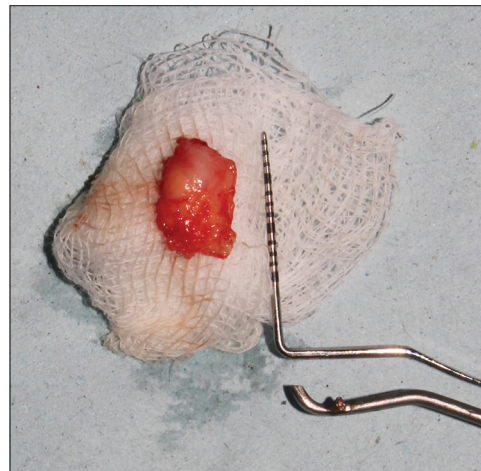


Figure 4: Connective tissue graft obtained from the right palate using a trap door technique

After adequate hemostasis periodontal dressing was placed, postoperative instructions and medications were prescribed. The patient was reviewed after 1 week, 1, 3, and 6 months later [Figure 7].

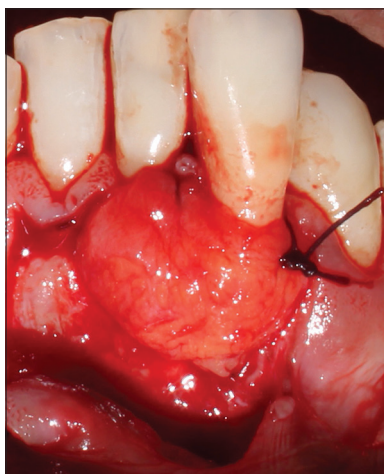


Figure 5: Connective tissue graft sutured over the recipient site (#32)



Figure 6: Subpedicle flap displaced laterally and sutured over the recipient site (#32)



Figure 7: Six months postoperative view after recession coverage at #32

### Clinical outcomes

One week and 1 month postoperative evaluation showed satisfactory healing and complete root coverage with mild residual inflammation. At the 3<sup>rd</sup> month, complete healing with a good clinical attachment gain of 7 mm (CAL 3 mm) was seen and it was maintained till 6<sup>th</sup> month evaluation. In the present case, inspite of a wide and deeper recession defect (CAL 10 mm), subpedicle connective tissue graft technique with Er,Cr:YSGG laser root biomodification, have resulted in a good recession coverage (CAL gain of 7 mm) at 6<sup>th</sup> month evaluation.

### Discussion

The goal of any root coverage procedure is to restore the tissue margins at the level of CEJ and to achieve a new attachment with no bleeding on probing and a minimal probing depth which are influenced by the elimination of contributing factors and severity of defect.

In the present case with subpedicle connective tissue graft technique and Er,Cr:YSGG laser root biomodification, we achieved good recession coverage (CAL gain of 7 mm). Previous reports on subepithelial connective tissue grafts have reported, a recession coverage varying from 3 to 4 mm which is much lesser than our results (CAL gain of 7 mm).<sup>[11]</sup> The improved recession coverage obtained in our case, inspite of wide and deeper defect, may be due to effective removal of smear layer, endotoxins, and exposure of the organic matrix of the root cementum by Er,Cr:YSGG laser root biomodification. This is supported by earlier studies,<sup>[12]</sup> where they have shown that root surface conditioning by Er, Cr: YSGG laser improved the mean root coverage and the percentage of complete root coverage compared to the group treated without laser root biomodification. Furthermore, reports comparing the efficacy of smear layer removal by chemical agents versus erbium lasers root biomodification, have concluded equivalent and complete smear layer removal by erbium laser.<sup>[13,14]</sup>

Inspite of all these reports showing better gingival recession coverage with Erbium lasers, which are evaluated clinically, there is a lack of histologic evidence, that erbium lasers facilitate new attachment. Thus, future studies should aim at histological evidence and clinical studies with larger sample size and longer follow-up to explore whether Er, Cr: YSGG laser root biomodification facilitates new attachment.

### Conclusion

Limited evidences are available in successfully treating a severely deep and wide gingival recession defect with contributing factors such as proclination. In this case report, laser root biomodification enhanced the outcome of the gingival recession coverage procedure as well stabilized the result for more than 6 months. The removal

of smear layer and exposure of root collagen by laser root bio-modification, may resulted in a firm fibrin attachment between root and graft. Proper and adequate knowledge about hard tissue laser is needed to achieve desired effect and avoiding overzealous instrumentation that can worsen the problem.

### Consent for publication

The patient has given valid and informed consent for publication of this case and related images.

### Declaration of patient consent

The authors certify that we have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his image and other clinical information to be reported in the journal. The patient understands the name and initials will not be published and due efforts will be made to conceal the identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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