

## Root Coverage Treatment in Bilateral Miller's Class I Using Subepithelial Connective Tissue Graft in a Smoker Patient

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### Abstract

In Indonesia, periodontal plastic surgery to cover exposed root is still uncommon, most of the cases were treated with filling. The surgical treatment is an alternative to obtain aesthetic, diminish dentinal hypersensitivity and allow better conditions of dental hygiene performance. Smoking often categorized as contraindication for periodontal plastic surgeries due to their influence of the healing and outcomes.

This report proposed to present root coverage treatment case on male 25 years old, and heavy smoker patient, with Miller's Class I. Coronally advanced flap and subepithelial connective tissue graft were chosen because of their ability to provide double blood supply on affected area. Recession height, width, probing depth, clinical attachment level (CAL), and height of the attached gingiva (HAG) were measured prior and after surgery.

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### Introduction

Gingival recession is defined as exposure of the root surface by an apical shift of marginal gingiva.<sup>1</sup> This is one of a common problem seen in our daily practice. There are several predisposing factors may account for the recessions appearance, such as trauma to the gingival tissues during tooth brushing, orthodontic movement, tooth malpositioning, periodontal disease, maladapted crowns, thin attached gingiva, labial frenulum, alveolar bone dehiscence, and iatrogenic factors.<sup>1,2</sup>

In 1985, Miller established the clinical classification of marginal tissue recessions:<sup>2,3</sup> The Classification are Class I – the recession does not extend the mucogingival junction without loss of interproximal bone or soft tissue; Class II – the recession extends to or beyond the mucogingival junction without loss of interproximal bone or soft tissue; Class III – the

recession extends to or beyond the mucogingival junction, loss of interproximal tissue is seen and the proximal gingival tissue is apically to the enamel-cementum junction and coronally to the recession; there is malpositioning of the tooth; and Class IV – the recession extends to or beyond the mucogingival junction with severe bone and soft tissue loss interproximally and/or severe tooth malpositioning.

Recently, patients have become increasingly aware of gingival recession due to their unaesthetic features, discomfort feeling caused by dentinal hypersensitivity, difficulty to remove dental plaque and occurrence of root caries.<sup>1,4</sup> The principal objectives of treating a gingival recession are to achieve better esthetics and reduce hypersensitivity.<sup>5</sup> Various treatments have been used to achieve the goals.<sup>5</sup>

In Indonesia, most of gingival recession cases treated with composite resin or glass ionomer cement filling, but it may lead to iatrogenic problems, such as gingivitis, or even a bigger recession caused by subgingival overhanging margins. The surgical treatment is an alternative to obtain patient's aesthetic, diminish or eliminate dentinal hypersensitivity and allow better conditions of dental hygiene performance in the affected area.<sup>1,2</sup>

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Periodontal plastic surgery is defined as the surgical procedures performed to correct or eliminate anatomic, developmental, or traumatic deformities of the gingiva or alveolar mucosa, including root coverage for gingival recession. Root coverage can be achieved using several treatment modalities, including subepithelial connective tissue grafts, free gingival grafts, advance coronally positioned flaps, laterally positioned flaps, guided tissue regeneration and acellular dermal matrix allografts.<sup>1</sup> Among these modalities, subepithelial connective tissue grafts is taken as a “Gold Standard” procedure because of it has demonstrated the highest success rates with greatest amount of predictability.<sup>1</sup>

The choice of the adequate technique and the long term success of the procedure depend on the careful evaluation of the defect type, recession’s etiology, operator’s ability, presence of keratinized tissue, tissue width, predictability, single or multiple gingival recessions, healing, aesthetic result, and risk factors.<sup>2</sup> Patient’s systemic condition also can become a risk factor for the successful of the treatment, this include patient’s smoking habit.

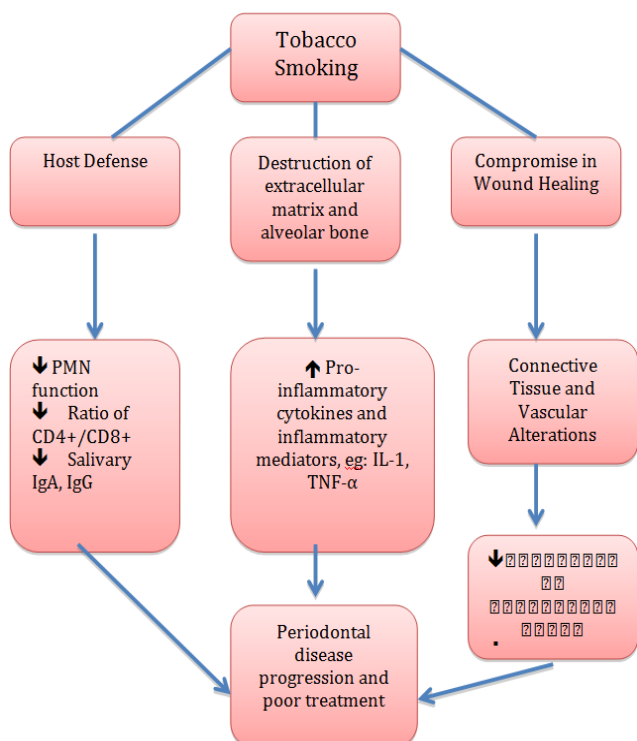
to periodontal disease. Researchers have reported tobacco smoking as producing a negative effect on periodontal therapy, nonsurgical, and surgical alike.<sup>6-8</sup> Smoking interferes with several physiological mechanisms and cellular functions, that may contribute to periodontal disease progression and treatment outcomes. (Figure 1).<sup>9-12</sup> Nicotine metabolites can concentrate in the periodontium and their effects include the promotion of vasoconstriction, and the impairment of the functional activity of polymorphs and macrophages.<sup>10</sup> Tobacco use also increasing the numbers of neutrophils in peripheral blood and impairing their migration through capillary walls due to paralysis of the cell membrane.<sup>10</sup> Cigarette smoking has been demonstrated to activate the release of inflammation mediators, which has the capacity to cause tissue damage.<sup>10</sup> Large number of tobacco toxins also may impair periodontal healing.<sup>13</sup> In contrary, some reports stated insignificant differences on root coverage surgeries result in smoker and nonsmoker patients.<sup>14</sup>

The purpose of this report is to present root coverage treatment case on Miller’s Class I using coronally advanced flap and subepithelial connective tissue graft on heavy smoker patient is possible and give a satisfactory result. Therefore, smoking is not always being a contraindication for root coverage surgeries.

**Objectives:** This case report to present a possibility in achieving a satisfactory result for root coverage treatment with the right sequences on gingival recession Miller’s Class I using *coronally advanced flap* and subepithelial connective tissue graft on heavy smoker patient.

### Case Report

Male patient, 25 years old, came to clinic of periodontology, Rumah Sakit Khusus Gigi dan Mulut (RSKGM), Faculty of Dentistry, Universitas Indonesia, with chief complaint of dentinal hypersensitivity and his gum tended to bleeding when he brushed his teeth. He brushed his teeth twice time a day, never used mouthrinses or dental floss. This was his first visit to a dentist, therefore he never experienced scaling. Systemically patient in a healthy condition but he has smoking habit, 1-2 packs consist of 20 cigarettes each.



**Figure 1.** Effect of tobacco smoking on periodontal tissue breakdown, disease progression, and treatment outcome. Smoking will alter immunologic and vascular responses.

Utilization of tobacco has long been linked

Anamnesis showed that the probable etiological factors were defined as traumatic tooth brushing. Clinically, patient had bad oral hygiene with plaque, supra and subgingival calculus on every region. Marginal recessions were about 2 mm at region 13 and 24, and 3 mm at region 14, not extend the mucogingival junction, with probing depth 3-5 mm. Clinical attachment level (CAL) for 13 and 24 were 2 mm and; for 14 was 4 mm, and height of the attached gingiva (HAG) for 13, 14, and 24 were 4 mm. Radiograph showed no alveolar bone loss on the interdental area of affected teeth. Therefore, the recessions were classified as Miller's class I, and then root coverage by subepithelial connective tissue graft was indicated (Fig. 2).



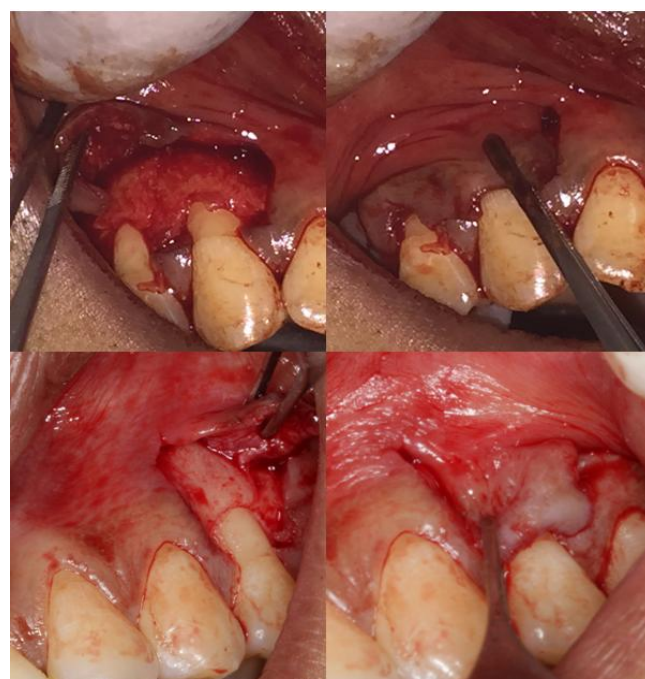
**Figure 2.** Initial clinical condition. Gingival recession 2-3 mm seen at region 13, 14 and 24.

Prior to the surgery, patient was given dental health education, particularly on the importance of oral hygiene maintenance and smoking cessation. Scaling and root planning were performed and the patient was instructed to use mouth rinse of 0,12% chlorhexidine gluconate to help increase his oral hygiene status. Patient was very cooperative on the smoking cessation program. He succeeded reduce the amount of cigarettes per day and replaced it with candies. At the first he reduced the cigarettes until 1 pack (20 cigarettes) per day, and after one year he already reduced it until only 2 cigarettes per day.

The first surgery that performed was on 24 regions because the area was narrower, to observe the healing reaction both on recipient and donor site, regarding to heavy smoking habit of the patient. The second surgery was done 5 months after.

Asepsis was carried out trough povidine iodine solution both on the recipient and donor site. Local anasthesia was given topically used Lidocaine 8%, Dibucaine 0,8% and infiltration using Mepivacaine Hydrochloride 2% with

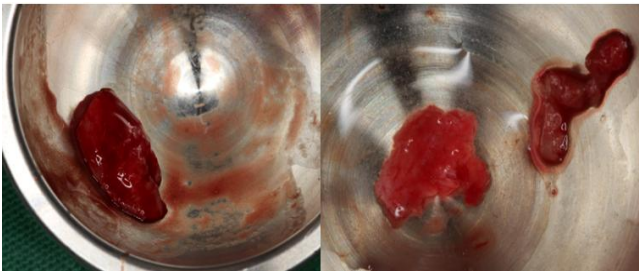
adrenaline. On the recipient site of 13, 14, and 24 region, horizontal and vertical incision was made only at the affected teeth, trapezoid with papilla reservation flap design (Fig. 3). Undermining flap on the apical area until there were no tension, therefore the flap can be pulled coronally without tension. After the flaps were released, scaling and root planning were executed to remove the contaminated and exposed cementum. Papilla deepithelizations were performed using small round diamond bur at the margin of the incision. The recipient site then covered using gauze that given 2,5 % NaCl solution, while the donor site was prepared.



**Figure 3.** Flap with horizontal and vertical incision (trapezoid form) with papilla preservation on the recipient site. Upper: region 13-14; Lower: region 24.

The donor sites were at palatal from distal 24 until mesial 26 for region 24, and from mesial 14 until distal 16 for region 13 and 14 due to their wider recession area. The subepithelial connective tissue graft were obtained through the technique of two parallel incisions, one perpendicular to the tooth axis and the other parallel to the bone surface. First incision was full thickness incision, 2-3 mm from marginal gingiva, and the second incision was partial thickness incision, 5-7 mm from marginal gingiva. Once the graft was obtained, removed the epithelial lining from the graft. (Fig. 4)





**Figure 4.** Subepithelial connective tissue graft harvested from palatal site. Left: from region 14-16; Right: from region 24-26.



**Figure 5.** Graft placement, sutured with absorbable thread and flap closure at the recipient site sutured with blue nylon non-absorbable thread. Upper: region, 13-14; Lower: region 24. \*Noted that the flap were well closed, so that no subepithelial connective graft were seen.



**Figure 6.** Donor site closure after subepithelial connective tissue graft harvesting.

The graft was adapted onto the recipient site through sling sutures with absorbable thread (Polyglycolic Acid Absorbable Suture 6.0, 3/8). The flap then positioned coronally onto the graft,

and stabilized using double sling and simple interrupted sutures (Blue Nylon 5.0, 3/8) (Fig. 5). At the donor site, absorbable haemostatic gelatin sponges was inserted to stop the bleeding, then sutured with simple interrupted suture (Fig. 6). Applied oxygen dental gel both on the recipient and donor site. The sutures then removed 2 weeks after the surgeries.



**Figure 7.** 1 week post root coverage procedure. Left: Region 13-14 Hiperemias noted especially at servical area.



**Figure 8.** Left: Region 13-14, 3 months post root coverage procedure. Right: Region 24, 6 months post root coverage procedure. Gingival recession is no longer seen at booth regions, no inflammation signs detected such as hiperemias, and oedems.

At postoperative period, patient was oriented to use 0,12% Chlorhexidine gluconate and dental gel around the operation area for 2 weeks. This is important to educate and motivate patient to at least reduce the amount of cigarettes that he consumed per day.

Patient need to understand that smoking can affect the healing result. Control periodic was done at 3 weeks, 1, 3, and 6 months and will be continue until 1 year and so on (Fig. 7-8). Patient follow up showed a good root coverage and significant aesthetic improvement.

## Discussion

Gingival recession associated with hypersensitivity, root caries and unaesthetic appearance is one of frequent concern to both clinician and the patient. Periodontal plastic surgery as an alternative for root coverage treatment was first introduced by Miller (1988).<sup>5</sup> The principal objective of gingival recession is to cover the exposed root surfaces to improve aesthetics and to reduce hypersensitivity. The success of surgical procedures for root coverage depends on several factors, such as anatomy of the defect, aesthetic consideration, interproximal bone level, and the choice for the most appropriate surgical technique.<sup>5</sup>

In this present case, there were several factors to support the success of surgical approach. General examination showed that patient is still at young age with no compromising systemic condition. Clinically, this patient had 2-3 mm gingival recession with no soft tissue and interproximal bone involvement, the keratinized gingiva is still adequate on both region (13-14, and 24). There were also some conditions that need special considerations, this patient had a smoking habit, and also bad oral hygiene condition. This patient smoked 10-20 cigarettes per day, thus he categorized as heavy smoker.<sup>13</sup> A trend has been noted for heavy smokers ( $\geq 20$  cigarettes per day) to respond less favorably to treatment than light smokers ( $< 20$  cigarettes per day).<sup>12,13</sup> Before any surgical treatment, it is important to enhance his oral hygiene status, and to educate him to at least reduce the amount of cigarettes he takes daily.

The mechanism of smoking affects periodontal plastic surgery outcomes remains unclear, but smoking itself interferes several physiological mechanism and cellular functions.<sup>13</sup> Toxins of tobacco in large amount and if consumed at the early age may impair periodontal healing.<sup>13</sup> Smoking will reduce the number of gingival blood vessels with increasing inflammation, decreases periodontal blood flow, compromising graft vascularization and subepithelial connective tissue graft outcomes.<sup>13</sup>

A study by Harris using CTG found no difference in average root coverage between smokers and non-smokers (smokers: 98.5% vs. non-smokers: 97.6%).<sup>14</sup> In contrary, a more recent study by Barbosa, et al., reported that from 14 patients nonsmokers and 12 patients

smokers with gingival recession Miller Class I and II, that an average percentage of 96.66% of root coverage on nonsmokers and 82.49% on smokers ( $p=0.03$ ).<sup>6</sup> Complete root coverage was observed in 78.57% and 50% of patients, respectively.<sup>6</sup> Erley, et al. also reported that root coverage was 82.3 % for smokers, as compared to 98.3 % for nonsmokers.<sup>15</sup> Reino, et al. reported graft biopsies presented from smoker patients was  $18.69 \pm 4.87$ , this means heavy smokers may have their vascular blood flow severely hampered, thus, jeopardizing blood supply to the graft and complicating periodontal healing and root coverage. Meanwhile, the amount of vessels in the receptor site ( $13.49 \pm 5.48$ ) were even further reduced than that present in the grafts ( $p=0.0001$ ).<sup>13</sup> This suggests that smoking reduces tremendously vascularization in the receptor site, diminishing blood flow in these tissues, which may affect flap healing.<sup>6,13,15</sup> This could be a seriously hindering factor for root coverage, since the grafts are nourished by blood vessels originated by the flap.<sup>1,2,16,17</sup>

Intervention for smoking cessation is an important practice not only for the prevention and treatment of periodontal disease but also for various important oral functions.<sup>9</sup> The benefit of smoking cessation on the periodontium is likely to be mediated through various pathways, such as a shift towards a less pathogenic microflora, recovery of the gingival microcirculation and improvements in aspects of the immune-inflammatory responses.<sup>9,10,12</sup> Various methods for helping patients to quit smoking in dental environment, the simple method is the AAR program, which are: Ask the patient about their smoking status; Advise patient of the associations between oral disease and smoking and; Refer the patient to get smoking cessation program, this also can be cooperate with the professional.<sup>12</sup> This patient followed the suggestion to reduce the cigarettes amount daily cooperatively. He also increased his oral hygiene status as showed in his periodically recall after oral prophylaxis were done.

In this particular case we chose to use subepithelial connective tissue graft harvested from the palate, combined with coronally advanced flap. Langer and Langer (1985) described a technique of subepithelial conjunctive tissue graft for root coverage in the treatment of recessions at single or multiple

areas, attributing the procedure success to the double blood supply for the graft's nutrition, originating from the connective tissue of both the periosteum and flap.<sup>1,2</sup> Additionally, this technique is less invasive at the palatal area when compare to free gingival graft technique, causing a minimum postoperative discomfort to patient and offering a great predictability of coverage.<sup>2</sup> Among all various surgical procedures to treat gingival recession, subepithelial connective tissue graft demonstrated a high percentage of root coverage with a high predictability and without significant post-surgical complications, and so called as a "Gold Standard" procedure because of it has demonstrated the highest success rates with greatest amount of predictability.<sup>1,18</sup>

Thankkappan et al., found that that the root coverage was better in Group A (with SCTG subjects) at all time compared with Group B (with resorbable collagen membrane). At 12 months, Group A showed 81.42% coverage where in Group B it was 70.08%. Similarly, increase in the width of keratinized gingiva and attached gingiva were more in Group A.<sup>19</sup>

Da Silva compared the result of using coronally positioned flap with and without subepithelial connective tissue graft for Miller class I gingival recession treatment, and reported that mean root coverage was 75% for combination technique and 69% for coronally positioned flap only.<sup>17</sup>

In this case, full-thickness with papilla reservation flap up to the mucogingival junction in the receptor site was performed attempting to avoid bone and interdental papilla loss. A partial-thickness flap may cause in perforation, capable of resulting in flap necrosis, and consequently in bone tissue loss.<sup>2</sup> Palatal harvesting in the region between canine and first molar has now become established as the standard procedure and, and to enhance post operative patient comfort, the graft is usually harvested from the same side as the recipient area.<sup>20</sup>

Considering for periodontal prophylaxis and the location of neurovascular bundle of patient's high palatine (approximately 17 mm from the adjacent teeth), first incision was made at 2-3 mm and second incision was at 5-7 mm from the marginal gingiva.<sup>20</sup> Once the graft was harvested, according to Böhm et al., for all indications where the CTG is completely covered by the overlying flap of the recipient bed, the

epithelium included in the graft must already be removed beforehand.<sup>21</sup>

The graft needed to stabilize inside the flap using a resorbable thread, to avoid the need to take the suture off, therefore a double slings suturing technique was performed. Following that, the flap was sutured coronally with the same sling technique reinforced with simple interrupted suture on the vertical incision, without any tension on the apical area of the flap. Tension on the mucogingival junction can cause a pull back on the flap and resulting in soft tissue necrosis. According to Bouchard, et al. undesirable postoperative recession can be avoided by suturing the flap 1 to 2 mm coronal to the cemento-enamel junction.<sup>22</sup>

Adequate plaque control prior and post surgery is important to achieve satisfactory results. Dental health education and patient motivation for smoking cessation shall be continue after surgeries. The sutures were removed 2 weeks after surgeries, and followed with periodic recall at 3 weeks, 1, 3, and 6 months and will be continue until 1 year and so on to maintain the result of the surgeries.

## Conclusions

Even smoking habit is one of the risk factors for root coverage treatment with periodontal plastic surgeries, successful result still can be achieved. The success of this clinical case can be attributed to a careful examination, right diagnosis and proper treatment planning. Dental health education and smoking cessation program also play a significant role in this patient. Furthermore, precise indication of the technique of subepithelial conjunctive tissue graft and the double blood supply for the graft's nutrition for root coverage treatment in bilateral Miller's class I is possible and eventful in a heavy smokers patient.

## Declaration of Interest

The authors report no conflict of interest and the article is not funded or supported by any research grant.

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