

## Clinical applications of minimally invasive periodontal plastic surgery

**Sangeeta Singh, Saravanan SP, Devendra Srivastava, Raghvendra MH, A. K. Shreehari**

### ABSTRACT

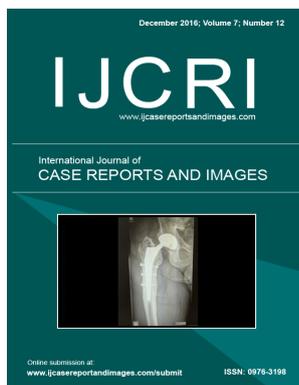
**Introduction:** The aim of this paper was to present the excellent results obtained using the principles of minimally invasive surgery in periodontal plastic surgery procedures.

**Case Series:** This paper will discuss five different procedures: Modified incision design for periodontally accelerated osteogenic orthodontics procedure, papilla reconstruction using the tunnelling approach and connective tissue grafting, pouch and tunnel procedure for adjacent recessions, envelope technique for isolated recession and Liu's Class 1a incision for connective tissue harvesting from the palate. All five techniques resulted in minimal exposure, reduced tissue trauma, minimal postoperative discomfort, better healing and excellent esthetics with perfect tissue color match.

**Conclusion:** The concept of minimally invasive periodontal surgery is especially valid in the field of periodontal plastic surgery resulting in minimal tissue trauma, reduced postoperative discomfort, preservation of the interdental tissues, excellent color match and perfect esthetics.



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# Clinical applications of minimally invasive periodontal plastic surgery

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**Introduction:** The aim of this paper was to present the excellent results obtained using the principles of minimally invasive surgery in periodontal plastic surgery procedures. **Case Series:** This paper will discuss five different procedures: Modified incision design for periodontally accelerated osteogenic orthodontics procedure, papilla reconstruction using the tunnelling approach and connective tissue grafting, pouch and tunnel procedure for adjacent recessions, envelope technique for isolated recession and Liu's Class 1a incision for connective tissue harvesting from the palate. All five techniques resulted in minimal exposure, reduced tissue trauma, minimal postoperative discomfort, better healing and excellent esthetics with perfect tissue color match. **Conclusion:** The concept of minimally invasive periodontal surgery is especially valid in the field of periodontal plastic surgery resulting in minimal tissue trauma, reduced postoperative discomfort, preservation of the interdental tissues, excellent color match and perfect esthetics.

**Keywords:** Minimally invasive surgery, Periodontally accelerated osteogenic orthodontics reconstruction, Pouch, Tunnel

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Received: 05 March 2016

Accepted: 28 August 2016

Published: 01 December 2016

## How to cite this article

Singh S, Saravanan SP, Srivastava D, Raghvendra MH, Shreehari AK. Clinical applications of minimally invasive periodontal plastic surgery. Int J Case Rep Images 2016;7(12):776–780.

Article ID: Z01201612CS10078SS

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doi:10.5348/ijcri-201617-CS-10078

## INTRODUCTION

The concept of minimally invasive surgery has been accepted universally in almost all fields of medicine and has led to the replacement of conventional procedures with minimally invasive ones. The field of periodontology is constantly evolving and reinventing itself at par with the advances in the field of medicine. The introduction of loupes, microscopes and microsurgical instruments has led to the modification of conventional larger access flap designs to the more conservative minimal access approach. This paper will discuss five surgical procedures where the conventional flap designs were modified to allow minimal access for surgery.

## CASE SERIES

### Clinical Scenario

**Case 1:** This was a case of a 17-year-old patient bimaxillary dentoalveolar protrusion referred from the Div of Orthodontics for periodontally accelerated osteogenic orthodontics procedure (PAOO).

**Case 2:** This patient was very conscious of the dark spaces in her front teeth and came to us seeking correction of the same. She also complained of food lodgement and halitosis.

**Case 3:** This patient was diagnosed with Millers Class II marginal tissue recession in 33, 34. This was associated with sensitivity.

**Case 4:** This young patient was diagnosed with Millers Class III marginal tissue recession. Tension test was positive in 31. He was apprehensive that he will eventually lose the tooth.

## Clinical management

### Case 1: Modified incision design for periodontally accelerated osteogenic orthodontics procedure

The conventional procedure for PAOO involves raising a mucoperiosteal flap along with two vertical incisions to allow access for corticotomy cuts beyond the apex of the teeth. However, since the corticotomy is performed taking into care the preservation of the crest of the interdental bone, there is no requirement of exposure of this region. The incision was given starting at 2 mm above the marginal gingiva with two vertical incisions. This modification preserves the papilla and prevents unnecessary exposure and loss the loss of crestal bone. This incision design was introduced by Ochsenbein-Luebke and is commonly done for apicoectomy procedure apicoectomy procedure [1] (Figure 1).

### Case 2: Papilla reconstruction using the tunneling approach and connective tissue grafting

The tunneling approach eliminates the semilunar or vertical incisions and preserves the existing papilla. This approach involves creating a tunnel beneath the papilla extending both buccally and palatally. Subsequently, a connective tissue graft harvested from the palate is shaped to adapt inside the tunnel with buccal and palatal extensions. The papilla is coronally advanced and sutured using ePTFE (expanded polytetrafluoroethylene sutures) [2] (Figure 2).



Figure 1: Modified incision design for periodontally accelerated osteogenic orthodontics procedure.

### Case 3: Pouch and tunnel procedure for adjacent recessions

A sulcular incision was given from the canine to the first premolar and a partial dissection was performed in order to create a pouch beyond the mucogingival junction keeping the tip of the interproximal papilla intact. The connective tissue harvested from the palate was then placed inside the tunnel using the suturing technique described by Zabalegui [3] (Figure 3).

### Case 4: Envelope technique for isolated recession and Lui's class 1a incision for connective tissue harvesting from the palate

Raetzke described the envelope technique in order to cover singular recessions using a connective tissue graft which was sutured in a supraperiosteal "envelope", prepared as recession surrounding mucosal flap



Figure 2: Papilla reconstruction using the tunneling approach and connective tissue grafting.



Figure 3: Pouch and tunnel procedure for adjacent recessions.

without vertical releasing incisions. This technique is an incision-free, minimally invasive method for gingival augmentation as blood supply can be maximally preserved and coverage of the graft is optimized compared to other techniques [4] (Figure 4). Lui's had classified incisions for harvesting the connective tissue graft from palate [5]. The class 1a single incision technique is the minimally invasive, provides primary wound closure and graft thickness can be controlled. The connective tissue grafts for Cases 2–4 were harvested using this technique (Figure 5).

### Follow-Up

All the cases healed excellently with minimum or no discomfort to the patient. As the procedures followed were based on the principles of minimal exposure, the postoperative swelling was minimal with mild or no associated pain. The tissues appeared healthy and results were esthetic (Figure 6). The donor site in the palate in Cases 2–4 healed excellently with no discomfort since a primary closure was obtained.



Figure 6: Comparison between preoperative and postoperative evaluation in Cases 1–4.



Figure 4: Envelope technique for isolated recession.

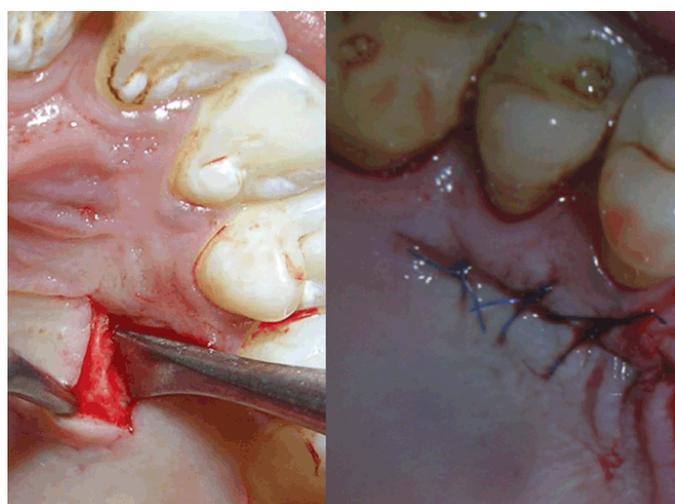


Figure 5: Lui's Class 1a incision for connective tissue harvesting from the palate.

### DISCUSSION

Mortality and morbidity are unavoidable events of a therapeutic process and are accepted as a part of any therapy. With advances in the field of medicine it has become evident that less invasive methods of interventional treatment in some areas produce far fewer complications with a reduced risk of death and morbidity [6]. Preliminary data from case cohorts and from many studies reveal minimally invasive approach in periodontal surgery has a high potential to seal the healing wound from the contaminated oral environment by achieving and maintaining primary closure. Soft tissues are mostly preserved and minimal gingival recession is observed, an important feature to meet the demands of the patient and the clinician in the aesthetic zone [7].

### Modified incision design for periodontally accelerated osteogenic orthodontics procedure

This modification preserves the papilla and prevents unnecessary exposure and loss the loss of crestal bone.

This incision design was introduced by Ochsenbein-Luebke and is commonly done for apicoectomy procedure. The advantages of this flap design are conserving the marginal gingiva, most adequate visibility, non-exposure & minimal loss of crestal bone, ease of re-approximation of flap and good aesthetic results.

### **Papilla reconstruction using the tunneling approach and connective tissue grafting**

Reconstruction of the lost papilla is one of the most challenging procedures in the field of periodontal plastic surgery. This is primarily due to the fact that papilla lacks minimal source of blood supply and elaborate procedures in this region compromise the vascularity further thus compromising the predictability of any grafting procedures for papillary reconstruction. The basic principles of surgery in the papillary region are to maximize blood supply, flap designed to maintain papillary integrity and minimum tissue trauma thereby preventing tissue necrosis and enhancing the graft uptake [8]. The tunneling approach eliminates the semilunar or vertical incisions and preserves the existing papilla.

### **Pouch and tunnel procedure for adjacent recessions**

The use of tunnel procedure eliminates the vertical incisions, preserves the interdental papilla and may accelerate the initial wound healing. The tunneling also applies less traction and preserves the gingival height. Minimal trauma to the recipient site along with elimination of vertical incisions is the biggest advantage of this technique.

### **Envelope technique for isolated recession**

This technique is an incision-free, minimally invasive method for gingival augmentation as blood supply can be maximally preserved and coverage of the graft is optimized compared to other techniques.

### **Lui's Class 1a incision for connective tissue harvesting from the palate**

This single incision technique permits primary wound closure and control of graft thickness thus reducing the patient discomfort significantly.

The modifications in instruments sizes leading to innovations in designs and reduced size has also explored the feasibility of the minimal invasive approach. Research has shown that immune response is better after minimally invasive procedures, leading to better results.

## **CONCLUSION**

Minimally invasive surgical techniques are now widely accepted and will continue to evolve to further minimize the trauma during surgery. This concept goes a long way in overall patient satisfaction and positive outcomes of any procedure adapted to utilize this technique.

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### **Author Contributions**

Sangeeta Singh – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Saravanan SP – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Devendra Srivastava – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Raghvendra MH – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

A. K. Shreehari – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

### **Guarantor**

The corresponding author is the guarantor of submission.

### **Conflict of Interest**

Authors declare no conflict of interest.

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