



**PERIODONTAL REGENERATION BY MINIMALLY INVASIVE SURGICAL
TECHNIQUE - CASE REPORTS**

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ABSTRACT

In the last decade, a special emphasis has been focused on the design and performance of surgical procedures for periodontal regeneration. Specific surgical approaches have been proposed to preserve the soft tissues and to reach a stable primary closure of the wound in order to seal the area of regeneration from the oral environment. We report two cases showing isolated bone defects in which minimally invasive periodontal surgical technique was carried out by using small incisions with minimal reflection of flap, in which a periodontal regeneration was attempted using regenerative material. A brief review on minimally invasive dentistry and its benefits has been discussed.

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INTRODUCTION

Recent trends in medicine and dentistry promote the use of minimally invasive procedures. The use of laparoscopic and endoscopic instruments has allowed physicians to decrease the morbidity of many procedures by eliminating the need for large surgical incisions.¹ Minimally invasive dentistry (MID) is defined as a concept that preserves dentition and supporting structures.²

Some of the procedure which is considered as minimally invasive are microincisions for hard and soft tissue periodontal surgical techniques, mini- implants, laser assisted non surgical and surgical periodontal and peri implant therapy, placement of veneers instead of crowns, bondable restorative materials like sealants, digital radiography instead of conventional radiography, videoscope assisted minimally invasive surgery (V-MIS), robot-assisted minimally invasive surgery (R-MIS).

Wickham and Fitzpatrick described the techniques of using smaller incisions as “minimally invasive surgery” in 1990.³ It was further refined by Hunter and Sackier who described the surgical approach as “the ability to miniaturize our eyes and extend our hands to perform microscopic and macroscopic operations in places that could previously be reached only by large incisions.”⁴ Periodontal microsurgical techniques have been described by Tibbetts and Shanelec.⁵ However, as was

the case in medicine, the term periodontal microsurgery is limiting due to the fact that it is linked to the use of surgical microscope. Hence the term periodontal minimally invasive surgery may be a more appropriate description of the smaller more precise surgical techniques. In 1995, minimally invasive surgery (MIS) was introduced by Harrel and Rees, in order to minimize wounds and flap reflection.⁶

In these case reports, Modified-Minimally Invasive Surgical Technique (M-MIST) was considered with the use of small incisions with minimal reflection of flap, in which a periodontal regeneration was attempted by using hydroxyapatite graft.

Case Report 1

A twenty years old female patient reported to the Department of Periodontics and Oral Implantology with the chief complain of spacing of maxillary anterior teeth. Clinical examination revealed a probing pocket depth of 6 mm along with traumatic bite irt 11 and 21 and on radiographic examination, IOPA revealed vertical bone loss mesial to 21. Traumatic bite was relieved irt to 11 and 21 and two weeks after thorough phase I therapy, minimally invasive surgery was planned. The procedure was explained and informed consent was obtained from the patient. After infiltrating with local anesthesia, sulcular incision was given mesial to 21 not extending to the distal surface, flap was raised, keeping the adjacent papilla intact, After root planing, bone graft was condensed in increments into the defect, flap was closed. Coe pack was placed.

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Figure 1 (A) Pre operative probing depth of 6mm mesial to 21. (B) Post operative 9 months clinical view, showing probing depth of 3mm irt 21. (C) Pre operative clinical view of the lingual surface of 36 showing clinical attachment loss and grade II furcation involvement. (D) Post operative 9 months clinical view, showing gain in clinical attachment level irt 36.

Case Report 2

A twenty eight years old female patient reported with the chief complain of bleeding gums and was diagnosed as a generalized chronic periodontitis. After conventional periodontal surgery on other areas, tooth no 36 with grade II furcation involvement was planned for MIS. Intracavicular incision was given on the lingual side not extending to the adjacent papilla, flap was reflected and root planing was carried out, bone graft was condensed in furcation defect and Coe pack was placed. Patients were requested to avoid brushing, flossing and chewing in the treated area. Antibiotic -Amoxicillin 500mg was prescribed thrice daily for five days and analgesic twice daily for three days. After one week, sutures were removed. At week four, patients resumed mastication in the treated area. Patients were recalled after three months, six months and nine months for reevaluation.



Figure 2 (A) Sulcular incision given irt 21. (B) Flap reflected keeping the interdental papilla intact. (C) Bone graft placed irt 21.

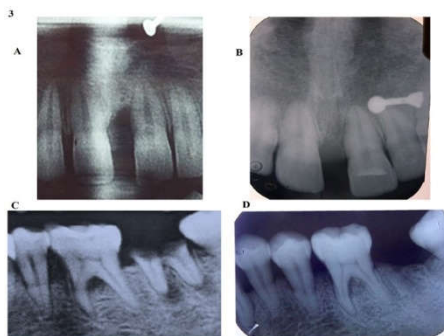


Figure 3 (A) Pre operative IOPA, vertical bone loss irt 21. (B) Post operative at 9 months IOPA, bone fill irt 21. (C) Pre operative IOPA, grade II furcation involvement, showing bone loss in the furcation area of 36. (D) Post operative at 9 months IOPA, bone fill irt furcation area of 36.

In case one, there was reduction of probing pocket depth from 6 mm to 3 mm and complete bone fill was noticed in vertical

defect mesial to 21 at 9 months. There was no attachment loss post operatively.

In case two, there was a gain in clinical attachment level by 2 mm and bone fill was observed in furcation defect radiographically. In both the cases healing was uneventful.

DISCUSSION

Some of the objectives of minimally invasive procedures are to reduce surgical trauma, increase flap/wound stability, allow stable primary closure of the wound, reduce surgical chair time, and minimize patient discomfort and side effects.

Minimally invasive surgical procedures are indicated in isolated, usually interproximal, defect that does not extend significantly beyond the interproximal site, periodontal defect that borders on an edentulous area. It is contraindicated in generalized horizontal bone loss and multiple interconnected vertical defects.

The lack of embarrassment of the blood supply to the flap is a probable reason for the improved soft tissue healing and the minimization of postoperative soft tissue changes that have been reported following the use of MIS.⁷

Bone graft to repair osseous defects has been attempted for centuries. One of such allogeneous bone graft is natural hydroxyapatite, which play a major role in repair and regeneration of bone defects. Since hydroxyapatite is osteoconductive, it supports the in growth of spurting capillaries, perivascular tissue and osteoprogenitor cells from recipient host bed into the bone graft. This early vascularization is believed to provide nutritional support for the osteogenic capability of anorganic bone. When placed next to viable bone, new bone gets deposited directly onto the surface of hydroxyapatite without intervening fibrous tissue and grows into porous matrix. Since it is extremely biocompatible as its chemical composition is similar to that of bone, it does not stimulate a foreign body surface. Hydroxyapatite serves as passive scaffold or “creeping substitution” which gets slowly resorbed in the bone cavity.⁸ In 2001, Cortellini and Tonetti evaluated the outcomes of a microsurgical approach in the regenerative therapy of deep intrabony defects.⁹

Cortellini and Tonetti in 2009 suggested a Modified Minimally Invasive Surgical Technique¹⁰ (M-MIST). The primary aim was to provide a minimal access to the defect only from the buccal side.

The M-MIST was designed to: I) improve flap stability; II) maintain space for regeneration; and III) preserve an increased portion of the blood supply at the level of the crest and the papilla. The surgical approach consists of a limited interdental incision in which only a buccal triangular flap is elevated, while the papilla is left in place, connected to the root of the crest-associated tooth with its supracrestal fibres. The palatal/lingual tissues are not involved in the surgery.

As previously indicated, the M -MIST is not always applicable (Cortellini *et al* 2009). When a defect wraps around the lingual aspect of a tooth, elevation of the interdental soft tissues becomes necessary and a Minimally Invasive Surgical Technique (MIST) becomes the preferred approach.

Few of the previous studies^{7,8,9,10} have shown that bone grafting using a minimally invasive surgical approach yields statistically and clinically significant reductions in probing depth and improvement in attachment levels. However periodontal regeneration cannot be completely relied upon the radiographic findings, hence some of the techniques to access the periodontal regeneration are bone probing, surgical re-entry, and CADIA (Computer Assisted Densitometric Image Analysis).

CONCLUSION

Patient acceptance of treatment plans that include MIS has been positive. Patients regard these procedures as generally less painful and having less postoperative morbidity. There is also psychologically less fear associated with small incision surgery. It can be speculated that MIS will be popular in clinics and become a promising therapeutic modality to cure isolated or multiple periodontal intra-bony defects, replacing traditional surgical procedures in the future.

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