

Comparison between conventional and micro-assisted periodontal surgery: Case series

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ABSTRACT

Microsurgery is a minimally invasive procedure that uses a surgical microscope, specially designed equipment, and suture materials. Even though this equipment and expertise of numerous surgeries are required to meet patient esthetic reckoning, doctors must be ready to invest time and effort into becoming familiar with novel surgical methods and devices. The ambition of this case series is to compare conventional macro surgery and microsurgery in terms of clinical approach. This study included four cases, two flap surgery, and two root coverage. Clinical parameters for root coverage, increase in keratinized tissue (KT), gain in clinical attachment level (CAL) and complete root coverage (CRC), dentin hypersensitivity index-Schiff's index and for flap surgery, probing depth, clinical attachment level. Healing and pain analysis were done. There was no significant difference seen between conventional and clinical outcomes of a microsurgical technique such as clinical attachment level, probing depth, increase in KT, gain in clinical attachment level (CAG), and CRC, dentin hypersensitivity index-Schiff's index. When patient-based outcomes such as healing index and Visual Analog Scale, a significant difference was seen. If a microsurgical method is used instead of a traditional macroscopic approach, the early healing index can be significantly improved and there will be less postoperative pain.

Key words: Innovative technique, microsurgery, minimally invasive surgery, periodontitis

INTRODUCTION

Over the previous few decades, dentistry has seen a lot of developments in terms of thoughts and practices. One of which is microsurgery. Daniel defined microsurgery in broad terms as surgery performed under magnification

by the microscope.^[1] Microsurgery, according to Serafin, is a methodology that involves the modification and improvement of existing surgical methods employing magnification to increase visualization, and it may be applied to any specialty.^[2] Shanelec and Tibbetts delivered an ongoing training session on periodontal microsurgery at the American Academy of Periodontology's annual meeting in 1993.^[3]

Periodontal microsurgery usually preferred for performing esthetic periodontal plastic surgeries to obtain exemplary and complex details in small scale. Operating microscopes render major benefits to performing surgery, which include illumination, magnification, and refined surgical skills collectively called the magnification triad.^[4]

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The benefits of microsurgery include:

- Surgical abilities are delivered with more accuracy. as a result, more precise incisions with smaller instrumentation, less trauma, and faster postoperative recovery can be achieved
- Smaller needles and sutures are used to precisely reposition tissues
- Improved visibility of root surfaces, allowing for more precise calculus removal and root smoothness.^[4]

To achieve the above-listed benefits for periodontal microsurgery, correct ergonomics and microsurgical instruments play an important role. A calm mental attitude, appropriately supported hand, a comfortable posture for the body, and a secure instrument-holding stance are all required of an operating surgeon.^[4,5]

Due to better optical acuity, smaller instruments can be utilized with greater precision. Microsurgical instruments should have a slightly top-heavy design, a round cross-section, mostly titanium made, and a length of around 18 cm to facilitate proper handling and high-precision movement.^[6]

The microsurgical techniques are commonly employed in the following periodontal surgeries:

1. Mucogingival surgery: It is critical to conduct exceedingly fine and exact incisions, meticulous suturing to enhance graft stabilization and immobilization, and precise wound margin closure to produce a great result in terms of both esthetics and function.^[7] As a result, the use of a surgical microscope in mucogingival therapy may be beneficial in cases when the complete and flawless covering is required in root coverage operations^[8] and interdental papilla augmentation^[9]
2. Root debridement: The importance of root debridement as a necessary component of periodontal therapy is well acknowledged. Several writers have stressed that the depth of root surface debridement, rather than the grafting modality used, is more important for improved periodontal therapy outcomes^[10] Magnification and proper illumination aids root surface debridement by showing morphological characteristics of supragingival and subgingival tooth surfaces and properly recreating working end angles during instrumentation^[11]
3. Regenerative periodontal surgeries: The clinical efficiency of modifying existing surgical methods for periodontal regeneration of intrabony lesions has been intensively researched in recent decades. Several writers have advocated that single or multiple intrabony defects be treated using a microsurgical method.^[12] Improved illumination and magnification of the surgical field allow for better access to and debridement of the intrabony defect with higher precision and less stress when utilizing a microsurgical approach in regenerative therapy.^[13]

Even though surgical operating microscopes and loupes are used to obtain magnification for various procedures in many sectors of medicine and surgery is well praised, their application in dentistry, particularly periodontics, necessitates a more thorough approach. Our team has produced a number of excellent articles as a consequence of our research and knowledge.^[14-28] The purpose of this case study is meant to contrast the standard macro surgery and microsurgery in terms of clinical approach.

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CASE SERIES

Case I

Root coverage using conventional approach

A male patient aged 37 years was diagnosed with class I Miller's gingival recession in relation to lower anteriors. Pouch and tunnel technique using platelet-rich fibrin (PRF) was planned. Pouch and tunnel were created using HuFreidy's contrangled tunneling knife. PRF was then tunneled into the pouch created. Suturing was done using 5-0 polyamide suture. Anchoring suture was done and stabilized using composite [Figure 1].

Case II

Root coverage using microsurgical approach

A 35-year-old male patient was diagnosed with class I Miller's gingival recession in relation to lower anteriors. Pouch and tunnel technique using PRF was planned. Microsurgery was done under 0.6 using Zeiss dental microscope. Pouch and tunnel were created using HuFreidy's contrangled tunneling knife. PRF was then tunneled into the pouch created. Suturing was done using 5-0 vicryl suture. Anchoring suture was done and stabilized using composite [Figure 2].

Case III

Periodontal flap surgery using conventional approach

A 35-year-old male patient had an 8 mm deep pocket in relation to the mesial surface of 11. Under local anesthesia, papilla preservation flap was raised. Conventional debridement was done using Gracey's ½ curette. Intrabony defect was seen. Defect was grafted using xenograft and PRF. The flap was closed using 3-0 silk suture by simple interrupted and vertical mattress suturing technique [Figure 3].

Case IV

Periodontal flap surgery using microsurgical approach

A 39-year-old female patient had a 10-mm deep pocket in relation to the mesial surface of 21. Under local anesthesia, a modified papilla preservation flap was raised. Conventional debridement was done using Gracey's ½ curette. Intrabony defect was seen. The defect was grafted using xenograft and

GTR membrane. The flap was closed using 5-0 polyamide sutures by simple interrupted, anchor, and vertical mattress suturing technique [Figure 4].

Platelet-rich fibrin preparation

In sterile vacutainer tubes without anticoagulants, the patient’s 10 mL of whole venous blood was obtained. The vacutainer tube is then spun at 3000 rpm for 10 min in a centrifugal machine, and the intermediate proportion containing the fibrin clot is collected 2 mm below the bottom dividing line to yield the PRF.

Microsurgery was done under × 0.6 using Zeiss dental microscope. Postoperative instructions were given, and analgesics and antibiotics were prescribed. The patient was recalled for evaluation after a week and followed up for 1 month. Clinical parameters for root coverage, increase in keratinized tissue (KT), gain in clinical attachment level (CAG) and complete root coverage (CRC), dentin hypersensitivity index-Schiff’s index and for flap surgery, probing depth, clinical attachment level. Wound healing index (WHI)^[29] and Visual Analog Scale (VAS) were measured.

RESULTS

There was no significant difference seen between conventional and microsurgical approaches in terms of clinical outcomes such as clinical attachment level, probing depth, increase in KT, gain in clinical attachment level (CAG) and CRC, dentin hypersensitivity index-Schiff’s index. When patient-based outcomes like healing index and VAS, significant difference was seen [Tables 1-3].

DISCUSSION

The current investigation was done to emphasize the pros of microsurgery over conventional periodontal surgery.

An operating microscope, proper ergonomics, and microsurgical instruments were employed to increase the ability of the clinicians to have good command over tissue manipulation.

When the clinical outcomes were compared, even though there were significant differences between baseline and postoperative values, there were no significant differences when the conventional and microsurgery group compared. Several study results were in alignment with the current study. Several studies compared open flap debridement to microsurgical periodontal surgery, the results obtained showed no significant difference between the groups for probing pocket depth, relative attachment level, gingival recession, gingival bleeding index, and gingival margin level.^[30,31] This result is in correlation with the present study.

Table 1: Clinical parameters for root coverage Cases I and II

Serial number	Parameters	Baseline (mm)		1 month (mm)	
		I	II	I	II
1	KT	5	6	7	8
2	CAL	4	5	2	1
3	CRC	3	2	2	2
4	Schiff’s index	2	2	1	0

KT: Keratinized tissue, CAL: Clinical attachment level, CRC: Complete root coverage

Table 2: Clinical parameters for flap surgery Cases III and IV

Serial number	Parameters	Baseline (mm)		1 month (mm)	
		III	IV	III	IV
1	PPD	10	9	5	5
2	CAL	11	12	8	6

CAL: Clinical attachment level, PPD: Probing pocket depth



Figure 1: Conventional recession coverage



Figure 2: Micro-assisted recession coverage



Figure 3: Conventional flap surgery

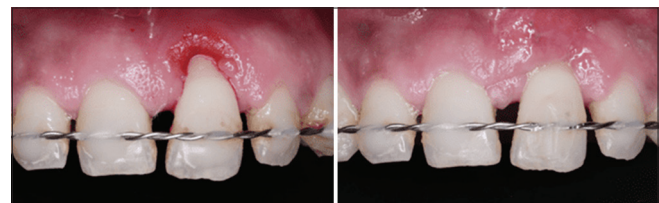


Figure 4: Micro-assisted flap surgery

Table 3: Healing and pain score for periodontal surgeries

Serial number	Parameters	Baseline				I week			
		Root coverage		Flap surgery		Root coverage		Flap surgery	
		I	II	III	IV	I	II	III	IV
1	WHI	2	2	1	2	4	5	2	5
2	VAS	8	5	9	6	5	2	4	1

WHI: Wound healing index, VAS: Visual analog scale

When 32 recessions were randomly compared between conventional and microsurgery in terms of recession reduction, clinical attachment gain, and reduction in probing depth showed no statistical difference.^[32]

When the healing score and visual analog score were compared between conventional and microsurgical approaches in terms of root coverage procedure, the microsurgical approach showed improvement in early WHI scores and reduced postoperative discomfort. Furthermore, when compared to using a conventional macroscopic method in an open flap debridement surgery, microsurgical approach showed significant improvement in the early healing index and less postoperative pain.^[30] Studies concluded that microsurgical treatments provide enhanced visual acuity, less stressful soft-tissue handling, and accurate wound closure that allows for primary intention healing, they also add time and cost to the entire treatment.^[12,33,34]

From the operator's point of view, visibility and illumination of the operating site improved tremendously, and defect morphology was seen clearly. Dentist's ergonomics improved considerably. The primary difference/variable from the conventional approach was that microsurgical technology increased visual and tactile perception.^[35-37] The coarseness of most surgical manipulations is revealed when periodontal surgery is studied under a microscope. Tissue handling that appears to be delicate turns out to be gross crushing and tearing. The microscope is a technology that allows for less invasive and less stressful surgery.

CONCLUSION

It is conceivable to conclude, within the constraints of this study, that the microsurgical procedure produced greater recovery and less postoperative pain than the conventional surgical method. In terms of improving surrogate endpoints or clinical outcomes, both operations were equally beneficial. However, patient-based outcomes should also be considered when choosing between micro- and macro-surgical techniques.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The

patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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