



A COMPARATIVE CLINICAL EVALUATION OF MICROSURGICAL AND CONVENTIONAL OPEN FLAP SURGICAL PROCEDURE IN PATIENTS WITH CHRONIC PERIODONTITIS – A PILOT PROJECT

Dental Science

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ABSTRACT

Objective: The present pilot study was carried out to assess and compare the clinical healing outcomes with the conventional and microsurgical techniques.

Subjects & Methods: 15 patients with chronic periodontitis in age range of 25-55 years, having probing pocket depth ≥ 5 mm in two or more than two teeth and in minimum two or more than two quadrants were randomly divided into - test group which was treated by open flap procedure using microsurgical technique and the control group which was treated by conventional open flap procedure. The clinical periodontal parameters and assessment of primary healing of the soft tissues was done using an endodontic reamer number 8 at various time intervals.

Results: There was statistically significant improvement in GI, PPD, RAL and soft tissue healing ($p < 0.001$) within both test and control groups at various time intervals. However, no statistically significant difference was observed when the two groups were compared with each other at the various time intervals. ($P > 0.05$)

Conclusion: Early healing was marginally better with the microsurgical approach.

KEYWORDS

Microsurgery, conventional surgery, Open flap debridement

INTRODUCTION

Periodontitis is a complex phenomenon involving bacterial challenge and host response factors.¹ The goal of periodontal therapy is to provide a dentition that functions in health and comfort for the life of the patient² which is generally achieved by elimination of the periodontal infection resulting from the subgingival colonization of periodontopathic bacteria.^{2,3} Periodontal diseases have been managed by non-surgical and/or surgical therapy which includes a wide variety of procedures such as open flap debridement surgery, regenerative and resective surgical procedures.

A microsurgical approach to periodontal surgery has proved to be highly beneficial in enhancing treatment outcomes. Its perceived advantages relate to the improved visual acuity associated with magnification and better soft tissue manipulation. A variety of factors associated with soft tissue manipulation and importantly, the ability for primary closure of the flap, play an important role in determining the outcome of the flap surgery.^{4,5,6}

Complete removal of calculus is essential for achieving a biologically acceptable tooth surface in the treatment of periodontitis. However evidence has shown that residual calculus exists not only on teeth treated by scaling alone but also on teeth treated by flap surgery followed by scaling & root planing.⁷

Several studies have reported the use of microsurgery in various root coverage procedures, interdental papillae preservation techniques and periodontal regeneration procedures in intrabony defects. Till date, no clinical studies have documented the use and possible advantages of operating microsurgical loupes in periodontal flap debridement surgery. This study attempts to compare the clinical outcomes following periodontal flap surgery with and without magnifying loupes. In addition, the study also intends to evaluate and compare the healing outcomes with primary flap closure, in both the approaches.

MATERIALS AND METHODS

Following approval from the Ethical Committee of the institute, a clinical case-control study with a split mouth study design was conducted on 15 patients reporting to the Department of Periodontics with localized or generalized chronic periodontitis.

Inclusion criteria:

- Patients willing to sign on a written consent form.
- Male & female patients aged between 25-55 years with true
- suprabony pockets periodontal pockets having probing pocket

depth ≥ 5 mm in two or more than two teeth and in minimum two or more than two quadrants, number of teeth present ≥ 20 .

Exclusion criteria:

- Presence of any systemic or debilitating diseases.
- Pregnant or Lactating women
- A recent history or presence of any acute or chronic infections
- History of any drug intake including antibiotics, analgesics or any other drugs 3 months prior to the study
- Undergone periodontal therapy in the last 6 months
- Paan/tobacco/betelnut users & or smokers
- Physically or mentally challenged persons.

METHOD OF COLLECTION OF DATA:

The following clinical parameters were recorded at baseline 0, 1 month, 3 months and 6 months following therapy.

1. Gingival index (Loe and Sillness 1963)
2. Probing pocket depth (PPD)
3. Relative attachment level (RAL) (using an acrylic stent).
4. Assessment Of Primary Soft Tissue Healing. (Figure 1 A & 1 B)

This was carried out using endodontic reamer number 8. The reamer was inserted from the buccal side to the lingual side of the tooth below the contact point and just above the interdental papilla to avoid traumatizing it. The stopper was kept on buccal surface at the point where the tip of the reamer reached the lingual line angle and the distance from buccal side line angle to lingual side line angle was measured. These measurements were done immediately before and after the surgical procedure and at the subsequent follow up days i.e 1 day, 8 days, 1 month, 3 months and 6 months following therapy.

Treatment procedure

The patients were asked to rinse the mouth with 10 ml of 0.2% chlorhexidine digluconate solution as a pre-procedural rinse. After administration of local anaesthesia, intrasulcular incisions were given with a no.15 blade, and then using a periosteal elevator, full thickness buccal and palatal/ lingual flaps were elevated. Granulation tissue was removed using area specific curettes to provide full access and visibility to the root surfaces. The flaps were approximated to the original level and secured with 3-0 silk sutures.

In the site where microsurgical approach was carried out, the procedure was performed using 3X optimal magnification dental loupe and intrasulcular incisions were given with a microsurgical blade, and further procedures were repeated as above with the conventional flap

surgery. The flaps were approximated to the original level and secured with 5-0 silk sutures.(Figure 2A to 2E). Periodontal pack was not given as the primary healing assessments had to be made postoperatively.

Post operative care

Patients were prescribed antibiotics and non steroidal anti-inflammatory drugs for post operative pain management and were instructed to rinse with 0.2% chlorhexidine solution for 1 minute twice a day for 2 weeks. Removal of sutures was done after 7 days.

Statistical analysis

Descriptive analysis that included mean, standard deviation percentages were found for each parameter in two groups and were used for analysis. Frequency tables and measures of central tendency were obtained by using the statistical package SPSS V-20 for comparison of mean values of test and control groups across various parameters at each time period. A 'P' value of 0.05 or less was considered statistically significant.

RESULTS

Periodontal parameters - (TABLE 1, 2 & 3)

There was significant reduction in mean gingival index scores, probing pocket depths and relative attachment levels within both the test group and control group from baseline to 1,3 and 6 months respectively which was found to be statistically significant ($P < 0.001$) at all the time intervals.

However, comparison between the two groups revealed no significant difference at 1, 3 and 6 months respectively ($P > 0.05$).

Soft tissue healing assessment (TABLE 4)

Although there was significant changes within both the test and control groups, comparison between the two groups revealed no significant difference in soft tissue healing assessment after surgery, at the various time intervals. ($P > 0.05$).

DISCUSSION

The aim of conventional periodontal therapy; either surgical or non-surgical, is to stop and possibly reverse the loss of periodontal attachment resulting from this disease. Reduction of probing pocket depths, maintenance or improvement of clinical attachment levels, and reduction in bleeding on probing are the most common outcome measures used to determine whether treatment is successful. In order to treat moderate to advanced periodontitis, surgical intervention is often indicated⁸ which often results in greater pocket reduction and clinical attachment gain.⁹ Among the various advances in technology available today, periodontal microsurgery is fast gaining popularity. Of prime importance to make any surgical procedure more acceptable are gentle handling of tissues and passive wound closure aiding in primary uneventful healing. A treatment modality addressing both biologic and esthetic demands is today most often required from the periodontal care provider. However, the successful use of the surgical microscope in periodontal surgery is scarcely documented as only a few studies address the advantages of the application of magnification to periodontal surgery.^{10,11,12} Therefore this study was carried out to evaluate and compare the healing outcome following open flap debridement with microsurgical technique and conventional technique. Patients with chronic periodontitis, in general good health and presenting pockets on the contralateral sites were recruited in the study and randomly designated into test and control groups. A split mouth design was used as this excludes the influence of individual patient characteristics and obtains a more powerful estimate of treatment effect with a smaller size.¹³ The sample size used in this study was in accordance with the vast majority of clinical periodontal regenerative studies in humans.¹⁴ The microsurgical approach was intended to increase the ability of the clinician to control each single step of the surgical procedure required to treat periodontal defects while preserving as much periodontal tissue as possible as evidenced in literature.¹⁵ It involves delicate handling of tissues and precise wound closure which accounts for the favourable early wound healing as reported from studies (Wachtel et al.2003¹⁵, Fickl S et al.2009¹⁶). The sharper and finer surgical blades together with finer suture material used in the microsurgical approach account for the reduced tissue damage along with primary closure of the wound. The improved vascularization after microsurgical approach also enhance the wound healing.¹⁷ Therefore it was decided to assess the soft tissue healing following primary flap closure. A reamer no.8 was used by inserting it

in the interdental area below the contact point taking the line angles of the buccal and lingual side of the tooth as the reference point at baseline before surgery, immediately after surgery on day 0 and 1 day, 8 days, 15 days, 1 month, 3 months and 6 months following therapy. The increase in this distance which was observed at the immediate post-operative measurement may be due to increase in inflammatory component and as the healing progressed, this component reduces thereby decreasing the distance between the flaps. Other methods of assessing healing clinically include evaluation of colour changes of the gingiva, assess patient experiences of the degree of swelling, pain, bleeding and root sensitivity following periodontal surgery (Curtis et al. 1985)¹⁸, using early wound healing index (EHI) after surgery (Wachtel H et al. 2003)¹⁴, fluorescent angiograms for the vascularization (Burkhardt R et al. 2005¹⁷), etc. This method of evaluating healing has been carried out for the first time and in our opinion is a fairly predictable quantitative assessment of primary flap closure assessment.

The clinical study was a 6 month follow up study which assessed the clinical variables gingival index (GI), probing pocket depth (PPD), relative attachment level (RAL) at baseline, 1, 3 & 6 months postoperatively. The results showed that there was significant reduction in the mean gingival index scores within the microsurgical and conventional treated groups from baseline to 1,3 & 6 months respectively which is in accordance with the results of the study by Wachtel H et al (2003)¹⁵ & Fickl S et al (2009)¹⁶ where they found significant improvement in GI scores at 6 months and 12 months in microsurgery treated sites, and also with the results reported by Gunsolley et al (1994)¹⁸ where there was a reduction in GI scores at 3 months, by Pihlstrom et al (1981)¹⁹ who observed reduction at 6 months and by Heitz – Mayfield et al (2002)⁹ who found improvement at 12 months following open flap debridement.

Relative attachment level (RAL) and probing pocket depth (PPD) measurements are commonly used to assess and monitor the periodontal status. Pocket depth resolution is not only a desirable outcome of periodontal therapy, but may be the most important parameter in patient care for the clinician, since it directly impacts his or her ability to instrument a treated area during the maintenance appointments. There was marked reduction in probing depth within both microsurgical and conventional treated sites from baseline, 1, 3 and 6 months which is in accordance with the studies by Wachtel H et al (2003)¹⁵ & Fickl S et al (2009)¹⁶ wherein there was significant improvement in PPD score at 6 months and 12 months in microsurgery treated sites, and the results reported by Gunsolley et al (1994)¹⁸, Pihlstrom et al (1981)²⁰ and Heitz – Mayfield et al (2002)⁹ who found reduction in PPD at 3, 6 and 12 months respectively following open flap debridement. Both the microsurgically treated and conventional surgery treated sites showed significant improvement in relative attachment level (RAL) within their respective groups at 1, 3 & 6 months. This suggests that there was a statistically significant attachment gain from baseline to 1,3 & 6 months within both microsurgical and conventional surgically treated sites which is consistent with the findings of Wachtel H et al¹⁵ (2003) & Fickl S et al¹⁶ (2009), where it has been shown that microsurgical access flap surgery resulted in improvement of these parameters over a period of 6 & 12 months, and also with the results reported by Pihlstrom et al (1981)²⁰ and Heitz – Mayfield et al (2002)⁹ who found gain in attachment at 6 months & 12 months respectively following open flap debridement. In contrast, Gunsolley et al (1994)¹⁸ found no gain in attachment at 3 months following conventional open flap debridement.

In addition to the clinical parameters; it was decided to clinically assess the primary healing of the approximated flaps in both the groups using an atraumatic reamer number 8. This method has been used for the first time as in the past, various indices have been used to assess healing clinically and hence no previous evidence is available. The values were found to be statistically significant within both the groups at all the time intervals which included before and after surgery, at 1 day, 8 days, 1 month, 3 months & 6 months. However studies by Wachtel at al¹⁵ (2003), where they used early wound healing index and found high percentage of primary flap closure and maximum tissue preservation when microsurgical flap procedure was performed when evaluated at the end of 6 & 12 months, were mainly in accordance with our findings. Similarly, Forum S.J et al (1981)²¹ found satisfactory healing following conventional open flap debridement at 6 & 7 months. There was increase in the distance between the flap immediately and one day after surgery due to increase in inflammatory components and there was

decrease in distance as the healing took place. As already mentioned; earlier studies have used various healing indices which were subjective and not very reliable. Our method was objective and yielded reliable results.

Interestingly, no difference was observed between both the groups with regard to the clinical parameters and healing at the various time intervals of the study. This could be attributed to the beneficial effect of microsurgery only being limited to the early healing parameters rather than the long-term effects. Although the healing scores of the microsurgery treated sites were much better than the conventional sites, in the immediate postoperative assessment period, the values did not reflect statistically significant relevance.

CONCLUSION

Microsurgical technique revealed better clinical outcomes and healing in the early postoperative phase with no difference between the 2 approaches over the 3 to 6 month period.

LIMITATIONS

1. More sophisticated healing assessment methods like fluorescein angiogram, flow cytometry using markers for various cells and cytokines; and also immunohistochemistry evaluation of healing using various MMPs as markers could be done to establish the enhanced healing outcomes with microsurgical approaches.
2. Larger sample size involving a larger cross section of the population needs to be carried out.

TABLES:

TABLE 1 - GINGIVAL INDEX :

Comparison of mean change GI between the test and control groups:

Time Interval	Group	Mean	Std dev	SE of Mean	Mean Difference	t	P-Value
Baseline to 1 Month	Test	0.85	0.30	0.07	0.164	1.284	0.209
	Control	0.68	0.42	0.10			
Baseline to 3 Months	Test	1.17	0.28	0.07	0.101	0.818	0.420
	Control	1.06	0.41	0.10			
Baseline to 6 Months	Test	1.46	0.29	0.07	0.031	0.327	0.746
	Control	1.43	0.24	0.06			

TABLE 2 - PROBING DEPTH (PPD) :

Comparison of mean change PPD between the test and control groups:

Time Interval	Group	Mean	Std dev	SE of Mean	Mean Difference	t	P-Value
Baseline to 1 Month	Test	0.71	0.40	0.10	0.013	0.079	0.937
	Control	0.69	0.53	0.13			
Baseline to 3 Months	Test	1.22	0.53	0.13	0.073	0.371	0.713
	Control	1.14	0.59	0.15			
Baseline to 6 Months	Test	1.72	0.53	0.13	0.173	0.891	0.380
	Control	1.55	0.57	0.14			

TABLE 3 : ATTACHMENT LEVEL (RAL)

Comparison of mean change RAL between the test and control groups:

Time Interval	Group	Mean	Std dev	SE of Mean	Mean Difference	t	P-Value
Baseline to 1 Month	Test	0.33	0.23	0.06	-0.038	-0.400	0.692
	Control	0.36	0.30	0.07			
Baseline to 3 Months	Test	1.03	0.41	0.10	-0.013	-0.083	0.934
	Control	1.04	0.48	0.12			
Baseline to 6 Months	Test	1.46	0.54	0.14	-0.063	-0.262	0.795t
	Control	1.52	0.80	0.20			

TABLE: 4 SOFT TISSUE HEALING (ST)

Comparison of mean change ST assessment between the test and control groups:

Time Interval	Group	Mean	Std dev	SE of Mean	Mean Difference	t	P-Value
Before to After	Test	0.55	0.39	0.10	-0.134	-1.127	0.269
	Control	0.68	0.28	0.07			
Before to 1 day	Test	0.50	0.37	0.09	-0.166	-1.437	0.161
	Control	0.67	0.27	0.07			

Before to 8 days	Test	0.43	0.39	0.10	-0.113	-0.908	0.371
	Control	0.54	0.31	0.08			
Before to 1 Month	Test	0.49	0.44	0.11	0.006	0.024	0.981
	Control	0.49	0.83	0.21			
Before to 3 Months	Test	0.56	0.50	0.12	0.081	0.500	0.621
	Control	0.48	0.42	0.10			
Before to 6 Months	Test	0.70	0.60	0.15	0.119	0.625	0.537
	Control	0.58	0.46	0.12			

FIGURES:

FIGURE 1



FIGURE 2

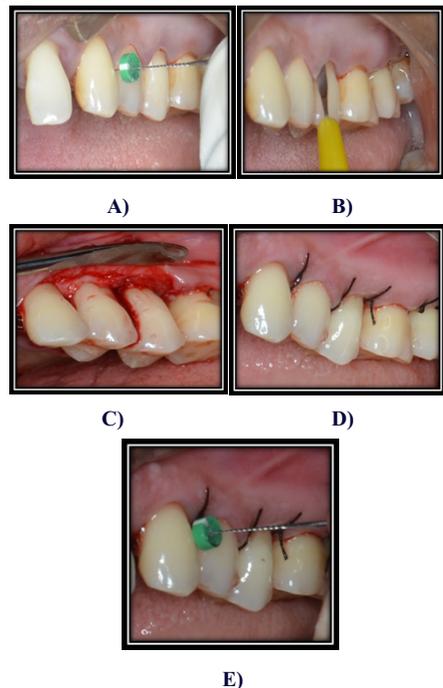


FIGURE LEGENDS:

FIGURE 1: SOFT TISSUE APPROXIMATION ASSESSMENT WITH REAMER NO.8

A) Buccal view

B) Lingual view

FIGURE 2: MICROSURGICAL PROCEDURE

A) Soft tissue assessment

B) Incision with microsurgical blade

C) Reflection & debridement done

D) Microsutures (5-0) placed

E) Soft tissue primary closure assessment

REFERENCES

1. Carranza, Newman, Takei, Klokkevold. Advanced Diagnostic Techniques. Clinical Periodontology; 10th edition: 582.
2. Grant DA, Stern IB, Listgarten MA. Periodontics: the tradition of Gottlieb & Orban, 6th ed by Mosby publications. 1990. P.315-375.
3. McDonell HT, Mills MP. Principles and practice of periodontal surgery. In: Rose LF, Genco RJ, Cohen DW. Periodontics. medicine, surgery and implants. Elsevier Mosby publications. P.358-404.
4. Harrel SK. A minimally invasive surgical approach for periodontal regeneration: Surgical Technique and observations. J Periodontol 1999;70:1547-1557.
5. Tibbetts L and Shanelec DA. An overview of periodontal microsurgery. Curr Opin Periodontol 1994; 187-193.
6. Shanelec DA & Tibbetts LS. A perspective on the future of periodontal microsurgery. Periodontology 2000 1996; Vol. 11: 58-64.
7. Caffesse RG, Sweeney PL, Smith BA. Scaling and root planing with and without periodontal flap surgery. J Clin Periodontol. 1986 Mar;13(3):205-10.
8. Hayakawa H. Guideline for examination, diagnosis, and treatment planning for periodontal diseases. Japanese Society of Periodontology. 2008; 24-25

9. Heitz-Mayfield LJA, Trombelli L, Heitz F, Needleman I, Moles D. A systematic review of the effect of surgical debridement vs. non-surgical debridement for the treatment of chronic periodontitis. *J Clin Periodontol* 2002; 29 (Suppl 3):92–102
10. Tibbetts LS & Shanelec DA. Periodontal microsurgery. *Dental Clinics of North America* 1998; 42: 339-359.
11. Shanelec DA. Periodontal Microsurgery. *J Esthet Restor Dent* 2003; 15:118-123.
12. Belcher JM. A perspective on periodontal microsurgery. *Int J periodontic Restorative Dent* 2001; 21:191- 196.
13. Hujuel DP, DeRuen CT. Validity of split – mouth trails. *J Clin Periodontol* 1992; 19:625-627.
14. Antezaks AA, Tulloch JFC, Berkey CS. Split mouth and cross over designs in dental research. *J Clin Periodontol* 1990; 17:446-453.
15. Wachtel H, Schenk G, Böhm S, Weng D, Zuhr O, Hürzeler MB. Microsurgical access flap and enamel matrix derivative for the treatment of periodontal intrabony defects: a controlled clinical study. *J Clin Periodontol*. 2003 Jun; 30(6): 496-504.
16. Fickl S, Thalmair T, Kepschull M, Böhm S, Wachtel H. Microsurgical access flap in conjunction with enamel matrix derivative for the treatment of intra-bony defects: a controlled clinical trial. *J Clin Periodontol* 2009 Sep; 36(9):784-90.
17. Burkhardt R, Lang NP: Coverage of localized gingival recessions: comparison of micro- and macrosurgical techniques. *J Clin Periodontol* 2005; 32: 287–293.
18. Curtis JW, Jr McLain JB, Hutchinson RA. The incidence and severity of complications and pain following periodontal surgery. *J. Periodontol.* 1985;56(10):597–601. doi: 10.1902/jop.1985.56.10.597.[PubMed] [Cross Ref]
19. Serino GB, Ramberg RP, Socransky SS, Lindhe J. Initial outcome and long-term effect of surgical and non-surgical treatment of advanced periodontal disease. *Journal of Clinical Periodontology* 2001; 28(10): 910–916.
20. Philstrom BL, Ortiz-Campos C, McHugh RB. A Randomized Four-Year Study of Periodontal Therapy. *J. Periodontol.* 1981; 52(5):227-242.
21. Froum SJ, Coran M, Thaller B, Kushner L, Scopp IW, Stahl SS. Periodontal Healing Following Open Debridement Flap Procedures I. Clinical Assessment of Soft Tissue and Osseous Repair. *J Periodomol* 1982; Vol 53; 8-14.