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Open flap debridement using microsurgical loupes and modified widman flap approach - A case series

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Abstract
Periodontitis is a chronic inflammatory disease of multifactorial origin resulting in pocket formation, loss of attachment, gingival recession, bone loss, mobility and eventually loss of tooth. The use of specifically designed microsurgical instruments aids in achieving clinical outcomes with increased accuracy, reduced fatigue, improved motor skills, minimal soft tissue trauma and hence reduced discomfort post operatively. This case series envisages the comparison of clinical outcomes following Open Flap Debridement (OFD) with and without magnifying loupes using Modified Widman flap approach.
Case series: Five patients diagnosed with chronic generalised periodontitis having 10 sites with similar periodontal defects in contralateral quadrants (3 maxillary and 2 mandibular) were selected for this case series. Quadrants were randomly assigned to the microsurgical or conventional group. The results of this case series showed that the use of microsurgical approach had superior results in terms of early wound healing and patient comfort compared to conventional surgical approach.
Conclusion: Thus, utilisation of microsurgical approach results in enhanced outcomes.

Keywords: Microsurgery, open flap debridement, modified widman flap

Introduction
Periodontitis is a chronic inflammatory disease of multifactorial origin which results in pocket formation, loss of attachment, gingival recession, bone loss, mobility and eventually loss of tooth [1]. Treatment of periodontitis is aimed at disease prevention, slowing or arresting disease progression, regenerating lost periodontium and maintaining the achieved therapeutic objectives. Removal of plaque and calculus from the tooth surface remains to be the gold standard in treating periodontal disease, which is known to be the major etiologic factors of periodontal diseases [2]. Treatment can be done via "closed" (subgingival scaling and root planing) and "open" (surgical) method. The therapeutic modality selected will depend upon the type of periodontitis (chronic or aggressive), the severity of the disease and upon many factors [3].
Surgical therapy has advantages of establishing an environment that is conducive to periodontal health and accessibility to scaling and root planning [5]. Of the numerous periodontal surgical techniques, modified Widman flap ("Modified Widman Flap," MWF) remains the standard surgical periodontal therapy (Ramfjord 1977) [7].
The clinical steps include precise incisions, partial reflection of flap exposing the bone and a thorough debridement. The goal of this surgical procedure is not necessarily pocket elimination but healing by formation of a long junctional epithelium. Modified Widman Flap (MWF) still remains the most sought after surgical procedure for pocket therapy as it establishes an intimate postoperative adaptation of collagenous connective tissue to tooth surface thereby resulting in pocket reduction [7].
The current pendulum of clinical opinion in some areas of periodontal education and research has swung away from traditional mechanical, surgical therapy towards advanced treatment options.
Periodontal microsurgery is the refinement of basic surgical techniques made possible by the improved visual acuity gained with the help of surgical microscope [8].

As of today very few clinical studies have demonstrated the advantages of magnification in enhancing the clinical outcomes after periodontal open flap debridement. So the aim of the present case report is to evaluate the treatment outcomes of microsurgery using modified Wid man flap approach for open flap debridement and comparison with conventional approach.

Case Series

2 male and 3 female patients aged 32-36yrs diagnosed with chronic periodontitis were selected from the outpatient Department of Periodontics, Dr Syamala Reddy Dental College, Hospital and Research centre, Bangalore. All patients were systemically healthy. On clinical intraoral examination, generalized inflammation, generalized probing pocket depth of more than 8mm was recorded. Radiographic examination revealed a generalized horizontal pattern of bone loss in contralateral quadrants in all the patients. On the basis of clinical and radiographic examination a diagnosis of chronic generalized periodontitis was given. After phase I therapy the patients were recalled after 4 weeks. On re-evaluation an average probing depth of 5.8- 6.2mm was recorded. Patients were informed about the treatment, a detailed clinical case history was recorded and written informed consent was obtained from the patients. Before the treatment, patients were sent for routine blood investigations that revealed results within normal limits. Sites were randomly assigned to the conventional or microsurgical approach by flip of a coin method.

The following clinical parameters were recorded before the surgical procedure (at baseline), at the time of surgery, at 1st, 2nd, 3rd week and at 3 and 6 months post- surgery in a sequential manner in both the groups:

1. Probing pocket depth (PD) - at baseline, 3 months and 6 months, 2. Relative Clinical attachment level (RCAL) - at baseline, 3 months and 6 months, 3.Healing Index (HI) - (Landry *et al*.) [9] at 1st, 2nd and 3rd week, 4.Visual Analog Scale (VAS) - for 1 week, 5. Duration of surgery. Vertical measurements were obtained using customized acrylic occlusal stents and UNC 15 probe.

After baseline examination and profound local anesthesia (2% lignocaine with adrenaline at a concentration of 1: 80,000) of the surgical site, the surgical procedure involved the following steps:

Microsurgical approach with loupes

1. Internal bevel followed by crevicular incisions were given with microsurgical blades.
2. A microsurgical periosteal elevator was used to elevate a full thickness buccal and palatal / lingual flap.
3. A third interdental-incision was made in a horizontal direction.
4. Pocket epithelium and granulation tissue was removed using curettes (Gracey curettes, Hu- Friedy, Chicago, IL, USA.) to provide full access and visibility to the root surfaces.
5. Any remaining plaque and calculus was gently removed with ultrasonic scalers followed by root planing using curettes, to get a clean smooth hard surface.
6. The flaps were approximated to the original level and secured with 6-0 microsutures.

In conventional approach the quadrants were treated with the above mentioned flap surgical technique, but with regular blades and instruments and sutured with 3-0 sutures.

Post-operative care: Post-operative instructions were given to the patients. Patients were prescribed with antibiotics (Amoxicillin Trihydrate 500 mg thrice daily for 5 days) and analgesics (Diclofenac- 100 mg. twice daily for 3 days). Chlorhexidine rinses (0.2%) were prescribed twice daily for 1 week. Periodontal dressings and sutures were removed 1 week postoperatively. Patients were advised to initiate mechanical plaque control from the second postoperative week. Patients were recalled for post-operative evaluation according to the study design.

Results (Table 1 & 2)

Results showed that there was an average reduction in probing depth of 2.37 at 3 months 2.88mm at 6 months in conventional group, 2.4mm and 3.14mm at 3 and 6months respectively in microsurgical group. CAL gain of 1.48mm at 3 months and 2.37mm at 6 months was recorded for conventional group and 1.89mm and 2.74mm at 3 and 6 months were recorded for microsurgical group. The average Healing Index scores recorded was 4.6 in conventional group and 5 in microsurgical group. The average visual analog scale value was 4.5 and 2.8 in conventional and microsurgical group. The time recorded to perform the surgery using microsurgical approach was 98 min while it was 84 min for conventional approach.

Table 1: Clinical parameters recorded in conventional group

S. No	PD (B)	PD (3M)	PD (6M)	RCAL (B)	RCAL (3M)	RCAL (6M)	VAS	HI	Duartion of surgery
1	5.41	3.1	2.43	10.23:	9.1	8.03	5.4	4.8	80
2	6.17	4.1	3.12	9.91	8.4	7.32	4.2	4.6	101
3	5.58	3.2	2.87	11.25	9.8	9.26	3.8	4.2	90
4	5.31	3.1	3.03	9.98	8.2	7.43	4.2	4.8	70
5	6.40	3.5	3.01	11.76	10.4	9.22	5.1	4.8	80

Table 2: Clinical parameters recorded in microsurgical group

S. No	PD (B)	PD (3M)	PD (6M)	RCAL (B)	RCAL (3M)	RCAL (6M)	VAS	HI	Duartion of surgery
1	6.12	3.8	3.06	10.89	9.23	8.5	3.1	5	105
2	5.68	3.1	2.62	9.45	8.12	7.4	2.2	5	110
3	5.89	3.4	3.17	9.92	8.01	7.2	3.4	4.9	100
4	6.36	3.9	3.03	10.91	8.76	7.6	2.1	5	85
5	6.52	4.1	3.01	11.54	9.16	8.3	3.1	5	90

Discussion

Periodontitis is a chronic inflammatory disease characterized by loss of supporting structures of teeth. Periodontal therapy constitutes a key aspect of the treatment of patients having periodontal diseases. It aims at establishing healthy gingiva and arresting the progressive destruction of the supporting apparatus [3]. The limitations of nonsurgical therapy led to the development of the various surgical procedures in the treatment of periodontal disease to obtain access to the root surfaces for proper debridement to provide ideal conditions for healing and to manage persistent diseased sites with deep probing depths. A variety of surgical techniques have been developed and tested for their potential to restore the periodontal tissues lost due to destructive periodontal disease.

The modified Widman flap procedure is frequently used in periodontal therapy (Ramfjord 1977) [7]. It is one of the conservative surgical approaches to eliminate the inflamed gingival tissue and also provide access for root debridement. It mainly aims at reattachment and readaptation of the pocket walls rather than the surgical eradication of the outer walls of the pockets thereby reducing pocket depths and promoting attachment gain [7].

The use of magnification systems and periodontal microsurgery are part of a broad movement in dentistry toward the use of minimally invasive procedures to replace the need for more extensive surgical procedures. The introduction of microsurgery has helped the periodontist in treating the patient in a conservative manner using enhanced visibility of the surgical field which increase the effectiveness of scaling & root debridement, minimize surgical wounds, rapid wound healing, decreased post-operative morbidity and increased acceptance by the patients. Several studies have documented the use of microsurgery in various root coverage procedures, interdental papillae preservation techniques and periodontal regeneration procedures in intrabony defects. Very few clinical studies have documented the use and possible advantages of operating microsurgical loupes in periodontal open flap debridement surgery.

Results of the present case series showed a reduction in probing depth and gain in clinical attachment level both at 3 and 6months in both the groups with slightly better results in terms of microsurgical group (Table 1 & 2). This is in accordance to study conducted by Perumal *et al.* [10]. The wound healing score of 5 obtained in this case series was superior in microsurgical approach compared to conventional approach. This could be attributed to minimal trauma by using small sutures (6-0), delicate handling of the tissues and precise wound closure, which is in accordance with studies by Cortellini & Tonetti [11]. This encourages repair through primary healing, which is rapid with minimal scarring, thereby reducing inflammation and pain. In the present study mean VAS scores were significantly higher in the conventional group showing that the pain perceived was more than in the microsurgical group. These findings are in accordance with the study by Shetty *et al.* [12]. Tibbetts [13] found that microsurgery offers less postoperative pain, discomfort, and better healing because of finer sutures and instruments used in it. The mean surgical operation time for microsurgical group was 1 h and 38 min that is 8% more than in conventional sites (1 h and 24 min). It may be speculated that the extended operation time may compensate for the beneficial treatment effect of minimally invasive techniques. This is in accordance with studies by Nizam *et al.* [14] and Perumal *et al.* [10]. Our results clearly demonstrate improvement in all clinical parameters at 6 months compared to baseline in both the groups with slightly better results in microsurgical group. Open flap debridement with microsurgical loupes showed better early wound healing and less patient discomfort compared to conventional approach.

Surgical Steps: Conventional Group

Fig 1: Baseline probing

Fig 2: Inverse bevel incision on buccal side

Fig 4: Suturing done using conventional suture

Fig 5: Probing depth at 6 months

Surgical Steps: Microsurgical Group

Fig 6: Baseline probing

Fig 7: Inverse bevel incision on buccal side

Fig 8: Reflection and debridement on buccal side

Fig 9: Suturing done using microsutures

Fig 10: Probing depth at 6 months

Conclusion

Thus use of microsurgical approach can enhance the predictability of improvements in open flap surgery using modified Widman flap approach in terms of improved healing and less patient discomfort. Overall clinically better results were observed when open flap debridement was combined with microsurgery. Further long-term studies using larger sample sizes and longer duration are required in this direction to strengthen the evidence.

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