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A comparative study of ergonomics and clinical outcome with microsurgical and macrosurgical periodontal procedures

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ABSTRACT: It has been observed that in most of the asian countries there is hesitation for using magnifying loupes while performing various dental procedures. In long term dental practice it may lead to operator's own physical disabilities. Keeping this fact in mind, this study has been conducted with aim
to compare clinical outcome of patient, their comfort and operator's ergonomics by using macrosurgical and microsurgical method for periodontal flap surgeries.30 quadrants with chronic periodontitis were included. They were divided in two groups. Group A(test) for microsurgery and Group B(control) for macrosurgery. In Group B, after local anesthesia intracrevicular incision was made, flap reflection and debridement was done followed by irrigation, suturing, periodontal dressing and post operative instructions. In Group A, similar type of surgery was performed using magnifying loupe 3.5x and microsurgical instruments. Plaque index ,Gingival index, Probing depth, Clinical attachment level at baseline,1 month and 3 months, post operative healing at 1 week and patient comfort for 7 days postoperatively were recorded in both groups. Effect of magnifying loupes on ergonomics of dental operator was assessed immediately after surgery using questionnaire. Statistical analysis included paired and unpaired t-test, SPSS software 17.0 (IBM corporation, USA).Test group offers less postoperative pain, discomfort to patient ($p<0.05$), better ergonomic score($p<0.05$) than control. Clinical outcome were statistically similar for both groups. Hence concluded that enhanced patient comfort and better operator's ergonomic benefits are substantiated using magnifying loupes as compared to macrosurgery. This will have long term impact on dental health professionals.

KEYWORDS: Microsurgery, Ergonomics, Periodontal flap, magnifying loupes

I. INTRODUCTION

Microsurgery is refinement in surgical technique by which normal vision is enhanced through magnification, includes magnifying loupes or surgical microscope [1,2].The Chair-side work posture of dental operators has long been a concern because of health related problems like various musculoskeletal disorders(hand tremors, carpal tunnel syndrome etc.) potentially caused or exacerbated by poor posture due to lack of visibility [3,4]. As a result dental operators are increasingly concerned about Ergonomics [5,6]. Although magnifying loupes are used during endodontic and perio-plastic surgical procedures but there is paucity of literature which compares clinical outcome of patient and ergonomics of dental operator using microsurgical and macrosurgical techniques while performing routine dental treatments. Hence this study was taken up to compare ergonomics and clinical outcome with microsurgical and macrosurgical procedures for conventional periodontal flap surgeries.

II. MATERIALS AND METHODS

It was a randomized, case control ,split mouth study in which 30 quadrants in patients of age group 30-55 years with generalized chronic periodontitis were assigned randomly for test(microsurgical) and control(macrosurgical) open flap debridement. Group A(Test) 15 quadrants for microsurgery and Group B(Control) 15 quadrants for macrosurgery. In our study single operator worked on all the 30 quadrants. The time lapse between microsurgery and macrosurgery in this split mouth study was 7days in same patient. In Control (Group B) after achieving adequate anesthesia intracrevicular and interdental incisions were made using blade no.15, full thickness

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mucoperiosteal flap was reflected ,surgical debridement was carried out using scalers and curettes, surgical sites were irrigated with sterile saline .Surgical flap was sutured to presurgical level with 4.0 silk suture. Periodontal dressing (coe-pack) was placed(Figure i). Antimicrobials and analgesics were prescribed for 5 days and post operative instructions were given to patients. All clinical parameters like Plaque index(PI), Gingival index (GI), Clinical attachment level (CAL) and probing pocket depth (PPD) were recorded at baseline, 1 and 3 months**.** One week postoperatively healing was assessed by Early Healing Index (EHI)**.** For seven continuous days postoperatively patient comfort was assessed by Visual Analogue Scale. After surgery a printed VAS sheet was given to the patient for seven days and the patient was instructed to score their postoperative pain and discomfort on that sheet which was then collected on the day of suture removal and assessed. Immediately after surgery ergonomics of dental operators was assessed using a self-administered questionnaire. In Test (Group A) Microsurgery was carried out with 3.5x optical magnification dental loupe. Surgical procedure was same as that for Group B i.e, after achieving adequate anesthesia intracrevicular and interdental incisions were made using blade no.15c, full thickness mucoperiosteal flap was reflected ,surgical debridement was carried out using minicurettes. All microsurgical instruments were used to perform the microsurgery. Surgical sites were irrigated with sterile saline .Sutures were placed using 5.0 silk suture. Periodontal dressing (coe-pack) was placed(Figure ii). Antimicrobials and analgesics were prescribed for 5 days and post operative instructions were given to patients. All clinical parameters, early Healing Index, patient comfort and operator's ergonomics were done similar to that for control group.

Assessment for outcome of clinical parameters was done by single operator. For assessment of ergonomics ten different operators were included in the study for whom a self-administered questionnaire (see below) was given immediately after they performed similar type of surgery.

III. RESULTS

In present study plaque index and gingival index showed a statistically significant reduction for both the groups after 1month and 3 months when compared to baseline. In the inter group comparison test group showed a statistically significant reduction for PI & GI after one month i.e. p=0.009 & p=0.004 respectively (Table I and Graph Ia , Ib). Clinical attachment level and periodontal probing depth showed statistically significant reduction for both the groups after 1month and 3 months when compared to baseline ($p<0.05$). In the inter group comparison there was no statistically significant difference (Table II and Graph IIa , IIb). Mean Early Healing Index (EHI) for test and control group, was found to be statistically insignificant as $p>0.05$ (Table III, Graph III). When Visual Analogue Scale (VAS) was compared for patient comfort among test and control group, it was found to be significantly better for test group as $p<0.05$(Table IV, Graph IV). Mean ergonomic score was 3.87±0.18 in test group and same was 1.80±0.41 in control group. It was also found to be significantly better for test group as $p<0.05$(Table V ,Graph V).

IV. DISCUSSION

In the present study it has been observed that the clinical outcome in terms of PI, GI, CAL,& PPD gave almost similar results when microsurgical technique was compared to macrosurgical techniques. There was a significant improvement in oral hygiene status and gingival health after 1month and 3 months as is always expected in any flap surgery [7,8]. This is also in agreement with study done by Reddy et at [9]. Lindhe and co-workers in 1984 [10] suggested that evaluative factor of success of periodontal therapy is meticulousness of debridement of root surface rather than choice of grafting modality. The operators in this study were able to perform the debridement thoroughly under non magnification as well as magnification. Mean Early Healing Index (EHI) showed no significant difference between the two groups $p>0.05$. All these findings are suggestive of that there is no much difference in overall treatment outcome by using any of these technology. But, when Visual Analogue Scale (VAS) score was compared it was found that there was significantly better patient comfort level with among test group as compared to control group $p<0.05$. VAS score was higher in control (macrosurgery) group showing that pain perceived was more when compared to test (microsurgical) group. This may be due to delicate handling of tissues and precise wound closure as discussed by Cortellini and Tonetti [11].The operator's comfort in terms of ergonomics, which is of utmost significance, was also found to be be significantly high while using magnifying loupes as compared to naked eyes. It can be due to the operators straight back, erect neck and focussed vision while operating i.e, due to enhanced magnification, illumination and instrumentation.

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V. CONCLUSION

It's a common practice in dentistry of not using or minimally using any magnification for dental procedures but after this study it may be recommended to dental graduates to use magnifying loupes for all types of dental procedures.

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Tables

Table I: Comparison of plaque index and gingival index at different intervals between test and control group.

Plaque Index	**Test**		**Control**		**t test**	**p value**
	Mean	**SD****	**Mean**	**SD****		
At baseline	1.88	0.15	1.97	0.40	0.82	0.42
At 1 month	1.28	0.17	1.57	0.36	2.82	0.009*
At 3 months	1.02	0.06	1.34	0.31	3.93	0.001*
Gingival Index						
At baseline	1.48	0.11	1.69	0.27	1.79	0.07
At 1 month	1.14	0.15	1.32	0.16	3.18	0.004*
At 3 months	0.86	0.12	0.95	0.19	1.55	0.13

* statistically significant, ** Standard Deviation
p value<0.05 is considered as significant

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Table II: Comparison of CAL and PD at different intervals between test and control group.

.CAL[k]	Test		Control		t test	p value
	Mean	**SD****	**Mean**	**SD****		
At baseline	5.80	0.63	5.65	0.68	0.63	0.54
At 1 month	4.41	0.53	4.21	0.69	0.89	0.38
At 3 months	3.57	0.69	3.35	0.93	0.74	0.47
PD[#]						
At baseline	5.47	0.78	5.39	0.60	0.32	0.76
At 1 month	3.93	0.62	3.81	0.56	0.56	0.58
At 3 months	3.11	0.71	2.79	0.68	1.26	0.22

k Clinical attachment level , # Probing Depth , ** Standard Deviation
p value<0.05 is considered as significant

Table III: Comparison of Early Healing Index(EHI) between test and control group.

Intervals	Mean	SD**	t test	p value
Test	1.40	0.51	0.96	0.75
Control	1.60	0.63		

** Standard Deviation
p value<0.05 is considered as significant

Table IV: Comparison of Visual Analogue Scale(VAS) between test and control group.

Intervals	Mean	SD**	t test	p value
Test	0.77	0.18	22.28	<0.01*
Control	5.43	0.79		

* statistically significant, **Standard Deviation
p value<0.05 is considered as significant

Table V: Comparison of ergonomic score between test and control group.

Intervals	Mean	SD**	t test	p value
Test	3.87	1.52	5.90	<0.01*
Control	1.80	0.41		

* statistically significant, **Standard Deviation
p value<0.05 is considered as significant

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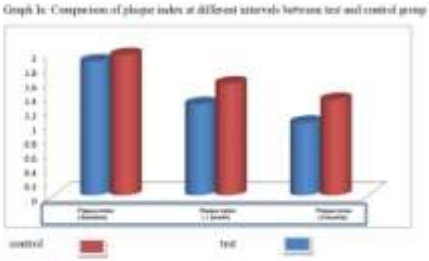
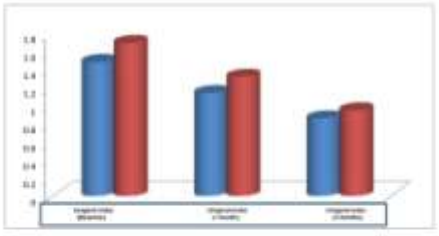
Figure legends:
Figure i- Macrosurgery
Figure ii-Microsurgery
Figure iii-Graph Ia,Ib
Figure iv-Graph IIa,IIb
Figure v-Graph III,IV,V





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