

# Clinical Evaluation of Periodontal Status and Patient Comfort Levels Assessment Before and After Manual Scaling Under Conventional Approach and Surgical Operating Microscope: A Comparative Analysis

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## **Abstract:**

**Introduction:** Hand scaling is the conventional techniques where hand scalers are being used these hand scalers have advantage over other techniques of scaling by providing increased precision and tactile sensation of the clinician which further results in patient's better treatment outcomes. Magnification is the advanced equipment used which increase the hand-eye coordination for better results. The aim of this study is to assess the periodontal treatment outcome before and after manual scaling executed by conventional method and surgical operating microscope and to evaluate the ergonomic benefit of the clinician and patient comfort levels in both the groups. **Materials and method:** A split mouth study is conducted for 50 patients where all the 50 patients underwent scaling and were divided as group A and group B, where scaling procedure was done in conventional procedure and under surgical operation microscope (SOM). Plaque index (PI), gingival index (GI), Bleeding index (BI) and probing pocket depths (PPD) were assessed from baseline to 4 weeks and a questionnaire was given to the clinician and the patients to assess their comfort levels. **Results:** The results of our study have shown no significant difference in the intra and inter group for PI and GI and intra group for BI and PPDs, whereas a significant reduction is observed in BI under magnification and in PPDs in conventional approach. The ergonomics of the clinician and the patient's pain perception, satisfaction levels and comfort levels under the surgical operating microscope had also shown positive response when the treatment was performed under surgical operating microscope. **Conclusion:** Even though there has been better treatment outcomes and increased ergonomics under SOM than the conventional approach, still further studies has to be carried out to analyse the importance of the usage of microscope.

***Keywords: Conventional approach, ergonomics, manual scaling, surgical operation microscope***

## **1. INTRODUCTION**

Dental science has gone through a plethora of changes both in concepts and techniques in the last few decades with the advancements in general and periodontics in particular.

Periodontitis is a complex disease, its expression involves intricate interactions of the biofilm with the host immune-inflammatory response [1]. The major recognized etiological agents in the initiation and progression of periodontal disease are the bacterial plaque and calculus [2]. Periodontal treatment thus focuses on the thorough removal of plaque and calculus, thereby maintaining a healthy periodontium [3].

Dental surgeons who deal with dental procedures day in and day out are at risk for musculoskeletal disorders due to their nature of work, wherein the subject of ergonomics arises. A dental procedure requires more precision due to the constraints in the oral cavity, and a good vision plays a crucial role in execution of the procedures. In this regards, the usage of magnification devices has taken a long leap in the recent times [4]. They are advocated in dental clinical practice for improvements in promoting good posture, reducing musculoskeletal stress, enhancing diagnostic process and precision and thereby decreasing the impact of interventions to patients' quality of life and pain perception [5].

On the other hand, conventional scaling which is the most commonly advocated procedure from a long time for the removal of plaque and calculus also has shown favorable results with regards to the precision and perception of the practitioner, thereby providing superior tactile sensation and good access for the instrumentation [6].

As the mechanical removal of plaque and calculus along with properly executed oral hygiene instructions and motivation reinforcements form the sole prospect for the cessation of periodontal disease, non-surgical periodontal therapy encompassing scaling and root planning remains the gold standard for the cessation of periodontal disease and maintenance of the periodontal health [7]. Also alterations in the supragingival microbiota to one compatible with periodontal health by reducing the bacterial load and local deposits on the tooth surfaces can be effectively achieved by manual scaling performed with conventional hand scalers [8].

Even though literature states that use of magnification has shown better precision in diagnosis and treatment execution, ranging from dental loupes to surgical operating microscope, the use of surgical microscope has been understated.

It is interesting to know that only one study in the literature so far has shown the usage of magnification loupes in the supragingival scaling and no study has even been carried out till date in performing manual scaling under surgical operating microscope.

The purpose of the study is to compare the clinical outcomes of the manual scaling under conventional and surgical operating microscope evaluating the periodontal status, and at the same time assessment of the comfort levels of the patient under these 2 distinct entities.

## 2. MATERIALS AND METHOD

50 patients with age range of 25 to 65 years and with Minimum of 20 teeth in the mouth who were diagnosed with gingivitis or mild to moderate periodontitis according to AAP guidelines, 1999 and the Patients who had not received periodontal treatment for past 6 months to 1 year were included in this study. Patients with uncontrolled systemic diseases and physically and Mentally Challenged individuals were excluded. Study has been reviewed and approved by the

Ethical board of institution and informed consent has been obtained from the patients participated in the study.

All the 50 patients underwent scaling and were divided as group A and group B. Group A included the first and the fourth quadrant of every patient in which the scaling procedure was done under surgical operating microscope and group B included the second and third quadrant where scaling procedure was done in conventional procedure.

They were evaluated for the following parameters before and after 1 month of scaling:

1. Plaque index, PI (Silness and Loe )
2. Gingival index, GI (Loe and Silness)
3. Bleeding index, BI (Muhelmann H.R and Sons)
4. Probing pocket depth, PPD

## 3. RESULTS

### Plaque index

At baseline plaque index values for the scaling procedure done in conventional procedure and under surgical operation microscope were  $1.68 \pm 0.91$  and  $1.69 \pm 0.91$  respectively (Table 1). Significant difference was observed between both the groups at the baseline (Table 2).

After one month statistically significant decrease was observed in both the groups in conventional procedure and under surgical operation microscope as from  $1.68 \pm 0.91$  to  $0.54 \pm 0.20$  and  $1.69 \pm 0.91$  to  $0.54 \pm 0.20$  respectively. However, there is no statistical significance between the two groups in inter group comparison has been observed (Table 3).

### Gingival index

At baseline gingival index values for the scaling procedure done in conventional procedure and under surgical operation microscope were  $6.66 \pm 1.13$  and  $6.66 \pm 1.13$  respectively (Table 1).

After one month statistically significant decrease was observed in both the groups in conventional procedure and under surgical operation microscope as from  $6.66 \pm 1.13$  to  $0.52 \pm 0.24$  and  $6.66 \pm 1.13$  to  $0.52 \pm 0.24$  respectively (Table 1). However, there is no statistical significance between the two groups in inter group comparison.

### Bleeding index

At baseline index values for the scaling procedure done in conventional procedure and under surgical operation microscope were  $1.37 \pm 0.48$  and  $1.44 \pm 0.48$  respectively (Table 1).

After one month statistically significant decrease was observed in both the groups in conventional procedure and under surgical operation microscope as from  $1.37 \pm 0.48$  to  $0.46 \pm 0.14$  and  $1.44 \pm 0.48$  to  $0.49 \pm 0.14$  respectively and also a statistical significant decrease between the two groups in inter group comparison ( $p=0.003$ ) (Table 3).

### Probing depths

At baseline probing depths values for the scaling procedure done in conventional procedure and under surgical operation microscope were  $2.72 \pm 0.44$  and  $2.56 \pm 0.42$  respectively (Table 1).

After one month no statistical significant difference was observed in both the groups in conventional procedure and under surgical operation microscope as from  $2.72 \pm 0.44$  to  $2.70 \pm 0.44$  and  $2.56 \pm 0.42$  to  $2.55 \pm 0.42$  respectively (Table 2), but a statistical significant decrease between the two groups in inter group comparison was observed ( $p=0.03$ ) (Table 3).

### Questionnaire Analysis

A questionnaire was given to given to the patient for the evaluation of patient's pain perception, comfort levels and satisfaction levels under conventional and surgical operating microscope.

Patient's perception of pain is mild in 26%, moderate in 46% and severe pain is 28% under conventional procedure, whereas 32% had mild, 52% had moderate and only 16% reported severe pain under surgical operating microscope. (Graph 1)

12% of patients said that there was no difference in the comfort level, 50% reported partly comfortable, 32% fairly comfortable and 6% felt excellent comfort with conventional approach. Whereas, 4% felt no difference in the comfort level, 44% partly comfortable, 38%

fairly comfortable and 14% excellent comfort with surgical operating microscope approach. (Graph 2)

Coming to the satisfaction of the patient 24% of the patients showed that they were partly satisfied, 62% fairly satisfied, 14% felt excellent satisfaction with conventional approach. And 22 % of the patients showed that partly satisfied, 52% fairly satisfied, 26% felt excellent satisfaction with SOM approach. (Graph 3)

Total of 5 clinicians participated in the study and among which 80% had ergonomic satisfaction while doing the treatment under surgical operating microscope. (Graph 4) (figure 1)

Table 1: Descriptive statistics showing the mean values of the plaque index, Gingival Index, Bleeding index, pocket depths before and after 1 month of scaling

MEASUREMENTS OF INDICES			N	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
PLAQUE INDEX	SOM	BEFORE	50	1.6876	0.91	0.75	5.00
		AFTER	50	0.5427	0.20	0.00	1.00
	CONVENTIONAL	BEFORE	50	1.6888	0.91	0.75	5.00
		AFTER	50	0.5427	0.20	0.00	1.00
GINGIVAL INDEX	SOM	BEFORE	50	1.6612	1.13	0.30	5.80
		AFTER	50	0.5210	0.24	0.20	1.00
	CONVENTIONAL	BEFORE	50	1.6612	1.13	0.30	5.80
		AFTER	50	0.5210	0.24	0.20	1.00
BLEEDING INDEX	SOM	BEFORE	50	1.4468	0.48	0.47	2.42
		AFTER	50	0.4982	0.14	0.21	0.73
	CONVENTIONAL	BEFORE	50	1.3774	0.48	0.27	1.92
		AFTER	50	0.4634	0.14	0.21	0.71
POCKET DEPTHS	SOM	BEFORE	50	2.5616	0.42	1.71	3.17
		AFTER	50	2.55	0.42	1.71	3.17
	CONVENTIONAL	BEFORE	50	2.72	0.44	1.87	3.83
		AFTER	50	2.70	0.44	1.87	3.83

**Table 2:** Comparison of the mean values of the study indices at Baseline and after one month

PAIRED DIFFERENCES	MEAN	STANDARD DEVIATION	95% CONFIDENCE INTERVAL OF THE DIFFERENCE		t VALUE	df	p-VALUE
			LOWER	UPPER			
BSOMP - ASOMP	1.14490	0.99682	0.86161	1.42819	8.122	49	0.000**
BCONVP - ACONVP	1.14610	0.99557	0.86316	1.42904	8.140	49	0.000**
BSOMG - ASOMG	1.14020	1.21206	0.79574	1.48466	6.652	49	0.000**
BCONVG - ACONVG	1.14020	1.21206	0.79574	1.48466	6.652	49	0.000**
BSOMB - ASOMB	0.94860	0.39027	0.83769	1.05951	17.187	49	0.000**
BCONVB - ACONVB	0.91400	0.40206	0.79974	1.02826	16.075	49	0.000**
BSOMPD - ASOMPD	0.01100	0.09996	-0.01741	0.03941	0.778	49	0.440
BCONVPD - ACONVPD	0.02540	0.13999	-0.01438	0.06518	1.283	49	0.206

p-value\*\* = high statistical significance

BSOMP = Microscopic measurement of plaque index before scaling  
ASOMP = Microscopic measurement of plaque index after one month of scaling  
BCONVP = Conventional measurement of plaque index before scaling  
ACONVP = Conventional measurement of plaque index after one month of scaling  
BSOMG = Microscopic measurement of gingival index before scaling  
ASOMG = Microscopic measurement of gingival index after one month of scaling  
BCONVG = Conventional measurement of gingival index before scaling  
ACONVG = Conventional measurement of gingival index after one month of scaling  
BSOMB = Microscopic measurement of bleeding index before scaling  
ASOMB = Microscopic measurement of bleeding index after one month of scaling  
BCONVB = Conventional measurement of bleeding index before scaling  
ACONVB = Conventional measurement of bleeding index after one month of scaling  
BSOMPD = Microscopic measurement of pocket depth before scaling  
ASOMPD = Microscopic measurement of pocket depth after one month of scaling  
BCONVPD = Conventional measurement of pocket depth before scaling  
ACONVPD = Conventional measurement of pocket depth after one month of scaling

**Table 3:** T-test comparison of paired differences of the indices in microscopic and conventional measurements

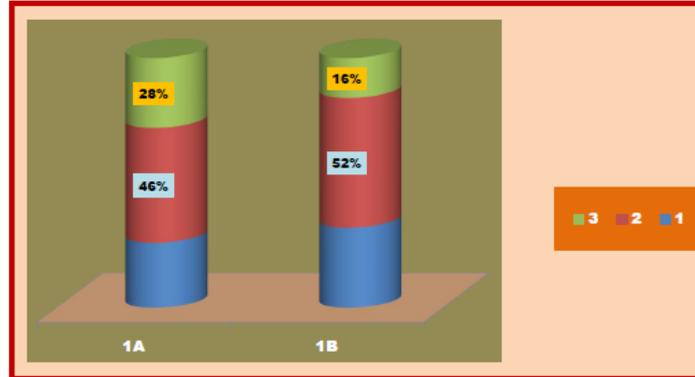
PAIRED DIFFERENCES	MEAN	STANDARD DEVIATION	95% CONFIDENCE INTERVAL OF THE DIFFERENCE		t VALUE	df	p-VALUE
			LOWER	UPPER			
SOMP - CONVP	-0.00060	0.00600	-0.00179	0.00059	-1.000	99	0.320
SOMB - CONVB	0.05210	0.17394	0.01759	0.08661	2.995	99	0.003*
SOMPD - CONVPD	-0.15240	0.50030	-0.25167	-0.05313	-3.046	99	0.003*

p-value &lt; 0.01\* = statistically significant

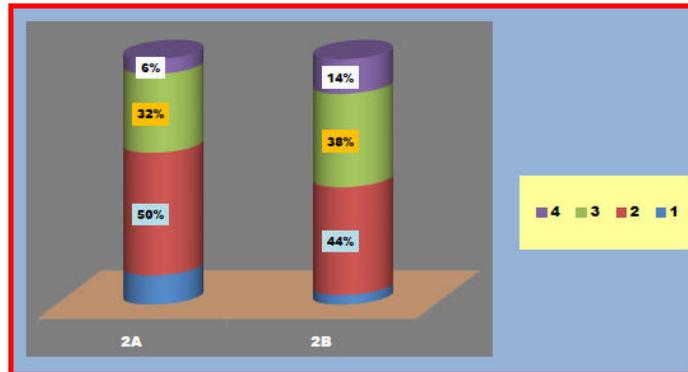
SOMP = Microscopic measurement of Plaque index  
CONVP = Conventional measurement of Plaque index  
SOMB = Microscopic measurement of Bleeding index  
CONVB = Conventional measurement of Bleeding index

SOMPD = Microscopic measurement of Pocket depth  
 CONVPD = Conventional measurement of Pocket depth

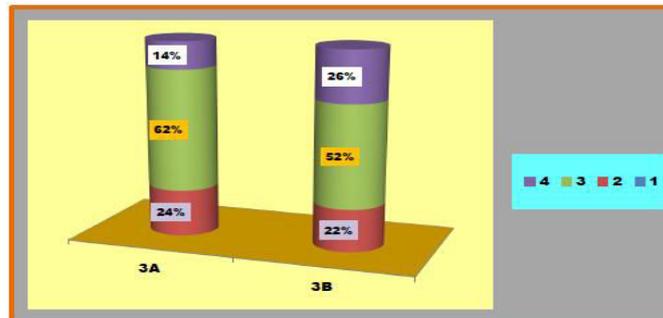
Graph 1 shows the questionnaire response by the patients under conventional and SOM measurements, where bar 1A represents pain perception during treatment through conventional approach, 1B represents pain perception during treatment through SOM approach. 1=mild, 2=moderate, 3=severe



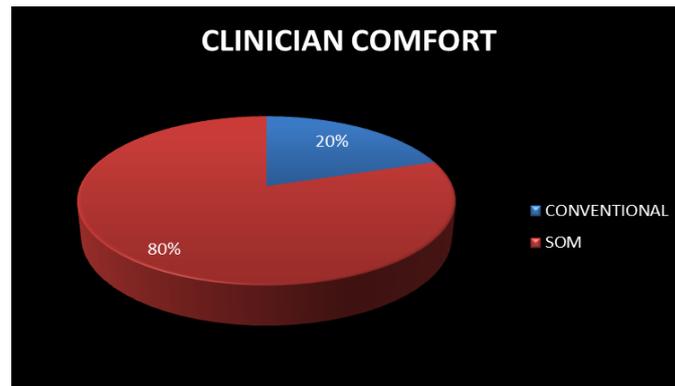
Graph 2 shows the questionnaire response by the patients under conventional and SOM measurements, where 2A represents the comfort levels of the patient during treatment through conventional approach, 2B represents the comfort levels of the patient during treatment through SOM approach 1=no difference, 2=fairly comfortable, 3=partly comfortable, 4=excellent



Graph 3 shows the questionnaire response by the patients under conventional and SOM measurements, where 3A represents the satisfaction levels of the patient during treatment through conventional approach, 3B represents the satisfaction levels of the patient during treatment through SOM approach. 1=no difference, 2=fairly satisfied, 3=partly satisfied, 4=excellent



Graph 4 shows the questionnaire response by the clinicians under conventional and SOM approach



**Figure 1: photograph showing the ergonomics of the clinician**



#### 4. DISCUSSION

Periodontal disease is caused by the bacteria invading the tissues with the formation of pellicle on the tooth surface and later formation of a more complexed structure, the plaque which eventually leads to formation of calculus [6]. The non-surgical periodontal therapy, being the gold standard procedure eliminating the bacterial load in the oral cavity and is the, scaling is the most important treatment done for all the periodontal procedures [9]. This study was conducted towards performing scaling under magnification which is aimed towards vision and better ergonomics of the clinician in rendering more precise and better treatment outcomes.

Even though numerous studies have been discussed in the literature on manual scaling, there are no studies comparing the surgical operating microscope and conventional approach technique.

In this present study, plaque index and gingiva index were recorded, where there is no significant improvement is observed in the plaque index and the gingival index in the intergroup comparison and this was in accordance with the study conducted by Corbella S,

Taschieri S et al. where 30 patients were divided into three groups, and were treated with 2.5× loupes and 2.5× loupes and illumination, and without any magnification device. Full-mouth plaque score percentage (FMPS%) and full-mouth bleeding score percentage (FMBS%) were registered before and after the treatment. They concluded that the use of magnification loupes (with or without illumination) did not significantly improve clinical and patient-centered outcomes of supragingival scaling procedures [8].

In this study, the patient comfort levels were assessed based on a questionnaire and had shown less pain perception, more comfort to the patient and satisfaction under SOM than under conventional approach. The ergonomics of the clinician was also assessed by a questionnaire and 80% of the clinicians had more comfort under SOM than conventional approach. This was not in accordance with the study that has similar outcomes when a comparative descriptive study was undertaken by Parvez et al, where 10 subjects were chosen conveniently and were divided into 2 groups. First group received the conventional therapy (Scaling and Curettage) followed by the second group which received the same (Scaling and Curettage) with magnification loupes. Visual Analogue Scale (Heft-Parker Scale) was used to assess pain before scaling and curettage after undergoing the procedure. They concluded that no difference could be found among the groups in terms of objective outcomes [10].

In this study, the inter group comparison between conventional and the surgical operating microscope, a significant decrease was observed in the probing depths under the conventional approach than under SOM whereas significant decrease in the bleeding index was seen under surgical operating microscope than under the conventional approach which, is seen in correlation to a randomized clinical trial was conducted on 45 patients by Penmetsa GS, Panda KD et al who were diagnosed with mild-to-moderate chronic periodontitis and were treated under the surgical operating microscope with three different magnification variables (0.4, 0.6, and 1). Plaque index, gingival index (GI), and probing pocket depths (PPDs) were assessed from baseline to 4 weeks, whereas healing index was assessed after 2 weeks of root planing procedure. They have concluded that even though all the three magnification variables have shown better treatment outcome and ergonomics, 0.6 magnification variable, has demonstrated a more significant effect while performing root planing procedure [11].

## **5. CONCLUSION**

In the present study, comparison of scaling between conventional approach and surgical operating microscope was done. Both the groups showed similar results in the intra group comparison. However, there was significant difference in the bleeding index and probing pocket depths when the inter groups were compared. The ergonomics of the clinician had

shown a positive response and the patient's pain perception, satisfaction levels and comfort levels under the surgical operating microscope had also shown positive response when the treatment was performed under surgical operating microscope. Still, future studies are required for analyzing the importance of the usage of microscope as well as it has occupied to position as one of the advocated entities in the periodontal armamentarium.

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