COMPARATIVE ANALYSIS BETWEEN ULTRASONIC TIPS AND HAND INSTRUMENTS ON THE CLINICAL PARAMETERS OF PERIODONTAL DISEASE.

ABSTRACT

Aims: To compare hand versus ultrasonic scaling and root planning (SRP) on the clinical parameters of periodontal disease and to assess left over calculus by open flap approach.

Methods And Material: The study sample consisted of random selection of 30 patients with the evidence of chronic inflammatory periodontal disease. Two groups were made in each patient by split mouth design. Pre-treatment measurements recorded were plaque index (PI), calculus index (CI) and probing pocket depth (PPD). Post-treatment measurements recorded were PI, PPD and left over calculus after flap elevation.

Results: In hand instrumentation group (HIG), mean percentage of plaque score was slightly lesser as compared to ultrasonic but not significant. Overall mean reduction in PPD after instrumentation in HIG was greater as compared to ultrasonic, but it was not statistically significant (p>0.05). The percentage efficiency in removal of calculus of HIG was greater compared to ultrasonic but it was also not statistically significant (p>0.05). There was no significant difference between HIG and ultrasonic for number of sites with residual calculus and moreover no. of sites increased apically.

Conclusions: There was significant post-treatment change in the clinical parameters taken in the present clinical study in both HIG & UIG and also slightly more favourable with HIG but not statistically significant.

INTRODUCTION

Periodontal therapy consists of treatment modalities aimed at arresting infection and maintaining a healthy periodontium. The mechanical removal of subgingival microbial biofilms (bacterial plaque) is essential for controlling inflammatory periodontal diseases, because disease causing bacteria can repopulate pockets within weeks following active therapy Sbordone[1].

Scaling and root planing whether by hand instruments or ultrasonic instruments have consistently been shown to be one of the most effective means of treating periodontal diseases. Several studies have been performed comparing the two with varying results. In several studies utilizing the dissection microscope Schaffer[2], Belting and Sjøt[3] and the profilometer Pameijer et al.[4], curettes (hand instrumentation) produced roots surfaces which were smoother than those produced by ultrasonic instrumentation. Although both instruments appeared to be effective in removing calculus, but the question is which method is more effective in complete removal of subgingival calculus when visualized clinically.

MATERIALS AND METHODS

The present study was conducted in the Department of Periodontology, KGMU, Lucknow. Thirty patients between the age group of 20 and 50 years were selected from the Outpatient Department clinic, after obtaining approval from ethical committee, irrespective of the sex and socio-economic status. Two groups (HIG - hand instrumentation group and UIG - ultrasonic instrumentation group) were made in each patient by split mouth design. Pre-treatment measurements recorded were plaque index, calculus index and probing pocket depth. Post-treatment measurements recorded were plaque index, probing pocket depth and left over calculus after flap elevation.

The criterion for inclusion was systemically healthy subjects with the evidence of chronic inflammatory periodontal disease and probing pocket depth >4 mm after scaling and root planning and subjects with calculus score > 2 and no missing maxillary anterior teeth (Fig.1). Subjects with periodontal surgery or medications for last six months, surface caries or any subgingival restoration, smokers and pregnant women were not included in the study.

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KEYWORDS

Open flap approach, periodontal disease, scaling and root planing, ultrasonic

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followed by 100 mg once daily for 5 days. Nimesulide 100 mg twice daily and B-Complex, 1 capsule once daily for 5 days) and postoperative instructions were given. Chlorhexidine mouthwash was prescribed twice daily for three weeks. The subjects were recalled after 7 days for the removal of periodontal dressings and sutures (Fig.3).

Fig. 2  - Periodontal Flap Reflected To See Residual Calculus.

Clinical Parameters
Plaque Index by Silness and Løe.
'0' = No plaque in the gingival area.
'1' = A thin film of plaque adhering to the free gingival margin and adjacent area of the tooth. The plaque may be recognized only by running a probe across the tooth surface.
'2' = Moderate accumulation of soft deposits within the gingival pocket and on the gingival margin and/or adjacent tooth surface that can be seen by the naked eye.
'3' = Abundance of soft matter within the gingival pocket and/or on the gingival margin and adjacent tooth surface.

Calculus Index
'0' = Absence of calculus
'1' = Supragingival calculus extending only slightly below the free gingival margin (not more than 1 mm)
'2' = Moderate amount of supragingival and subgingival calculus or subgingival calculus alone.
'3' = An abundance of supragingival and subgingival calculus.

Probing Pocket Depth
Probing Pocket depth was recorded in millimeters with the help of UNC 15 periodontal probe from gingival margin to the base of the pocket at six locations.

Left Over Calculus
After recording PI and PPD, a full thickness flap was elevated to gain access to the root surface and RC was scored according to following criteria.
'0' = No calculus
'1' = Calculus upto 2 mm from CEJ
'2' = Calculus upto 4 mm from CEJ
'3' = Calculus > 4 mm from CEJ

Statistical Analysis
The statistical analysis of the data was done using Statistical Package for Social Sciences Version 10.0 (SPSS 10.0). The mean of each experimental group was done to depict the central tendency of that group. Standard Deviation: Standard deviation denoted the degree of variation from the central tendency. Paired 't' test was done to see the difference between pre and post-experiment values. As the design of the present study was experimental, the differences between groups were calculated using Student’s 't' test for independent samples. Chi-square test was used to see the association between two groups.

The significance levels were graded as follows:
- p < 0.05 – Significant (95% level of significance)
- p < 0.01 – Highly significant (99% level of significance)
- p < 0.001 – Very highly significant (99.9% level of significance)

RESULTS
The study was conducted on the 1080 sites for PPD and calculus score and 720 sites for PI in 30 subjects. Out of these sites, 50% sites were instrumented with hand instruments and remaining 50% sites with ultrasonic instruments. The efficiency of both the instruments was compared with respect to PI, CI and PPD. In both the groups, there was reduction in mean percentage of PI which was statistically significant. In HIG, there was reduction from 80.83% to 17.50% and in UIG, from 78.61% to 20.00% (Graph 1). There was overall mean reduction in PPD of 1.5 mm after hand instrumentation and after ultrasonic instrumentation it was 1.36 mm. (Graph 2).

Graph 1 Comparison Of Mean Percentage Of Plaque Score Before And After Instrumentation.

Graph 2 Mean Reduction In PPD After Instrumentation.

In HIG, 42 sites with RC were noticed and in ultrasonic instrumentation, 51 sites. (Graph 3). Table 1 shows comparison of percentage efficiency of hand instruments & ultrasonic tip in the removal of calculus. An increase in the percentage of RC was noticed with increase in ppd and also presence of RC was more as distance increased from CEJ apically (Table 2). There was significant post-treatment change in the clinical parameters taken in the present clinical study in both HIG & UIG and also slightly more favourable with HIG but not statistically significant.

Graph 3 No. Of Sites With RC In Hand And Ultrasonically Instrumented Groups.
calculus was measured & different scores were given. This method of probing pocket depths were recorded by UNC 15 periodontal probe. Specimen the sulcus had returned to a normal and healthy condition. PI residual calculus after flap elevation.

For calculus score, out of 540 sites, 42 sites with residual calculus were noticed in HIG, & in UIG, 51 sites. Therefore percentage efficiency of hand instruments was 92.33% & of ultrasonic scaler was 90.56%, which appears in agreement with results of Barnes & Schaffer who reported 94.6% of calculus was removed by curettes. Stende & Schaffer also reported 88.16% efficiency of ultrasonic scalers and 90.48% of hand instruments. Jones WA & O’Leary reported 18.75% of the visible flecks of calculus on root planed surface detected after post extraction examination. Gellin et al. reported 26.8% of the residual calculus by measuring extent of most apical border of residual calculus in mm from CEJ.

An increase in the percentage of RC was noticed with increase in probing pocket depth and also presence of RC was more as increase from CEJ apically. In HIG, percentage of sites with RC in PPD < 4 mm was 14.28% and in UIG it was 17.64%. In PPD > 4 mm, in HIG it was 85.7% and in UIG it was 82.35%. This was in corroboration with studies of Rabbani et al. who found high correlation between percentage of RC & PPD.

For PPD, in HIG, the mean reduction range observed was from 1.2 to 2.0 mm. In UIG, the range varied from 1.0 to 2.0 mm. The overall mean reduction in HIG was 1.50 mm and in UIG it was 1.36 mm. Boretti et al. reported significant decrease in probing depth by manual and ultrasonic instrumentation with no significant difference when results of both the instrumentation groups were compared. The similar results were obtained in the present clinical study also. The previous studies by Bandersten et al. and Laurell et al. compared the powered and hand instrumentation for periodontal scaling and root planing and reported similar reduction in probing depth, similar results were obtained in the present study. Overall mean reduction in PPD was 1.5 mm in HIG and 1.36 mm in UIG which was in agreement with studies compiled by 1996 World Workshop in Periodontics which indicated 1.29 mm reduction in moderate pockets and 2.16 mm in deep pockets. Copulos et al. also reported similar results.

**CONCLUSION**

There was significant change in the clinical parameters taken in the present clinical study in both HIG & UIG and also slightly more favorable with HIG but not statistically significant. As the distance from CEJ increased apically, number of sites with RC also increased in both the groups but no significant difference between HIG and UIG for number of sites with RC. The findings were led to several interesting questions or speculations. Considering the inadequacies of present methods of instrumentation, could one expect to find complete calculus removal? If, then, RC is to be expected, obvious questions arise. How much calculus can be left and the tissue remain healthy? Further study must be therefore undertaken in this direction.

**REFERENCES**


