Root Planing with Dull and Sharp Curettes

by

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SUBGINGIVAL ROOT planing is a basic technique of clinical periodontics. Since rough tooth surfaces facilitate the accumulation and retention of bacterial plaque and calculus[1–5] root planing to attain smooth, as well as deposit-free tooth surfaces, is advisable. Periodontal curettes produce smoother roots than either the hoe or file types of instruments,[6–10] and curettes are generally used for subgingival root planing. It has been reported that dull curettes will burnish and improve the polish of root surfaces,[10] but most clinicians advise the use of sharp planing instruments to obtain smooth root surfaces.

The object of this study was to compare the effect on root surface roughness which results when (1) sharp, and (2) dull curettes are used as subgingival root planing instruments.

MATERIALS

Samples

For this study 48 anterior and/or bicuspid teeth from 12 male patients were used. All the teeth were scheduled to be extracted prior to prosthetic service at the United States Veterans Administration Hospital, Ann Arbor, Michigan. The patients ranged in age from 44 to 80 years. In the areas of root planing, the depth of the gingival crevice varied from 3-8 mm, and moderate to gross subgingival calculus deposits were present.

Instruments

Four sets of curettes (Bunting #5 and #6)* were used for subgingival root planing. The edges on one set of curettes were dulled by rubbing against the enamel crown of an extracted tooth. This dull set of curettes was identified by placing orange tape on the instrument handles. The other three sets of curettes were resharpened on a flat Arkansas stone** lubricated with oil after each period of use.

The equipment used for the measurement of root surface roughness consisted of the following Profilometer*** components: a type A-E automatic piloter with a G-P adaptor beam on a type GH tracer, and a type QB amplimeter. This industrial device has been utilized and described in previous investigations.[10–13] As the tracing stylus (radius = .0005″) follows surface deviations, electrical impulses are relayed to the amplimeter which indicates surface roughness on a numbered gauge.

METHOD

Clinical Procedure

Four anterior or bicuspid teeth from each patient were selected and subgingival root planing was accomplished on all four teeth during the same appointment by the investigator. In every series of four teeth the root planing was performed as follows: tooth A, only sharp curette; tooth B, only dull curette; tooth C, dull curette followed by sharp curette; tooth D, sharp curette followed by dull curette.

The following information was recorded on clinical work sheets: code letter identifying sample tooth, tooth number, calculus score,[14] instrumentation used, depth of gingival crevice in millimeters, distance from the free gingival margin to the cementum enamel junction in millimeters, sequential order of instrumentation, date of last previous scaling, presence or absence of tooth approximal to the experimental surface.

After obtaining local anesthesia the mesial surfaces of the selected teeth were root planed beneath the free gingival margin to the base of the gingival crevice. The sequence of instrumentation was rotated for each series of four teeth in order to equalize any possible fatigue factor. All root planing was done from the facial approach. Each sharp curette was used for planing only one experimental tooth. A sharp #17 explorer was used to test the smoothness of the planed root surfaces. Root planing on each tooth was continued until maximum smoothness had been attained. The teeth then were extracted using special care to avoid contacting the root planed areas. The extracted teeth were rinsed under running tap water and each tooth was stored in a separate, marked bottle containing physiologic saline solution.

Laboratory Procedures

The Profilometer measurements of surface roughness were performed on each series of experimental teeth within one hour following their extraction. The method of measurement utilized has been described previously.[10,13] A dissection microscope was used to select a flat portion of the experimental area which was then outlined with a sharp lead pencil. The Profilometer equipment was adjusted for high speed tracing with a stroke length of .010″. The amplimeter was set to measure roughness in terms of the arithmetical average

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**B.D. Needle Sharpening Stone.

***Micrometrical Division, Bendix Corporation.

TABLE 1
Roughness Values in Microinches
Following Root Planing

		Sharp Curettes	*Dull Curettes*	*Dull + Sharp Curettes*	*Sharp + Dull Curettes*
$\bar{x}$	Roughness value	9.6	9.7	10.0	8.1
s	(standard deviation)	2.09	2.14	3.11	1.56
S.E.	(standard error)	.60	.62	.90	.45

TABLE 2
Analysis of Variance of Roughness Values

	Source	*SS*	*df*	*MS = Var. Est.*	*F*
A	Instrumentation	26.58	3	8.86	2.55
B	Patients	116.77	11	10.62	3.05*
AB	Interaction	114.90	33	3.48	
	Total	258.25	47		

*Significant $P < .01$.

of the height in microinches (1 microinch = .000001″) of vertical deviations of the surface from the center line. The tooth was stabilized with modeling clay and 8 Profilometer readings were taken at different areas within the outlined field. Four readings were obtained with the stylus moving parallel to the long axis of the tooth and four readings were obtained with the stylus moving perpendicular to the long axis. The average of the 8 Profilometer readings on each experimental tooth was determined and used as a roughness score for that tooth. The mean roughness scores were combined, and a "mean of the means" of roughness scores, or roughness value, was calculated for each of the four methods of instrumentation.

RESULTS

The roughness values are indicated in Table 1. An analysis of variance was performed. The results are indicated in Table 2. The analysis indicated no statistically significant difference in tooth surface roughness values related to the type of instrumentation used. There was a significant variation among patients in tooth surface roughness values.

DISCUSSION

This study utilized an objective measuring method to evaluate tooth surface roughness after clinical instrumentation. The quantitative data obtained were derived in direct numerical terms amenable to statistical analysis. Previous investigations of clinical instrumentation effects on tooth surfaces have usually been inadequate in this regard.

It has been noted frequently that the degree of difficulty encountered during root planing instrumentation varies between both individual patients and individual teeth. In order to eliminate any influence on the surface roughness achieved due to this variation in degree of difficulty, no restriction was placed on the amount of time used to perform the subgingival root planing. However, it was observed clinically that smooth tooth surfaces were obtained most quickly when sharp curettes were used.

The analysis of the data indicated a statistically significant difference in the results obtained between the different patients. This difference could have been due to variations in the investigators performance on different occasions.[15] It is also possible that there may be some inherent difference between individual patients or teeth which affects the extent of surface roughness which can be eliminated by root planing instrumentation.

In this study and in two previous investigations[8, 13] no roughness score below 6 was recorded for any individual tooth root planed under clinical conditions with Bunting curettes (#5 and #6). These findings indicate that there may be a measured degree of root surface roughness which cannot be further reduced by clinical root planing with this particular type of curette.

The analysis of the data indicated no statistically significant difference in the measured tooth surface roughness values after root planing with either sharp or dull instruments.

SUMMARY AND CONCLUSIONS

This study compared the effect on root surface roughness which resulted when (1) sharp and (2) dull curettes were used as subgingival root planing instruments. In each of 12 patients a series of 4 anesthetized teeth which were to be extracted for prosthetic reasons were root planed as follows: (1) only sharp curettes, (2) only dull curettes, (3) dull curettes followed by sharp curettes, and (4) sharp curettes followed by dull curettes. After extraction of the teeth the roughness of the root planed areas was measured with a Profilometer. A mean roughness score was determined for each instrumented tooth, and a mean of the means (roughness value) for each of the methods of instrumentation was then calculated.

The analysis of the data in this study did not establish that there was a statistically significant difference between the root surface roughness values after root planing with dull or sharp curettes. When time is not considered, it is possible to obtain equally smooth tooth surfaces with either sharp or dull curettes.

REFERENCES

1. Swartz, M. L. and Phillips, R. W.: Comparison of

Bacterial Accumulations on Rough and Smooth Enamel Surfaces. J. Periodont., 28:304, (Oct.) 1957.

2. Turesky, S., et al: I. Histologic and Histochemical Observations Regarding Early Calculus Formation in Children and Adults. J. Periodont., 32:7, (Jan.) 1961.

3. Waerhaug, J.: Effect of Rough Surfaces Upon Gingival Tissue. J. Dent. Res., 35:323, (April) 1956.

4. Waerhaug, J.: Effect of Zinc Phosphate Cement Fillings on Gingival Tissues. J. Periodont., 27:284, (Oct.) 1956.

5. Zander, H. A.: The Attachment of Calculus to Root Surfaces. J. Periodont., 24:16, (Jan.) 1953.

6. Barnes, J. W. and Schaffer, E. M.: Subgingival Root Planing: A Comparison Using Files, Hoes, and Curettes. J. Periodont., 31:300, (Sept.) 1960.

7. Braum, S. T.: The Radicular Surfaces of Teeth Following the Use of Curettes, Hoes, and Files. Thesis. University of Mich. School of Dentistry, 1961, 41 pp.

8. Green, E. and Ramfjord, S. P.: Tooth Roughness After Subgingival Root Planing. J. Periodont., 37:396, (Sept.-Oct.) 1966.

9. Schaffer, E. M.: Histological Results of Root Curettage of Human Teeth. J. Periodont., 27:296, (Oct.) 1956.

10. Thebaud, J.: Some Microscopic Aspects of the Curetted Surface of the Cementum After the Subgingival Curettage. J. Canad. D. A., 17:127, (March) 1951.

11. Charbeneau, G. T., Peyton, F. and Anthony, D. H.: Profile Characteristics of Cut Tooth Surfaces Developed by Rotating Instruments. J. Dent. Res., 36:957, (Dec.) 1957.

12. Stoller, S. M.: The Microtopography of Teeth. J. Periodont., 36:485, (Nov.-Dec.) 1965.

13. Kerry, G. J.: Roughness of Root Surfaces After Use of Ultrasonic Instruments and Hand Curettes. J. Periodont., 38:340, (July-Aug.) 1967.

14. Ramfjord, S. P.: Indices for Prevalence and Incidence of Periodontal Disease. J. Periodont., 30:51, (Jan.) 1959.

15. Björn, H. and Lindhe, J.: The Influence of Periodontal Instruments on the Tooth Surface. A Methodological Study. Odont. Revy., 13:355, 4-1962.

Abstracts

Local Tissue Effects of Sodium Fluoride

Brånemark, P. I.
Ohont. Revy 18:273-294, #3, 1967

Sodium fluoride in concentrations of 0.2, 1.0, and 2.0% were tested for possible production of tissue injury, with the aid of vital microscopy, micro-angiography and electron microscopy in hamster cheek pouches, rabbits' mesentery, rabbits' ear and human skin. Tissue injury occurred ranging from a slight, under certain conditions reversible, trauma to a definite destruction of tissue cells leading to necrosis and subsequent proliferative reparative phenomena. Microvascular injury and perivascular disintegration of tissue cells as well as vascular proliferation occurred. It was concluded that when sodium fluoride is used in procedures where soft tissues are exposed to this drug, especially when the tissues are in some kind of inflammatory state, the damaging effects of sodium fluoride should be considered. *Laboratory of Experimental Biology, Department of Anatomy, University of Gothenburg, Sweden.*

Local Effect of Five-Percent Chromic Acid on the Gingiva and Teeth of Mice, Rats and Hamsters

Sharawy, A. and Lobene, R. R.
Paradont. Acad. Rev. 1:153, September 1967

A 5% solution of chromic acid was applied topically once a day on the teeth and gingiva of two groups each of six mice, six rats and six hamsters for periods of six or ten weeks. Control animals received 0.85% topical sodium chloride solution. Animals were sacrificed and the jaws were prepared for microscopic examination. Control animals showed normal tissues whereas reactions of experimental animals, which varied with species, showed initial pulpal and gingival hyperemia, with resolution in the mice to necrosis of the pulp and degeneration of supporting alveolar bone in the hamsters. The use of chronim acid for topical treatment of painful oral lesions, notably necrotizing ulcerative gingivitis, is not justified. *Department of Clinical Experimentation, Forsyth Dental Center, Boston, Massachusetts.*

Caries and Periodontal Disease in Hamsters Fed Cereal Foods Varying in Sugar Content and Hardness

Strålfors, A., Thilander, H. and Bergenholtz, A.
Arch. Oral Biol. 12:1361-1365, December, 1967

Four groups of 26 hamsters each were used in order to determine the amount of periodontal disease and caries when fed mazarine cake, soft rye bread, Danish pastry and hard rye bread. Dental caries was determined by the number of carious lesions and periodontal disease was determined by index of alveolar bone loss. They found a correlation between periodontal disease and caries in the four foods used, Mazarine cake having the highest score for both periodontal disease and caries, followed by soft rye bread, Danish pastry, and hard rye bread respectively. The lowest caries and periodontal disease rates were obtained with the hardest diet. *Departemnt of Operative Dentistry and Department of Oral Surgery, University of Umeå, Umeå, Sweden.*

The Periodontal Structures in Diabetic Mice

Stahl, S. S.
J. Oral Med. 23:15-17, January, 1968

Histological analysis was made of the periodontal structures of 22 mice suffering from mutation diabetes, and seven control mice of the same strain. Mesio-distally and labio-lingually orientated sections were prepared from different jaw sections. No significant periodontal disease was observed: there was little evidence of inflammation in the gingival connective tissue and the transseptal fibers as well as the fibers of the principal periodontal membrane appeared well orientated. Slight evidence of osteoporosis in the alveolar housing of some animals was not a consistent finding. A comparison between the histologic appearance of the periodontal structure in the experimental group and the controls indicated no significant variations. *Murry and Leonie Guggenheim Foundation Institute for Dental Research, New York University College of Dentistry, New York, New York.*