Patient Preference for Ultrasonic or Hand Instruments in Periodontal Maintenance

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The purpose of this study was to determine if patients prefer ultrasonic or hand instruments for periodontal maintenance. A questionnaire of 13 items was answered by 469 patients in three periodontal offices. The results showed a strong preference (74%) for ultrasonic instruments. The possibility of increased compliance because of this preference is discussed. (Int J Periodontics Restorative Dent 2003;23:567–573.)

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Periodontal literature shows strong evidence of the critical role periodontal maintenance provides following active periodontal therapy.[1,2] Nyman et al[3] found the recurrence of pockets in treated but noncompliant patients. Others[4] found an increase in bone loss resulting in greater tooth loss in their noncompliant group. Wilson et al[5] reported that fewer teeth were lost when patients were compliant. Over a 10-year period, similar findings of increased probing depths and greater tooth loss in patients who failed to comply with periodontal maintenance were observed.[6] A study of nonsurgical therapy found that as compliance decreased, the number and depth of pockets ⩾ 5 mm increased, resulting in greater tooth loss.[7]

Compliance with periodontal maintenance continues to be a challenge for the periodontal office. Clinical studies have shown compliance levels ranging from 16% to 40%.[8–10] These studies found the highest level of compliance in the surgically treated patients. Novaes and Novaes[11] found the highest rate of noncompliance (80%) to be in

young males who had received nonsurgical therapy. In both the medical and dental fields, when a patient has a chronic disease and does not consider it life threatening, he or she will generally comply one-third of the time.[12] That author was able to increase compliance from 16% in 1984 to 32% in 1991 by making various changes in office procedures.[12]

Prior to the 1980s, ultrasonic scalers' tip design limited their use to removal of supragingival calculus, plaque, and stain. A technique described the use of modified tips in a manually adjustable ultrasonic unit that facilitated a more thorough periodontal debridement of all subgingival root surfaces.[13] Studies have shown that these modified tips reach closer to the bottom of a periodontal pocket than do hand instruments, cause less root damage, and are less fatiguing to the operator.[14–17] Cavitational activity occurs as water touches the vibrating ultrasonic tip. This phenomenon may dislodge plaque and other surface irritants at and slightly beyond the reach of the instrument tip.[18]

The 1996 World Workshop in Periodontics[19] concluded that,

> Due to demands of skill, time, and endurance (both clinician and patient), a technique for scaling and root planing that is instrument driven, requiring less skill, but facilitating a highly efficient removal of plaque and calculus, would appear to be desirable for the average clinical practice. Further, given a choice, it would seem prudent for the clinician to choose an instrument which would minimize damage to the root surface while achieving the desired end-point.

The American Academy of Periodontology[20] states,

> Since the attitudes toward specific mechanical therapy techniques may influence patient compliance with prescribed treatment regimens, patient acceptance of power-driven scalers versus hand instruments is important. Surprisingly, with regard to comfort, very little data exists comparing different types of instrumentation.

This study was undertaken to determine a possible preference for hand instruments or ultrasonic instruments in periodontal maintenance.

Method and materials

An informed consent form was signed by each patient. A total of 469 patients with an age range of 24 to 86 years each answered a questionnaire. This questionnaire was created so that a meaningful statistical analysis could be completed. Each patient completed the questionnaire anonymously in the office and then placed it in a specifically marked box.

To assess patient preference to ultrasonic scaling using specialized tips and technique, a survey was given to patients in three periodontal practices. Each patient had received both hand scaling and ultrasonic scaling. Two of the three practices used the manually adjustable ultrasonic unit with modified tips for ultrasonic scaling 100% of the time, unless contraindicated. The third practice used this method for 85% of each periodontal maintenance appointment (ie, hand instruments were used for 15% of the appointment, and the remaining 85% was performed with ultrasonic tips).

Questionnaires were answered by 150 patients in two of the practices and by 169 patients in the third practice. The overall mean age of those surveyed was 59.4 years (standard deviation 10.4, median 60, range 24 to 86 years). Patients from one practice were significantly older than patients from the second and third practices. The mean age of patients surveyed was 62.7 years for the first practice, 58.6 years for the second practice, and 56.9 years for the third practice. Sixty percent of those surveyed were female. The gender distributions for the three practices were not significantly different.

Results

Patients had a strong preference (74%) for ultrasonic scaling when compared to hand scaling (item 13; Table 1). Particular preference for the ultrasonic scaling was registered for effective buildup removal (item 1), less irritating sound (item 6), clean feeling (item 7), less overall pain (item 10), more overall efficiency (item 11), and less mess (item 12).

Frequencies for overall questionnaire responses are given in Table 1. Chi-square tests of independence were conducted to

Table 1 Response to questionnaire (%): Overall frequency and frequency by office

Questionnaire item	Frequency*	Office 1	Office 2	Office 3
1. For removing buildup from my teeth, I find that:				
Hand scaling is much more effective	2.4 (11/457)	2.0 (3/149)	0.6 (1/166)	4.9 (7/142)
Hand scaling is somewhat more effective	2.2 (10/457)	0.7 (1/149)	0.0 (0/166)	6.3 (9/142)
Hand and ultrasonic scaling are equally effective	24.7 (113/457)	16.1 (24/149)	4.8 (8/166)	57.0 (81/142)
Ultrasonic scaling is somewhat more effective	15.3 (70/457)	23.5 (35/149)	10.2 (17/166)	12.7 (18/142)
Ultrasonic scaling is much more effective	55.4 (253/457)	57.7 (86/149)	84.3 (140/166)	19.0 (27/142)
2. When comparing the two methods of cleaning, I find that:				
Ultrasonic scaling takes much longer	0.7 (3/461)	0.7 (1/150)	1.2 (2/166)	0.0 (0/145)
Ultrasonic scaling takes somewhat longer	7.6 (35/461)	8.0 (12/150)	12.0 (20/166)	2.1 (3/145)
Ultrasonic and hand scaling take the same time	46.9 (216/461)	43.3 (65/150)	49.4 (82/166)	47.6 (69/145)
Hand scaling takes somewhat longer	29.1 (134/461)	33.3 (50/150)	16.3 (27/166)	39.3 (57/145)
Hand scaling takes much longer	15.8 (73/461)	14.7 (22/150)	21.1 (35/166)	11.0 (16/145)
3. Following the cleaning of my teeth, I find that:				
Hand scaling makes my gums much more sore	27.4 (121/441)	28.3 (41/145)	38.3 (62/162)	13.4 (18/134)
Hand scaling makes my gums somewhat more sore	34.7 (153/441)	33.8 (49/145)	36.4 (59/162)	33.6 (45/134)
Hand and ultrasonic scaling make my gums equally sore	30.4 (134/441)	30.3 (44/145)	21.0 (34/162)	41.8 (56/134)
Ultrasonic scaling makes my gums somewhat more sore	6.6 (29/441)	6.9 (10/145)	3.7 (6/162)	9.7 (13/134)
Ultrasonic scaling makes my gums much more sore	0.9 (4/441)	0.7 (1/145)	0.6 (1/162)	1.5 (2/134)
4. When comparing the two methods of cleaning, I find that:				
Ultrasonic scaling makes my gums bleed much more	0.7 (3/423)	0.7 (1/139)	0.0 (3/158)	1.6 (2/126)
Ultrasonic scaling makes my gums bleed somewhat more	3.5 (15/423)	1.4 (2/139)	3.8 (6/158)	5.6 (7/126)
Ultrasonic and hand scaling make my gums bleed the same	37.4 (158/423)	34.5 (48/139)	29.1 (46/158)	50.8 (64/126)
Hand scaling makes my gums bleed somewhat more	39.2 (166/423)	44.6 (62/139)	37.3 (59/158)	35.7 (45/126)
Hand scaling makes my gums bleed much more	19.1 (81/423)	18.7 (26/139)	29.7 (47/158)	6.3 (8/126)
5. When comparing the two methods of cleaning, I find that:				
Hand scaling makes me gag much more	9.0 (36/402)	7.6 (10/132)	14.6 (22/151)	3.4 (4/119)
Hand scaling makes me gag somewhat more	19.9 (80/402)	24.2 (32/132)	27.2 (41/151)	5.9 (7/119)
Hand and ultrasonic scaling make me gag the same	60.9 (245/402)	62.1 (82/132)	50.3 (76/151)	73.1 (87/119)
Ultrasonic scaling makes me gag somewhat more	9.7 (39/402)	6.1 (8/132)	7.3 (11/151)	16.8 (20/119)
Ultrasonic scaling makes me gag much more	0.5 (2/402)	0.0 (0/132)	0.7 (1/151)	0.8 (1/119)
6. When comparing the two methods of cleaning, I find that:				
Sound from ultrasonic scaling is much more irritating	3.9 (18/461)	4.0 (6/150)	0.0 (0/166)	8.3 (12/145)
Sound from ultrasonic scaling is somewhat more irritating	9.3 (43/461)	4.0 (6/150)	7.8 (13/166)	16.6 (24/145)
Sound from both methods is equally irritating	59.2 (273/461)	62.0 (93/150)	48.8 (81/166)	68.3 (99/145)
Sound from hand scaling is somewhat more irritating	13.9 (64/461)	16.7 (25/150)	20.5 (34/166)	3.4 (5/145)
Sound from hand scaling is much more irritating	13.7 (63/461)	13.3 (20/150)	22.9 (38/166)	3.4 (5/145)
7. When comparing the two methods of cleaning, I find that:				
Hand scaling makes my teeth feel much cleaner	2.8 (13/460)	2.0 (3/149)	1.8 (3/169)	4.9 (7/142)
Hand scaling makes my teeth feel somewhat cleaner	4.8 (22/460)	4.7 (7/149)	1.8 (3/169)	8.5 (12/142)
The two methods make my teeth feel equally clean	28.9 (133/460)	29.5 (44/149)	10.1 (17/169)	50.7 (72/142)
Ultrasonic scaling makes my teeth feel somewhat cleaner	18.5 (85/460)	19.5 (29/149)	14.8 (25/169)	21.8 (31/142)
Ultrasonic scaling makes my teeth feel much cleaner	45.0 (207/460)	44.3 (66/149)	71.6 (121/169)	14.1 (20/142)
8. When comparing the two methods of cleaning, I find that:				
My teeth are much more sensitive to ultrasonic scaling	5.7 (26/454)	3.4 (5/146)	1.2 (2/166)	13.4 (19/142)
My teeth are somewhat more sensitive to ultrasonic scaling	13.7 (62/454)	13.7 (20/146)	12.7 (21/166)	14.8 (21/142)
My teeth are equally sensitive to both methods	39.0 (177/454)	35.6 (52/146)	34.9 (58/166)	47.2 (67/142)
My teeth are somewhat more sensitive to hand scaling	19.6 (89/454)	21.2 (31/146)	19.3 (32/166)	18.3 (26/142)
My teeth are much more sensitive to hand scaling	22.0 (100/454)	26.0 (38/146)	31.9 (53/166)	6.3 (9/142)

*$P < .001$.

Continued

Table 1 Response to questionnaire (%): Overall frequency and frequency by office (continued)

Questionnaire item	Frequency*	Office 1	Office 2	Office 3
9. When comparing the two methods of cleaning, I find that:				
Hand scaling puts much more pressure on my teeth	33.7 (153/454)	35.4 (52/147)	48.5 (81/167)	14.3 (20/140)
Hand scaling puts somewhat more pressure on my teeth	36.8 (167/454)	36.7 (54/147)	31.1 (52/167)	43.6 (61/140)
Both methods put equal pressure on my teeth	23.8 (108/454)	21.8 (32/147)	18.0 (30/167)	32.9 (46/140)
Ultrasonic scaling puts somewhat more pressure on my teeth	5.3 (24/454)	5.4 (8/147)	2.4 (4/167)	8.6 (12/140)
Ultrasonic scaling puts much more pressure on my teeth	0.4 (2/454)	0.7 (1/147)	0.0 (0/167)	0.7 (1/140)
10. Overall, I find:				
Ultrasonic scaling is more painful than hand scaling	6.8 (30/440)	3.4 (5/146)	4.4 (7/160)	13.4 (18/134)
Both methods are equally painful	35.0 (154/440)	30.8 (45/146)	26.3 (42/160)	50.0 (67/134)
Hand scaling is more painful than ultrasonic scaling	58.2 (256/440)	65.8 (96/146)	69.4 (111/160)	36.6 (49/134)
11. Overall, I find:				
Hand scaling is more efficient than ultrasonic scaling	2.2 (10/454)	1.4 (2/146)	1.2 (2/169)	4.3 (6/139)
Both methods are equally efficient	26.0 (118/454)	19.2 (28/146)	9.5 (16/169)	53.2 (74/139)
Ultrasonic scaling is more efficient than hand scaling	71.8 (326/454)	79.5 (116/146)	89.3 (151/169)	42.4 (59/139)
12. Overall, I find:				
Ultrasonic scaling is messier than hand scaling	20.4 (90/442)	12.3 (18/146)	8.8 (14/160)	42.6 (58/136)
Both methods are equally messy	39.8 (176/442)	42.5 (62/146)	33.8 (54/160)	44.1 (60/136)
Hand scaling is messier than ultrasonic scaling	39.8 (176/442)	45.2 (66/146)	57.5 (92/160)	13.2 (18/136)
13. Overall, I prefer:				
Hand scaling	4.1 (19/466)	2.0 (3/150)	0.6 (1/169)	10.2 (15/147)
Ultrasonic scaling	74.0 (345/466)	86.7 (130/150)	94.7 (160/169)	37.4 (55/147)
No preference	21.9 (102/466)	11.3 (17/150)	4.7 (8/169)	52.4 (77/147)

*$P < .001$.

compare patient preference for ultrasonic scaling to patient preference for hand scaling. Chi-square testing was conducted first on the five- and three-point scales obtained from the questionnaires. This testing was repeated for dichotomized responses where those respondents expressing a preference were dichotomized into a hand-scaling preference or an ultrasonic-scaling preference for all items on the questionnaire (Fig 1). Overall, respondents found ultrasonic scaling to be significantly better in all respects compared to hand scaling. Efficient removal of buildup (item 1), less pain (item 10), and greater overall efficiency (item 11) were the characteristics where respondents overwhelmingly stated a preference for ultrasonic scaling.

A multiple logistic regression model was used to determine which factors were most closely associated with overall preference of ultrasonic scaling. Each item was dichotomized into ultrasonic preference versus no ultrasonic preference. The final model, which was based on stepwise model selection, is given in Table 2. Preference for ultrasonic scaling for effective buildup removal (item 1), less irritating sound (item 6), clean feeling (item 7), less overall pain (item 10), more overall efficiency (item 11), and less mess (item 12) were all associated with an overall preference for ultrasonic scaling over hand scaling.

Frequencies were also compiled by office (Table 1). Chi-square tests of independence were conducted to test for differences by office and for differences by method. In the two offices using the manually adjustable ultrasonic units with modified tips for 100% of each periodontal maintenance appointment, respondents indicated a stronger preference for ultrasonic scaling. Respondents from the third office showed less of a preference

for ultrasonic scaling overall, as well as less preference for ultrasonic scaling for effective buildup removal, less gagging, less irritating sound, clean feeling, less sensitivity, and overall efficiency. The third practice did not have the overwhelming preference for ultrasonic scaling found in the first and second practices. Nevertheless, the overall strong preference is shown in Fig 2.

Discussion

The results of this questionnaire indicated that patients preferred ultrasonic scaling with a manually adjustable unit using specialized tips to hand scaling. There was a stronger preference for ultrasonic scaling among patients in practices using this method without any supplementary use of hand instruments.

A randomized control study could further validate the overall patient preference to this ultrasonic technique. There was also an inherent nonresponse bias to this survey. Patients who may have objected to the use of ultrasonic scaling may have left the practice previously so that their opinions are not included. In spite of this possible nonresponse bias, the sample size, as well as the number of practices included, provide compelling evidence that this ultrasonic technique may represent a method of scaling that patients prefer.

Fear of pain is a major reason for noncompliance in dentistry.[21] Compliance may increase in patients having their periodontal maintenance

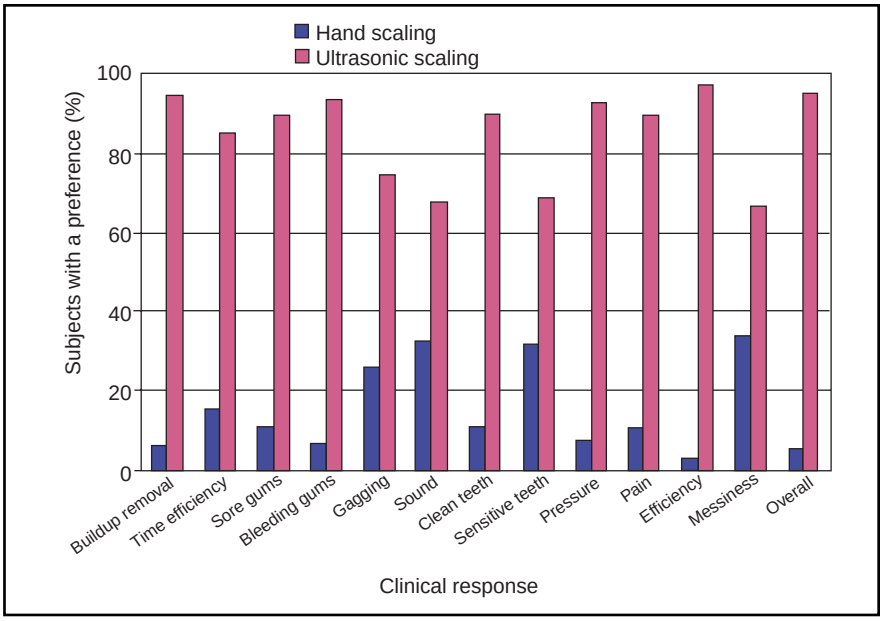

Fig 1 *Respondents expressing a preference are dichotomized into a hand-scaling or ultrasonic-scaling preference for all items on the questionnaire.*

Table 2 Multiple logistic regression factors associated with overall preference for ultrasonic scaling

Factor (item No.)	Odds ratio	95% confidence interval	P value
Effective buildup removal (1)			
No preference, or hand scaling preference	1.00		
Ultrasonic scaling preference	7.36	3.10, 17.4	< .001
Less irritating sound (6)			
No preference, or hand scaling preference	1.00		
Ultrasonic scaling preference	4.77	1.04, 22.0	.045
Feels clean (7)			
No preference, or hand scaling preference	1.00		
Ultrasonic scaling preference	5.82	2.30, 14.7	< .001
Less pain (10)			
No preference, or hand scaling preference	1.00		
Ultrasonic scaling preference	3.27	1.33, 8.03	.010
More efficient (11)			
No preference, or hand scaling preference	1.00		
Ultrasonic scaling preference	5.75	2.37, 13.9	< .001
Less mess (12)			
No preference, or hand scaling preference	1.00		
Ultrasonic scaling preference	4.51	1.31, 15.5	.017

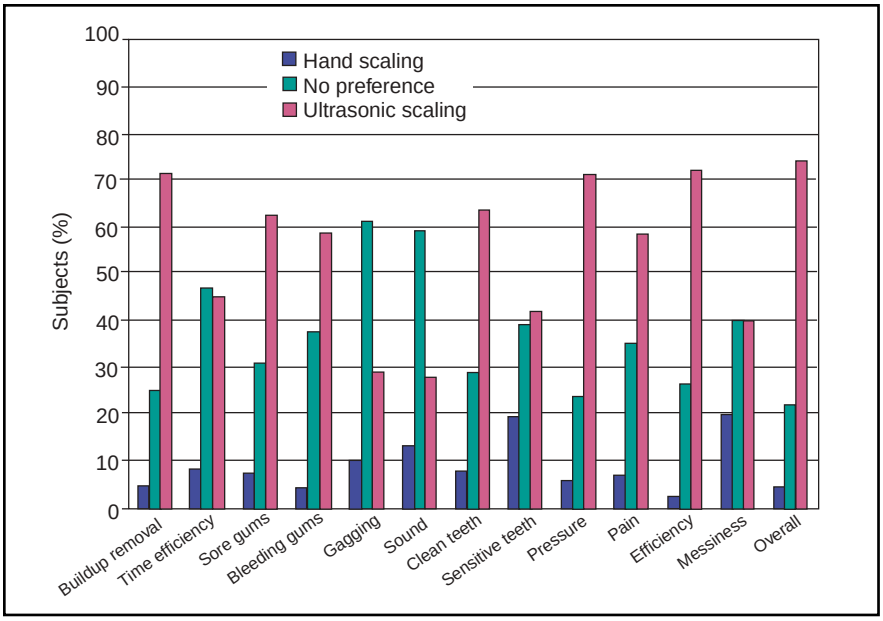

Fig 2 *Overall, respondents expressed a strong preference for ultrasonic scaling.*

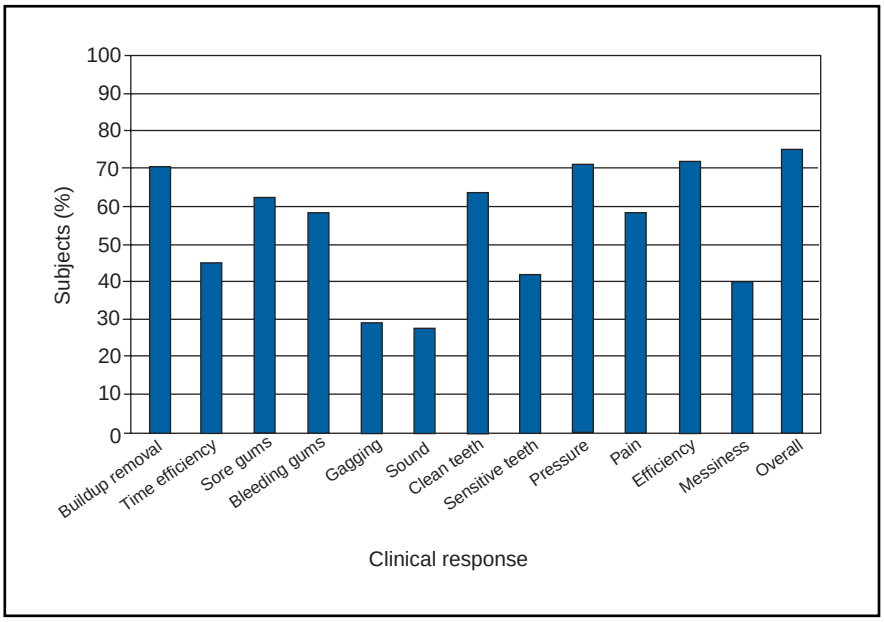

Fig 3 *Ultrasonic preference for all respondents.*

performed with this type of ultrasonic technique, since the majority of respondents reported it to be less painful. Patients also felt that this technique was less messy. One reason for this could be that there is no evidence of blood on gauzes (no gauze used to wipe the ultrasonic tips) or upon rinsing out.

Three periodontal offices using a specifically designed questionnaire sought to determine patient preference to hand instruments or ultrasonic scaling using a manually adjustable unit with modified tips for periodontal maintenance. There was a strong preference for ultrasonic scaling (Fig 3). Patients felt that this technique created a less irritating sound and a cleaner feeling, and was less painful overall, more efficient, and less messy. This strong preference for ultrasonics may have a significant influence on patient compliance with periodontal maintenance procedures.

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