

**257** Ultrasonic Instrumentation and Marginal Integrity of Resin Composite Restorations J SKELTON, T. MCCONNELL, R. MITCHELL, R. SCHUMACHER\*, S McEVOY (University of Kentucky, Lexington, KY, USA)

Ultrasonic debridement devices with modified thin tips are increasingly being used for routine deplaqueing as well as root debridement. The purpose of this study was to evaluate the effect of modified thin-tip ultrasonic devices on class V resin composite restorations. Eight extracted anterior teeth were prepared and restored by the same operator. Class V oval-shaped preparations 1-1.5 mm deep extending from line angle to line angle with the gingival margin in cementum were prepared using a 330 carbide bur. All margins were bonded using a dentin-bonding system (Optibond FL, Kerr). Restored teeth were stored in water for 48 hours at room temperature then thermocycled between 5 and 55 °C with a 30 second dwell time for 1000 cycles. Epoxy resin replicas of the restorations were prepared and a series of SEM photographs were made along the gingival margin. The percentage of open gingival margin was measured. A single operator then debrided the gingival margin of each tooth using a universal thin tip with external water flow mounted in an ultrasonic deborder (Cavitron SPS, Dentsply) set at the lowest power setting. Thirty overlapping strokes were applied to the margin during an 8-10 second period. Each tooth was again replicated and examined using the SEM. The percent open margin was remeasured.

Tooth	1	2	3	4	5	6	7	8
% open pre tx	38.0	36.3	0	58.3	0	0	37.6	0
% open post tx	39.4	36.8	0	57.3	0	0	37.6	0

There was no significant difference (paired t-test, p=0.05) in the percent open pre- and post-debridement margins. Ultrasonic debridement of class V resin composite restorations did not adversely affect the marginal integrity.

**258** Influence of smoking on response to non-surgical therapy in chronic periodontitis PM PRESHAW<sup>1</sup>, F STACEY<sup>2</sup> & PA HEASMAN<sup>2</sup> (1Ohio State University, Columbus, USA, 2University of Newcastle upon Tyne, UK)

The periodontal status of 41 medically healthy adults suffering from untreated moderate-severe chronic periodontitis was monitored for 6 months prior to and following scaling and root planing (SRP). Subjects were categorised as non-smokers (n = 12), ex-smokers (stopped smoking at least 1 year before study commencement, n = 14) and current smokers (smoking an average of 16 cigarettes per day, n = 15). Full mouth measurements included plaque indices (PI), probing depths (PD) and % bleeding on probing (BOP). 8 periodontal test sites were identified per subject, exhibiting BOP, radiographic bone loss, clinical attachment loss and 5-8 mm PD. Test site measurements included % BOP, PD and relative probing attachment levels (PAL). Measurements were recorded at months 0, 6 (immediately prior to SRP), and 13. Full mouth PI and % BOP, and test site % BOP and PAL did not differ significantly at any time point in the study between groups (ANOVA, p > 0.05). Full mouth PD were significantly greater at all time points in current smokers than in non- and ex-smokers (ANOVA, p < 0.001) (means at month 0 non-smokers = 3.72 mm, ex-smokers = 3.85 mm, current smokers = 4.55 mm). All groups demonstrated significant reductions in full mouth PD from month 6 to 13 (p < 0.01) (mean reductions non-smokers = 0.58 mm, ex-smokers = 0.83 mm, current smokers = 0.79 mm). At test sites, PD did not differ significantly between groups at month 0 (ANOVA, p > 0.05) (means non-smokers = 5.69 mm, ex-smokers = 5.72 mm, current smokers = 5.77 mm). At month 6, smokers had deeper PD (5.92 mm) than non- and ex-smokers (means = 5.30 mm) (p < 0.05). Statistically and clinically significant reductions in test site PD were observed in all groups after SRP (p < 0.05) (mean reductions non-smokers = 1.16 mm, ex-smokers = 1.62 mm, current smokers = 1.28 mm). Thus, PD were significantly greater in current smokers than in non- and ex-smokers, and were reduced significantly and comparably in all three groups as a result of treatment.

**259** Clinical Evaluation of Nd:YAG Laser Curettage on Periodontitis and Periodontal Pathogens H GREENWELL\*, D HARRIS, K PICKMAN, J BURKART, F PARKINS and T MYERS (University of Louisville, Louisville, Kentucky, USA)

The purpose of this study was to compare the effect scaling and root planing (SRP) alone to laser curettage (LAS) plus SRP, or no treatment (CON) on the clinical and microbial parameters of periodontitis. 12 patients with adult periodontitis and one or more probing depths of 4 mm in each quadrant that exhibited gingival bleeding were selected for this 3 month study. Three quadrants received one of the following treatments: 1) CON, 2) SRP, 3) LAS. The fourth quadrant received either SRP or LAS by random assignment. LAS was with a Nd:YAG laser and 320 µm fiber at 80 mJ, 20 Hz, and 2.0 watts for times varying from 1 to 3 minutes per tooth depending on probing depth. Probing depth, plaque index and bleeding index were evaluated at baseline, 1 week, 1 month and 3 months. Porphyromonas gingivalis (Pg) and Prevotella intermedia (Pi) levels were evaluated with DNA probes. Data were analyzed using ANOVA for a nested design, Tukey's pairwise HSD comparisons, and Mantel-Haenszel summary chi-square test. At baseline sites with 4 mm or greater probing depths had mean depths of 5.3 for LAS and SRP and 5.1 for CON. At 3 months mean probing depth reduction was 1.2 for LAS and SRP vs 0.5 for CON. Improvement for LAS and SRP sites was significantly better than CON (p < 0.05) with no differences between LAS and SRP sites (p > 0.05). Sites with gingival bleeding showed a reduction of 93% for LAS and SRP sites vs 52% for CON sites. The reduction for LAS and SRP sites was significantly better than CON (p < 0.05) with no differences between LAS and SRP sites (p > 0.05). For Pg baseline geometric mean counts (X 1000) were 39 for LAS, 41 for SRP and 27 for CON. At 3 months counts were reduced by 98% for LAS, 99% for SRP and 80% for CON. Reductions for LAS and SRP sites were significantly better than CON (p < 0.05) with no differences (p > 0.05) between LAS and SRP sites. For Pi baseline geometric mean counts (X 1000) were 31 for LAS, 25 for SRP and 14 for CON. At 3 months counts were reduced by 88% for LAS, 87% for SRP and 45% for CON. Reductions for LAS and SRP sites were significantly better than CON (p < 0.05) with no differences (p > 0.05) between LAS and SRP sites. Laser curettage plus SRP was as effective as SRP alone in treating early pocketing in adult periodontitis as indicated by probing depth reduction (1.2 mm) and gingival bleeding reduction (93%). Bacterial reduction was effective for LAS and SRP for both P. gingivalis and P. intermedia. This study was supported by American Dental Technologies, Inc.

**260** Efficacy of orthodontic treatment on periodontal splinting: A four year report. L.M VAN ZEGHBOECK\*, A ASHAYERI (Dental school, Univ Gent & Univ Leuven, Belgium)

Periodontal loss can lead towards tooth mobility and migration. The purpose of this study was to determine whether orthodontic alignment of the lower anterior teeth, prior to splinting, affects the survival of a bondable reinforcement ribbon Ribbond®. In 20 patients who were treated for severe periodontal loss, 120 lower anterior teeth were splinted from lower right to lower left canine using Ribbond® (Ribbond Inc.) and the composite resin Herculite® (Kerr). The mean pretreatment age was 60 years (53-83 years) and the average observation time was 36.3 months. Ten patients received orthodontic treatment prior to splinting (group I). Both, crowding and/or migration of the lower anterior teeth was equally present in both groups. Every six months a clinical evaluation was recorded and the results of periodontal health, decay prevalence and condition of the splint was recorded. After four years 19 subjects remained. 10 patients in group I (53%) and 9 patients in group II. Paired t-tests were used to identify statistically significant differences at P=0.005. Kaplan-Meier was used to determine failures. A primary failure was noted when a full crack between two teeth, loss of bonding or loss of periodontal support was observed. The results of the study revealed that no decay was found on the splinted teeth in both groups. A significant difference was found in gingival bleeding on probing and pocket depth (PD) between both groups after four years (group I PD 2.16±0.24 vs 3.02±0.37 group II 2.18±0.30 vs 2.31±0.19). Survival of the bonding material was found in 73.69% of the patients but was significantly higher in group II (88.89%) than group I (60.00%). There was a survival rate of 100% of functioning restorations. In this investigation it might be concluded that orthodontic treatment prior to splinting can be considered as a positive factor on the survival rate of both restoration and remaining teeth.

**261** Prevention of Periodontal Pockets on Mandibular Second Molars after Third Molar Removal. K.W. Kan\*, J.K.S. Liu, W.K. Leung, E.C.M. Lo & E.F. Corbet (Faculty of Dentistry, The University of Hong Kong)

This randomized controlled clinical trial aimed to investigate the effects of periodontal interventions on periodontally diseased mandibular second molars along with surgical impacted mandibular third molar removal. 30 subjects (50% male, mean age 32.1±7.8) with mesio-angular impacted mandibular third molars, crestal radiolucency between the third and second molars and probing pocket depth (PPD) ≥5mm at distal aspect of the mandibular second molar were recruited. A course of pre-extraction oral hygiene instruction, scaling and canes stabilization was delivered before assignment of subjects into Test and Control Groups by tossing a coin. Control Group subjects (16) received the standard surgical protocol of conventional impacted mandibular third molar extraction. Test Group subjects (14) received the same surgical protocol, followed by root surface debridement of the second molar, using ultrasonic scaler, and a 3 visit plaque control programme scheduled 6 weeks apart. At 6-months post-extraction examination, statistically significantly better periodontal healing was found at the distal aspect of the mandibular second molars of the subjects in the Test Group (mean maximum PPD=3.3±1.3mm mean average PPD=2.5±0.9mm mean maximum recession=2.9±1.1mm mean average recession=2.4±1.0mm, average %BOP=31 and average %SOP=0) than in the Control Group (mean maximum PPD=5.6±1.1mm, mean average PPD=3.8±0.9mm mean maximum recession=1.9±1.1mm, mean average recession=1.5±0.7mm, average %BOP=67 and average %SOP=8). The periodontal interventions investigated prevented periodontal pockets on the second molars over a six-month post-extraction period.

**262** Captek Alloy Reduces Dental Plaque Accumulation M. Goodson\*, I. Shohret, S. Imbert and S. Som (Forsyth Dental Center, Boston; Tel Aviv U. Sch. of Dent. Med., Tel Aviv)

Captek is a dental gold composite alloy process used to produce copings for ceramometal restorations. The process involves creation of a sintered platinum-gold framework on which a layer of 23K gold is fused. Clinicians have observed that tooth surfaces restored with Captek appeared relatively plaque free and were associated with more healthy periodontal tissues. To investigate these reports, the *in vivo* bacterial composition of subgingival sites with normal tooth structure was compared with similar sites restored with Captek alloy. Subgingival scaler samples were taken from 93 normal tooth sites and 73 sites restored by Captek (8 subjects). Bacterial samples were analyzed for 41 species using DNA probes (Socransky et al. BioTechniques 1994) and quantitatively evaluated by fluorescence emission (Attophos) on a phosphatase label. A subset of 4 subjects were sampled twice, each time by different operators, one 6 months after the other. The average mean bacterial count (Log<sub>10</sub> ± SEM) was:

Operator	Captek		Tooth		p
	1	2	1	2	
Operator 1	5.86 ± 0.12	6.83 ± 0.11	0.003		
Operator 2	6.38 ± 0.16	6.94 ± 0.09	0.03		

The correlation coefficient between operators was 0.43 (p=0.003), indicating reasonable reproducibility. The sites restored by Captek have approximately 1/10 the bacteria of normal tooth structure. Analysis of the larger data set indicated that the presence of the "red complex" periodontal pathogens (*P. gingivalis*, *B. forsythia* or *T. denticola*) was significantly less at sites restored by Captek. The largest numerical group difference in samples was associated with lowered numbers of streptococci at sites restored by Captek. These results indicate that sites restored by Captek alloy harbor lower numbers of bacteria than natural tooth sites, particularly streptococci and periodontal pathogens. Supported in part by Grant # DE11814 from the NIDR and a Grant from Precious Chemicals USA.

**263** Drinking Water Fluoride and Bone Fractures. Y. LI\*, C. LIANG, C. SLEMENDA, R. JI, S. GAO, B. KATZ, C. EMSLEY, M. LIAO, S. NIU and C. JOHNSTON (Loma Linda Univ., CA, Indiana Univ., IN, USA & IEHE, Beijing, PRC)

Reported findings on the risk of bone fractures associated with long-term fluoride (F) exposure from drinking water have been contradictory. The purpose of this study was to determine the prevalence of all bone fractures in Chinese populations of various F concentrations in drinking water. Healthy male and female subjects ≥50 years of age with continuous residence in the study communities were selected. In addition to the F exposure and prevalence of bone fractures, data collected included demographics, medical history, physical activity, cigarette smoking and alcohol consumption, and joint pain and stiffness. The results confirmed that drinking water was the only major source of F exposure in the study populations. There was an increased joint pain and stiffness in populations with excessive F in water. The prevalence of bone fractures is as follows:

Water F (ppm)	N (Surveyed)	N (Fracture)	Prevalence (%)	Odds Ratio	p-Value
0.25 - 0.34	1,363	101	7.41	1.72	0.0012
0.58 - 0.73	1,410	90	6.38	1.46	0.0261
1.02 - 1.06	1,368	61	4.46	---	---
1.45 - 2.19	1,574	86	5.46	1.24	0.2129
2.62 - 4.00	1,110	67	6.04	1.38	0.0788
4.32 - 7.02	1,407	102	7.25	1.68	0.0020

X-ray confirmed >90% of the self-reported fractures. Using the group of 1.02-1.06 ppm F as the reference, the data analyses showed that its prevalence of bone fractures was significantly lower (p<0.05) than that of the groups exposed to water F levels higher than 4.32 and lower than 0.73 ppm F. The significance of the difference between the groups of 1.02-1.06 and 2.62 - 4.00 ppm F was marginal. It is concluded that long-term F exposure from drinking water around 1 ppm F reduces the risk of bone fractures. This study was supported by NIH/NIAMS Grant AR-42838.

**264** Determination of fluoride intake from urinary fluoride excretion data C. E. KETLEY\* and M. A. LENNON (The University of Liverpool, Department of Clinical Dental Sciences, School of Dentistry, LIVERPOOL L69 3BX, UK)

The aim of this study was to determine total fluoride intake from all sources in children participating in a local school milk fluoridation scheme using urinary fluoride excretion data. Baseline 24 hour urinary fluoride excretion in response to normal daily fluoride intake (including fluoride from ingested toothpaste, diet and fluoridated milk containing 0.5 mg fluoride) was determined in each of nine 5-year old children. Each child was then put on a standard but variable fluoride regime for the 4 day study period. The children, on a low fluoride diet and using non-fluoride toothpaste, were given daily doses of fluoride increasing from 0.5 mg on day 1 to 2.0 mg on day 4. Pooled 24 hour urine samples were collected from each child on each day and analysed for fluoride content in order to determine the fluoride excretion in response to each of the standard doses. The mean daily fluoride excretion rose from 0.23±0.05 mg in response to the standard dose of 0.5 mg to 0.53±0.09 mg in response to the standard dose of 2.00 mg. Urinary fluoride excretion was then plotted against intake for the study period from which it was possible to determine total fluoride intake from all sources under normal conditions using the baseline urinary fluoride excretion data. The mean baseline urinary fluoride excretion under normal conditions was 0.26±0.06 mg and this was found to represent a mean daily total fluoride intake from all sources of 0.72 mg. It is therefore concluded that the total daily fluoride intake from all sources in this group of children is appropriate. This work was supported by the Borrow Dental Milk Foundation.