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COMPENDIUM

OF

DENTAL RESIDENTS' RESEARCH PROJECTS
AND LITERATURE REVIEWS

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Samuel P. Davis, Lieutenant Colonel, USAF, DC

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USAF Dental Investigation Service
Armstrong Laboratory
Human Systems Division (AFSC)
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NOTICES

This interim special report was submitted by personnel of the Dental Investigation Service, Clinical Sciences Division, Armstrong Laboratory, Human Systems Division, AFSC, Brooks Air Force Base, Texas, under job order NGDP-PC-CO.

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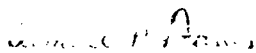
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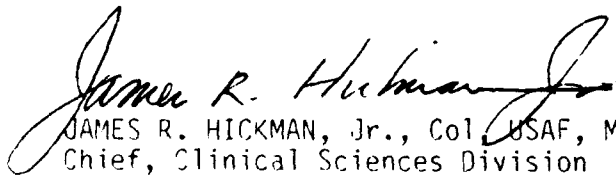
The voluntary, fully informed consent of the subjects used in this research was obtained as required by AFR 169-6.

The Office of Public Affairs has reviewed this report, and it is releasable to the National Technical Information Service, where it will be available to the general public, including foreign nationals.

This report has been reviewed and is approved for publication.


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PREFACE

ABOUT THE COMPENDIUM

The Compendium of Dental Residents' Research Projects was recommended to the USAF Dental Education Committee in 1986 as a way to preserve the research efforts of U.S. Air Force dental residents.

This collection of abstracts provides a synopsis of research projects completed by graduates of United States Air Force residency programs. The projects were undertaken in partial fulfillment of the requirements of the training programs.

The opinions and assertions contained in the abstracts are those of the writers and are not to be construed as official, or as reflecting the views of the Department of the Air Force.

USING THE COMPENDIUM

The Table of Contents contains a numbering system to aid the reader in finding titles arranged according to discipline and year of presentation. The first two digits represent the year the thesis was written. The second two digits represent the 98XX specialty discipline:

- 9826 - General dentistry
- 9836 - Oral and maxillofacial surgery
- 9846 - Periodontics
- 9856 - Prosthodontics
- 9866 - Orthodontics
- 9876 - Oral pathology
- 9886 - Endodontics
- 9896 - Pedodontics

The last two digits are for our accounting.

The Table of Contents lists the title of the thesis followed by the name of the primary author and the page number where an abstract of the thesis may be found. The names of secondary authors are listed with the abstracts.

We are providing a bibliography of Previous Titles. This section lists the titles according to the general category of their content. Within a category you'll find the titles listed alphabetically by author. If an abstract was provided in a previous edition of the Compendium, it will be in parentheses, as will be the year of publication.

Copies of theses are on file and can be obtained by calling or writing:

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Copies of General Practice Residency (GPR) literature reviews are not kept on file, but their titles are listed here. Direct any inquiries concerning the authors of literature reviews to the address above.

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90-26-01

TRIANGULAR FILE DESIGNS, GROUND AND TWISTED: A COMPARATIVE
STUDY IN TORSION AND STIFFNESS

S. A. Schmidt, Lt Col, USAF, DC

This study examined three brands of endodontic triangular files: the Brasseler K-file, the Brasseler Canal Master file, and the Caulk/Dentsply Flexofile. Resistance to torque at predetermined angular deflections and stiffness was measured against American National Standards Institute/American Dental Association Specification No. 28. Mean torque values for Caulk files Sizes 30 and 35, and the Brasseler Canal Master Size 35 failed to meet minimum torque requirements at 360 degrees. Fifty percent of Size 20, and twenty percent of Size 35 Brasseler K-type files, and ten percent of the Brasseler Canal Master Size 25 files failed to rotate 360 degrees prior to fracture. In the stiffness test, all files easily passed the ANSI/ADA standards. The number of degrees of rotation to fracture was also measured. The Brasseler K-file fractured in rotation prior to other files tested in all file sizes except Size 25.

90-26-02

EFFECT OF INTERMIXING ADDITION SILICONES ON DIMENSIONAL
ACCURACY OF CASTS

M. D. Zollars, Lt Col, USAF, DC

There are many addition reaction silicone impression materials on the market; however, little information is available on whether accurate casts are produced when the putty and wash material from different manufacturers are exchanged. This investigation compared the dimensional accuracy of Type IV gypsum casts produced from impressions made by interchanging the putty and wash impression materials from two manufacturers. Forty impressions were made of an aluminum model with five similar preparations using Mirror 3 Extrude and President as follows: 10-Extrude putty/Extrude wash, 10-Extrude putty/President wash, 10-President putty/President wash, and 10-President putty/Extrude wash using a single-step technique. The dimensional accuracy of the impressions was assessed by measuring one intra-arch, two cross-arch, and one vertical set of reference points on the casts produced from these impressions using a Unitron measuring microscope. The data were analyzed using a 2-way analysis of variance (ANOVA); and no statistically significant differences ($p > 0.05$) were found among the four groups. The results of this study indicate that casts produced from impressions made by intermixing Mirror 3 Extrude and President addition silicone impression materials are no less dimensionally accurate than casts produced from either single brand.

90-26-03

EFFECT OF THE PROPHY-JET ON HUMAN VENOUS BLOOD SAMPLES

F. A. Thomas, Major, USAF, DC

Concern has been voiced that the application of powdered sodium bicarbonate abrasive with the Prophy-Jet may be contraindicated in a variety of human disease states due to a possible rise in certain electrolyte levels. To monitor changes in venous blood electrolytes (Na^+ , Cl^- , K^+ , and HCO_3^-), ten healthy volunteers were given routine dental cleanings including use of the Prophy-Jet for periods ranging from 2 minutes, 24 seconds to 4 minutes, 30 seconds. An initial blood sample was drawn prior to cleaning. After prophylaxis, blood samples were taken at the following intervals: 5, 15, and 30 minutes, 1 hour and 2 hours. The venous blood samples were analyzed using a Ciba-Corning 288 Blood Gas Analyzer and a Beckman Astra-8 Automated Stat Analyzer. Analysis of the data revealed no significant difference overall as tested by an analysis of variance (ANOVA) for repeated measures ($p > 0.1$). Individual comparisons with Dunnett's test showed no significant difference for any parameter at any time period ($p > 0.1$). The amount of sodium bicarbonate absorbed during routine prophylaxis with the Prophy-Jet was not of sufficient magnitude to significantly alter venous blood values in healthy subjects.

90-25-04

PERIODONTAL EFFECT OF SUBGINGIVAL IRRIGATION WITH THE CAVIMED SYSTEM

A.R. Kious, Major, USAF, DC

The purpose of this investigation was to compare the effectiveness of three different subgingival irrigants used in conjunction with ultrasonic scaling. The irrigants used were ProSol (zinc chloride), Gel-Kam (1.64% stannous fluoride) and sterile saline. Ten males, mean age of 53, with at least three bleeding pockets of 6mm probing depth in different sextants were studied. Baseline data included plaque index, bleeding upon probing, attachment level, and subgingival plaque samples. One pocket in each sextant was scaled with the Cavi-Med for 3 minutes using one of the three irrigants. Following treatment, clinical indices and plaque samples were repeated at 3, 7, 12, and 16 weeks. Test data were evaluated using an ANOVA. All treatment groups demonstrated a significant improvement in plaque indices throughout the 16-week study. The bleeding upon probing responded most rapidly for the ProSol group, but at 7 weeks the reduction was similar for all three irrigants, and by 16 weeks had returned to baseline. All groups showed similar gains in attachment by the seventh week. Phase contrast microscopy showed reduction of cell counts following treatment for all morphotypes. The filamentous forms, rods, and motile rods had returned to baseline levels by the sixteenth week, but the spirochete count did not. This study did not demonstrate a significant difference among the three irrigants at 16 weeks as determined by clinical parameters and subgingival flora.

90-26-05

THE EFFICACY OF THE DECIDENT DISPOSABLE DISINFECTANT SLEEVE WHEN USED FOR MULTIPLE CYCLES TO DISINFECT DENTAL HANDPIECES

E.C. Staley, Lt Col, USAF, DC

The Decident Disposable Disinfectant Sleeve is a commercially available device containing an ethyl alcohol/phenolic solution for disinfecting dental handpieces. The purpose of this study was to assess the efficacy of individual sleeves used for five consecutive disinfection cycles of handpieces. The evaluation was based on EPA/AOAC standards in screening for tuberculocidal activity. Thirty disinfectant sleeves were used. Handpieces and smooth-surfaced stainless steel penicylinders were contaminated with Mycobacterium smegmatis and used in Cycles one and five. Contaminated handpieces only were used on Cycles two, three, and four. Cultures were performed on Cycles one and five for a total of 60 cultures each of handpieces and penicylinders. Results were recorded as growth (failure to disinfect) or no growth. No growth was observed on all 30 penicylinder samples for Cycle 1 and 29 of 30 samples for Cycle 5. Positive cultures were obtained on 18 handpieces from Cycle one and 18 handpieces from Cycle 5. The sleeves performed to an acceptable level of effectiveness using penicylinders. The results support the EPA and ADA approval of the sleeve solution for surface disinfection. However, the test results on penicylinders did not correlate with tests on actual handpieces. The sleeve was found to be unacceptably inconsistent in disinfecting handpieces. The results of this study underscore the need to develop alternative tests for handpiece disinfection.

90-26-06

EFFECTS OF CO₂ LASER TREATMENT ON INTRAPULPAL TEMPERATURE

W.M. Watts, III, Lt Col, USAF, DC

Coherent light has been suggested for a variety of uses in clinical dentistry. Use of the laser for caries removal, treatment of dentin hypersensitivity, and surgery has been proposed. The purpose of this study was to examine the temperature effects of the CO₂ laser on the pulpal space adjacent to laser-treated cervical dentin. Seven extracted teeth were scaled and stored in a 10% formalin solution until use. Coronal access to the pulp chamber was made and a thermocouple was placed to a point approximating the cervical area. The position of the thermocouple was confirmed by radiograph. The dentin in the cervical area of each tooth was lased with a TEA-103-1 CO₂ pulsed laser with a focal area of 1.5-2.0 mm. Average pulse density was 57 joules/cm². Temperature measurements were made with a digital thermometer. The teeth were then sectioned with a diamond saw and the dentin thickness was measured with an electronic digital caliper. The results showed a mean temperature rise of 1.5°C per mm of dentin. Light and scanning electron microscopy of the samples showed evidence of cratering and cracking caused by the laser. The CO₂ laser was found to produce undesirable pulpal and surface effects when used according to the parameters in this study.

90-26-07

MICROLEAKAGE EVALUATION OF A NEW GUTTA-PERCHA CONDENSATION DEVICE

R. H. Pruetto, Jr., Major, USAF, DC

A well-sealed root canal system prevents the percolation of irritants into and out of the periapical area. Many obturation techniques have been advocated to improve the apical seal of root canal fillings and minimize leakage. In this study, the microleakage of root canals obturated using the Endotec Thermal Endodontic Condenser and lateral condensation were compared. Twenty single-canal roots from extracted human canines were instrumented using sequential filing. The roots were then randomly assigned to one of two groups and filled with gutta percha and Roth's sealer. One group was condensed using the Endotec instrument and the other was filled using standard lateral condensation. The roots were submerged in 2% aqueous methylene blue for 72 hours and then cleared with methyl salicylate for direct visualization. The greatest extent of dye penetration was measured to the nearest 0.01 mm under a stereomicroscope. Photographs (35 mm color transparencies) were used for subjective evaluation of filling density and adaptation. The Endotec group exhibited a mean leakage of 0.25 mm (SD 0.23). Mean leakage of the lateral condensation group was 0.34 mm (SD 0.41). A one-way analysis of variance revealed no significant difference in leakage between the two groups. The Endotec condensed fillings were found to be generally more homogenous than the laterally condensed specimens. However, there was separation of the coronal and apical portions of gutta percha in three of the Endotec fillings. This separation was attributed to a tendency for the filling to be pulled out when the instrument was removed from the canal.

90-26-08

MARGINAL ACCURACY AND TRANSVERSE STRENGTH OF FIVE PROVISIONAL RESINS

G. G. Bassett, Lt Col, USAF, DC
J. O. Burgess, Col, USAF, DC

Numerous resin materials have been used to fabricate provisional restorations. Recently, two new provisional resin materials with a composite resin formulation have been introduced for clinical use. This study compared the marginal accuracy and transverse strength of five commercially available resins used to fabricate provisional restorations: TRIAD (Dentsply International Corp), a VLC BisGMA; PROTEMP (Espe/Premier Corp), a Bis-Acryl-GMA; JET (Lang Dental Mfg Co), a poly (methylmethacrylate); SNAP (Parkell), a vinyl ethylmethacrylate; and SPLINTLINE (Lang Dental Mfg Co), an ethylmethacrylate. Ten provisional three-unit fixed partial dentures were constructed with each material on a typodont model. Marginal accuracy was determined by measuring the vertical opening from the material to the preparation margin

using a measuring microscope at the mesiobuccal and distobuccal line angles for each abutment tooth. After storage in water for 1 week, transverse strength was measured using a three-point bend apparatus in conjunction with an Instron machine at a crosshead speed of 10 mm/min. Data for marginal accuracy and transverse strength were analyzed using analysis of variance (ANOVA) and Tukey-B tests ($p < 0.05$). Statistical differences of the marginal opening from least to most were: PROTEMP=TRIAD=SNAP < SPLINTLINE < JET. Three-point bend strength revealed TRIAD > JET > PROTEMP=SNAP=SPLINTLINE.

90-26-09

EFFECTIVENESS OF CAVITY VARNISHES AND DENTIN SEALANTS IN PROTECTING AGAINST PHOSPHORIC ACID

R. C. Tollefson, Lt Col, USAF, DC

Cavity varnish and dentin sealants have been marketed to protect the dentin from effects during the phosphoric acid etching procedure for composite resins. The purpose of this study was to compare the effectiveness of two varnishes, Copalite and Plastodont; and two dentin sealants, Barrier and Contact in resisting the effects of phosphoric acid liquid and gel. Sixty-six extracted teeth were sectioned to provide flat occlusal surfaces in dentin. The teeth were divided into 10 groups of six specimens each: the sealant groups were tested against liquid and gel and the varnish groups were tested against the liquid; there were four control groups. Varnishes and sealants were applied to the dentin according to manufacturer's instructions. Plastic adhesive film with a circular cutout was applied to create a standard surface area; a copper band was luted to the plastic to serve as a reservoir. The surfaces were subjected to a 10 min treatment with phosphoric acid liquid or a 30 sec treatment with gel. One group from each material received no acid treatment and served as a control. The dentin was rinsed and dried and the reservoirs were filled with methylene blue dye for 4 hrs, rinsed and brushed to remove excess dye. They were then photographed. The photographs were rated on a subjective scale of surface area penetrated by dye. Results were subjected to a chi-square analysis. Barrier was found to be significantly more effective than Copalite in resisting the effects of phosphoric acid liquid ($p < 0.05$). All other comparisons yielded no significant differences.

90-36-01

SURGICALLY ASSISTED RAPID PALATAL EXPANSION REVISITED

J. Armstrong, Major, USAF, DC
D. Rawley, Major, USAF, DC
R. Edwards, Major, USAF, DC

The treatment of dentofacial deformities in adults is frequently complicated by transverse maxillary deficiency. Although alternative, less

involved, maxillary osteotomies have been suggested as being adequate to effect routine orthopedic expansion, they often result in secondary relapse. The combined surgical/orthodontic procedure addresses the potential areas of incompleteness and main resistance to midpalatal separation, verifying at the time of surgery, bilateral and symmetrical expansion with creation of an anterior midline diastema. CT analysis in the axial and coronal plane was accomplished on ten patients, who underwent the described procedure, to verify the effect of the osteotomies and evaluate ossification of the osteotomy sites in the immediate, three-month, and six-month post-op period. Results of the CT analysis revealed the success of the osteotomies including the region of main resistance, the ptergomaxillary suture. This resulted in a symmetrical midpalatal separation and the creation of a midline diastema. Evidence of ossification was present at three months post-surgery, an indication to initiate closure of the midline diastema. Significant ossification in the osteotomy sites was noted six months post-surgery. Retention of the palatal expansion should continue for at least six months post-surgery, prior to appliance removal. In summary, CT analysis verified that the combined surgical/orthodontic procedure to treat transverse maxillary deficiency was successful, especially in the regions of maximum resistance. This form of treatment ensured stable midpalatal separation, thus, preventing secondary relapse.

90-46-01

DEVELOPMENT OF A RAPID QUALITATIVE ASSAY FOR DETERMINING ELEVATED ANTIBODY LEVELS TO PERIODONTOPATHIC ORGANISMS

B. L. Mealey, Major, USAF, DC

Analysis of serum antibodies to periodontopathic microorganisms has become an integral part of periodontal research. Currently available technology for such analysis is time-consuming and costly. To allow more widespread use in clinical practice, a rapid test was developed for determining elevated antibody to periodontitis-associated bacteria. The technique utilizes dot-immunoblotting (DIB) on nitrocellulose with whole formalinized Actinobacillus actinomycetemcomitans, Bacteroides gingivalis, and Bacteroides intermedius. To enhance its use in a clinical environment, antibody status was determined from whole finger-stick capillary blood. Antihuman IgG antibody conjugated with horseradish peroxidase provided rapid detection of antibody levels. An enzyme-linked immunosorbent assay (ELISA) was used to compare IgG antibody levels to the three organisms in peripheral capillary blood and venous serum from 44 subjects. Correlation between serum and capillary titers ranged from $r=0.760-0.900$ ($p < .00001$). Capillary blood antibody levels averaged 55% of those detected in serum (range: 47-68%). Serum antibody status was determined by ELISA and DIB for 34 periodontitis patients and 10 periodontally healthy subjects. Data from the two assays were compared in a blind fashion. The DIB detected elevated antibody levels to the organisms with a sensitivity of 83-100% and a specificity of 84-90%. When responses to the entire panel of three organisms were combined for each subject, the DIB had an overall sensitivity of 95% and a specificity of 83%. The data demonstrate that the DIB is highly accurate in detecting elevated

antibody levels to periodontitis-associated bacteria. The DIB uses finger-stick capillary blood with results available in less than two hours while the ELISA requires venous-derived serum and two days processing time. Thus, the DIB is conducive to clinical use for monitoring systemic antibody responses.

90-46-02

ANTIBODY RESPONSE TO PROTEIN TOXINS IN THE NONHUMAN PRIMATE,
MACACA FASCICULARIS

G. R. Bauman, Major, USAF, DC

Recent research indicates that periodontal disease in the nonhuman primate (NhP) is histologically, microbiologically, and clinically very similar to man. However, the immunologic aspects of the NhP have not been well defined. Since bacterial protein toxins are involved in the process of periodontal disease as well as other diseases of man, this study was designed to characterize the IgG and IgG subclass response in the NhP to immunization with the prototype protein toxin, tetanus toxoid (TT). Five NhPs were immunized with TT at baseline and again one month later. Serum samples were collected at 0, 1, and 30 days post primary immunization, and at 3, 7, 30, 60, 90, and 120 days post secondary immunization. Changes in serum IgG and IgG subclass levels with time were determined by enzyme-linked immunosorbant assay (ELISA). Development of IgG avidity (antigen binding capacity) with time was also determined by ELISA. The IgG primary response and secondary response were both significant over baseline (40 and 110 fold, respectively). All IgG subclasses showed significant primary and secondary responses. The overall response was dominated by IgG1 (62%) and IgG (25%) with minor contribution from IgG4 (6.5%) and IgG2 (6%). Avidity also increased significantly in the primary and secondary responses; however, peak avidity (60-90 days post secondary immunization) was not coincident with peak secondary response levels (7-30 days post secondary immunization).

90-56-01

STRENGTH COMPARISON AMONG THREE PORCELAIN ENAMELING SYSTEMS

D. Sather, Naval Dental School, Bethesda MD
E. Billy, Naval Dental School, Bethesda MD
L. Ciambaressi, Naval Dental School, Bethesda MD
S. Li, NIDR, National Institutes of Health, Bethesda MD

Feldspathic porcelain has been successfully veneered on cast metal artificial crown substructures. In addition to this enameling system, recommendations have been made to use fluoromica controlled crystallization castable glass and to use aluminous porcelain as substructures. This study

evaluated the force to fracture artificial incisor crowns using cast metal (Group 1), castable glass (Group 2), and aluminous porcelain (Group 3) as substructures. Fifteen substructures of each material were made. Thicknesses of the substructures were measured at 27 locations, added, and recorded. Feldspathic porcelain was veneered on each substructure. Thicknesses of the finished artificial crowns were measured at 6 locations and recorded. Heights and widths of the finished artificial crowns were also measured and recorded. Epoxy resin was used to intimately fill each artificial crown and to also serve as a support base for testing. A load was applied with an Instron testing machine at a crosshead speed of 5 mm/min to the incisal edge of each artificial crown along its long axis until fracture occurred. Mean failure loads (Pounds): Group #1 - 884 (SD=131), #2 - 457 (SD=129), #3 - 341 (SD=93). A one-way ANOVA showed a significant difference among the groups. Tukey's studentized range test was used for discrimination. All three groups were different at the 95% confidence level. Pearson's correlation coefficient compared the effects of the measured dimensions on the results. Differences in heights, widths, and thicknesses of the finished samples affect the results. Between the two all-ceramic groups (Groups 2 & 3), the substructure bulk positively correlated with the measured forces to fracture.

90-56-02

THE EFFECT OF TRANSLUCENCY ON TRISTIMULUS REFLECTANCE VALUES OF PIGMENTED MAXILLOFACIAL ELASTOMER OBTAINED WITH TWO COLORIMETERS OF DIFFERENT GEOMETRY

E. H. Rugh, Major, USAF, DC

Color parameters obtained with a small-area colorimeter have shown poor correlation with those obtained with other geometries. This study related the relative increase in tristimulus reflectance values, obtained on a thick sample using two geometrically different colorimeters, to a standard measure of translucency, contrast ratio. Samples of increasing contrast ratio were formed using increasing concentrations of mineral earth pigment in maxillofacial elastomer. For each concentration, samples were formed about 2 and 11 mm thick. The thin samples were measured with the large area colorimeter (Minolta CR200b) using black and white backings to obtain contrast ratios. The thick samples were measured using small area (Minolta CR121) and larger area colorimeters. The relative increase in tristimulus reflectance for each tristimulus value was determined (e.g., $Y_{\text{relative diff.}} = Y_{200b}Y_{121}/Y_{200b}$). An analysis of covariance (ANCOVA) was used to analyze the differences in the tristimulus values obtained with the thick samples using the two colorimeters. Statistical analysis of results shows that the relationship of relative increase in tristimulus reflectance to contrast ratio is highly significant ($F = 258.97, p < 0.001$). The relative increase may be used as an alternative indicator for translucency within the practical range of translucency found in esthetic dental restorative materials.

90-56-03

THE ADVANTAGES OF COATED TITANIUM IMPLANTS PREPARED BY RADIO
FREQUENCY SPUTTERING FROM HYDROXYAPATITE

D. R. Cooley, Lt Col, USAF, DC

The method used to apply hydroxyapatite to implant surfaces may affect the thickness and ultimately the physical properties of the coating. This study investigated and compared the healing rates of bone around commercially pure titanium implants and titanium implants which had been sputter-coated from an hydroxyapatite target. Forty-five sputter-coated implants and an equal number of noncoated titanium implants were placed in 15 partially edentulous dog mandibles. The implants were removed at three time periods and evaluated mechanically and histologically. Analysis of variance testing indicated that the interface bond strength was statistically greater ($p < .01$) for the sputter-coated implants. Histologic analysis of the bone-implant interface demonstrated that coated implants had nearly twice the percentage of direct bone contact when compared to the noncoated implants. These results indicate that implants sputter-coated from an hydroxyapatite target will accelerate the bone healing at the implant interface.

90-56-04

AN INVESTIGATION INTO THE EFFICACY OF STERILIZING
MUSLIN WHEELS BY AUTOCLAVING

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Sterilizing muslin cloth polishing wheels (rag wheels) by autoclaving has been advocated by the ADA for several years. In applying standard sterilization procedures it is essential to clean instruments promptly after use to remove debris before it can dry and harden in the serrations, crevices, etc. Thorough cleansing is extremely important because organisms concealed and protected by dried blood and scale in inaccessible parts of the instruments render sterilization more difficult. The purpose of this study was to determine whether autoclaving was an effective sterilization technique for laboratory muslin polishing wheels that had been saturated with contaminated pumice. Ten tubes of enriched thioglycollate medium were inoculated by swabbing rag wheels that were used to polish dentures which had been in patients' mouths. Three-inch and six-inch diameter ragwheels were swabbed; a positive culture growth rendered the thioglycollate medium cloudy by Day five; no growth resulted in a clear broth. All cultures obtained from contaminated rag wheels prior to autoclaving resulted in a cloudy broth. Those cultures obtained after autoclaving of the muslin wheels resulted in clear broth. These results verify that autoclaving killed the microorganisms found on the rag wheels by the penetration of steam and the higher temperatures which accompany the pressurized closed system.

90-76-01

FLOW CYTOMETRIC PLOIDY DETERMINATION OF ORAL
PREMALIGNANT AND MALIGNANT LESIONS

C. W. Pemble III, Lt Col, USAF, DC

Nuclear DNA content was evaluated for use as an objective parameter of diagnostic value in 20 cases of oral premalignancy which progressed to malignancy. Single cell suspensions were stained with propidium iodide and subjected to flow cytometric analysis which yielded histograms of the ploidy status for each specimen. Sufficient tissue quantity and acceptable coefficients of variation allowed for ploidy status determination for all specimens in 13 cases. The initial premalignant lesions in these cases were variously euploid, aneuploid, and diploid with high cell cycle 5 phase fractions. The intermediate lesions and the subsequent carcinomas contained cell populations with DNA contents seemingly unrelated to the precedent lesions or to the severity of dysplasia or degree of differentiation in the malignancy. Erythroplakic lesions were 3.6 times more likely to be aneuploid than euploid and twice as many carcinomas were noneuploid than euploid. Flow cytometric analysis of nuclear DNA content is a reproducible objective parameter of oral lesions which is applicable to formalin-fixed, paraffin-embedded tissue. The diagnostic value and the use of this parameter in predicting the biologic behavior of oral premalignant and malignant lesions must await further retrospective and prospective studies.

90-86-01

EFFECTIVENESS OF A BRUSH IN REMOVING POSTINSTRUMENTATION CANAL DEBRIS

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S. Montgomery, DDS, FACD

The purpose of this study was to evaluate the effectiveness of a brush in removing debris in the root canal after endodontic instrumentation. The Endobrush, an endodontically sized spiral brush, was used in this study. Seventeen extracted human maxillary first molars with mesiobuccal canal curvatures of 25 to 35 degrees were divided into two groups. After endodontic access and determination of working length, one group was instrumented to a #45 file and the other group to a #35 file at the working length. After the teeth were sectioned at the working length, and at 2, 4, and 6 mm from the working length, they were evaluated for debris remaining in the canal space. The specimens were reassembled, brushed with an Endobrush, and reevaluated. The scores for instrumentation alone (controls) and instrumentation plus brushing were compared using paired t tests. A significant difference in cleanliness between instrumented only and instrumented and brushed canals was seen in both groups. The combined results of both groups showed that significantly less debris remained in the root canal system at the 2 to 4 mm level

and the 4 to 6 mm level after brushing, whereas no significant difference was noted at the working length to the 2 mm level. Conclusions: Instrumentation with brushing was significantly better than instrumentation alone in debriding the root canal.

90-86-02

EFFECT OF INTRACANAL MEDICAMENTS ON THE SEALING ABILITY OF
TEMPORARY ENDODONTIC RESTORATIVE MATERIAL

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An in-vitro leakage study was performed to determine the effect of intracanal medicaments on the sealing ability of Temporary Endodontic Restorative Material (TERM). Fifty extracted mandibular molars with uniform access preparations were restored with TERM after placement of either a dry cotton pellet (control), or a pellet moistened with eugenol, formocresol, CMCP, or a paste of sodium perborate and superoxol. Multiple measurements were made on each intact specimen, at 5 time intervals after restoration, and in some cases, after thermocycling. Statistical analysis revealed no significant leakage in the control group, or in the groups which used eugenol, formocresol, or CMCP when they were compared to the control group. Analysis, however, did show significant leakage for the group containing the bleaching paste. Results show that the sealing ability of TERM is not affected by eugenol, formocresol, or CMCP. However, TERM should not be used for the temporary restoration of teeth being treated by the walking-bleach technique.

GENERAL PRACTICE RESIDENTS'
ARTICLES/LITERATURE REVIEWS: 1990

1. Bolling Air Force Base DC.

Det 1, Malcolm Grow USAF Medical Center/Col Paul K. Blaser, Director.

a. "Repair of Deficient Partially Edentulous Maxillary Ridge for Fixed Partial Denture: Review of Literature," May 90, Steven H. Helm, Captain, USAF, DC.

b. "Postmortem Identification and the Computerization of Dental Characteristics," May 90, Robert T. Jensen, Captain, USAF, DC.

c. "The Endodontic Management of the Curved Canal," May 90, Brett A. Johnson, Captain, USAF, DC.

d. "Picking the Right Occlusal Scheme in Complete Dentures," May 90, Kenneth C. Stanifer, Captain, USAF DC.

2. Chanute Air Force Base IL.

Chanute TTC Hospital/Lt Col Lawrence D. Schmeltzer, Director

a. "Osteoporosis and Dental Treatment," 16 Jul 90, Ronald S. Kovac, Captain, USAF, DC.

b. "A Historical Look at Where To Place that Crown Margin," 16 Jul 90, Karl P. Lackler, Captain, USAF, DC.

c. "Dental Luxations: A Review of the Literature," 16 Jul 90, Andrew J. Marck, Captain, USAF, DC.

d. "Dentin Bonding Agents: A Literature Review," 16 Jul 90, Brian L. Tuft, Captain, USAF, DC.

3. Davis-Monthan Air Force Base AZ.

836th Medical Group/Lt Col Robert A. Olson, Director.

a. "Comparison of Composite Finishing Techniques," 11 Jun 90, Robert F. Brandys, Captain, USAF, DC.

b. "Osseointegration of Titanium and Hydroxyapatite-Coated Implants," 11 Jun 90, Donald R. Hoaglin, Captain, USAF, DC.

c. "Dry Socket: Prevention and Treatment," 11 Jun 90, Gilbert E. Smith, Captain, USAF, DC.

d. "The Use of Ultrasonics in Endodontics," 11 Jun 90, Dean H. Whitman, Captain, USAF, DC.

4. Scott Air Force Base IL.

USAF Medical Center Scott/Col William D. Theobald, Director.

a. "Laser Use in Dentistry: The Current Status," 10 May 90, Rodney M. Waite, Captain, USAF, DC.

b. "Dicor, The Castable Ceramic," 18 May 90, John M. Yaccino, Captain, USAF, DC.

c. "Mucogingival Surgery," 1 Jun 90, Salvatore R. Cutino, Captain, USAF, DC.

d. "Guided Tissue Regeneration," 1 Jun 90, Ronald Abbott, Captain, USAF, DC.

5. Sheppard Air Force Base TX.

Sheppard TTC Hospital/Lt Col Kevin M. Gureckis, Director.

a. "Glass Ionomer Cement: Background, Development and Clinical Usage," May 90, Diane E. Kopra, Captain, USAF, DC.

b. "Lasers in Dentistry," May 90, Timothy F. Lekavich, Captain, USAF, DC.

c. "Guided Tissue Regeneration and the Management of Furcation Defects," May 90, David H. Pfotenbauer, Captain, USAF, DC.

d. "Thumbsucking - A Review of the Literature," May 90, James G. Rafael, Captain, USAF, DC.

6. Travis Air Force Base CA.

David Grant USAF Medical Center/Col Stanley M. Plies, Director.

a. "Retention Systems for Oral Implants," Peter S. J. Chang, Captain, USAF, DC.

b. "Metal Adhesive Resins, An Analysis of Their Properties and Their Role in Dentistry," David B. Chiesa, Captain, USAF, DC.

c. "The Foundation of Restorations: A Review of Dental Liners and Bases," John A. Helmkamp, Captain, USAF, DC.

d. "Extensive Amalgam Restorations: A Review of the Literature," Mark Y. Uyehara, Captain, USAF, DC.

7. Wright-Patterson Air Force Base OH.

USAF Medical Center Wright-Patterson/Col William R. Langenderfer, Director.

a. "Use of Vasoconstrictors in Local Anesthetics," Jul 90, Roger W. Childress, Captain, USAF, DC.

b. "Cast Glass Ceramic Veneers, Dicor State of the Art," Jul 90,
Steven A. Lang, Captain, USAF, DC.

c. "Histologic and Clinical Review of Circumferential Supracrestal
Fiberotomy," Jul 90, Michael E. Poth, Captain, USAF, DC.

d. "Treatment of Root Perforations: A Review of the Literature," Jul 90,
Michael D. Signorelli, Captain, USAF, DC.

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