15 Ridge Augmentation and Reconstruction Using Composite Bone Grafts

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The purpose of the current presentation is to introduce the composite autogenous bone graft and demineralized bone matrix to the practising clinician. In this presentation, the biochemical and molecular advances leading to the development of the composite bone graft are highlighted and the different aspects of its clinical application are demonstrated.

The composite bone graft is a mixture of autogenous bone (the patient's own bone) and allogenic demineralized bone matrix (DBM) (prepared from human cadaver bone or commercially available). Recently we reported that the demineralized bone matrix augmented the healing and integration of autogenous bone grafts. The composite bone graft induced 47% more new bone than the most widely used graft material,, the EC bone. In the composite graft, the type of autogenous bone, endochondral (EC) of origin i-e hip / rib bone graft or intramembranous (IM) of origin i-e cranial / chin bone graft, affects the integration of the graft with the recipient bed. Composite IM-DBM induced earlier neovascularization when compared with EC-DBM. Furthermore, an ultrastructural identification of cells involved in the healing of IM and EC bone demonstrated that intramembranous bone, unlike EC bone, heals directly through bone bypassing a cartilage intermediate stage. Clinically, implants were inserted within 3-4 months after *ridge augmentation using the composite bone graft*. Similarly, in cases of *mandibular and maxillary reconstruction* implants were inserted within 3-4 months.

In conclusions: IM bone heals through an osteogenic route which allows earlier loading of the grafted area. IM-DBM induces early vascularization which is vital to the bone induction ability of the composite graft. Composite bone grafts possess all the properties required for an effective graf; material and merit further clinical evaluation.

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16 Vascular endothelial growth pattern of composite intramembranous bone and demineralized bone matrix.

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The purpose of this study was to clarify the angiogeneic pattern in the early stages of healing of composite intramembranous (IM) and demineralized endochondral bone matrix (DBM). Fourteen critical-size 10 x 5 mm, full thickness bony defects were created in the parietal bones of mature rabbits. Defects were filled with combined IM-DBM. Tissues were retrieved in 1, 2, 3, 4, 5, 6 and 7 days post grafting. Neovascularization was assessed using antibodies to factor VIII antigen (marker for vascular endothelium) and gan-endothelial antibody (CD-31). Histological and immunohistochemical evaluation of the sequence of the events revealed that: two days after grafting, positive staining for endothelial cells were first observed near the periphery of the host bone rim. Small blood vessels were first seen budding from host bed towards the graft by day 3. At gay 4, differentiating chondroblasts were observed. With the advent of capillary invasion on day 6, initial signs of osteogenesis was observed and new bone was formed on the surface of cartilage matrix and the implanted matrix by day 7. In conclusion: this study demonstrates a rapid vascularization during the composite IM-DBM graft induced osteogenesis and provides a further evidence for the potential value of the composite graft.

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17 Two Patient Controlled Sedation Techniques Compared using Graseby PCA Pump.

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In a preliminary investigation, true patient controlled sedation where patients obtain 0.1 mg increments of midazolam without a lockout period was compared with the standard patient controlled technique where they obtain 1 mg increments of midazolam with a lockout period of 1 minute between increments. Eighteen healthy patients undergoing bilateral third molar surgery at two visits were included in the study following informed consent. The total dose of midazolam obtained by patients upto the end of surgery was significantly less with the true patient controlled technique, mean 4.1 mg, when compared with the standard technique, mean 5.2 mg ($p<0.05$). During true patient controlled sedation the number of demands for the drug far exceeded the increments they received. In both groups the majority of patients were moderately sedated and provided good operating conditions. One patient in the true patient controlled sedation group was considered to be markedly sedated. Almost an equal number preferred each technique. The majority (71%) who preferred the true patient controlled sedation technique said they could control the sedation better with this technique and the majority (56%) who preferred the standard technique said that adequate sedation was attained much earlier than with the other technique. Thus the conclusions of this preliminary investigation are that the so called true patient controlled sedation is a misnomer because even though the patients are able to press the button at any time they wish, they do not get an increment at every time they press the button and that even with true patient controlled sedation patients could become markedly sedated or may even become unconscious. This stresses the importance of having two practitioners one to monitor the patient and the other to perform surgery when patients are allowed to have increments during surgery in patient controlled sedation.

18 CLINICAL EFFICACY OF METAMIZOL IN PAIN AFTER SURGICAL REMOVAL OF IMPACTED WISDOM TOOTH

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This randomized double blind placebo controlled trial was undertaken to investigate the efficacy and tolerability of metamizol 500 mg, mefenamic acid 500 mg, ibuprofen 400mg. Two hundred and thirty nine patients were admitted to the study, but only two hundred and nine patients were included in the final analysis due to protocol violation. They consisted of 51 patients receiving metamizol, 54 patients receiving mefenamic acid, 54 patients receiving ibuprofen and 50 patients receiving placebo. Efficacy was assessed based on 5 point scale measurament of pain intensity and pain relief, every hour during 8 hour period following surgery. The results showed that there was no difference in pain intensity and pain relief between groups. However, significant differences between either drug group were observed as compare to placebo, indicating there analgesic efficacy. The adverse events during the treatment period were not significantly differences between groups. It was concluded, therefore, that metamizole 500 mg, mefenamic acid 500 mg and ibuprofen 400mg, were equally efficacious for the treatment of dental pain after surgical removal impacted wisdom tooth.

19 Evaluation of Flexural Strength of Materials for All-Ceramic Restorations.

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All-ceramic restorations are increasingly used due to their often superior esthetic qualities. Celay (Mikrona Technologie), IPS-Empress (Ivoclar) and Cerec (Siemens) are novel systems which can produce a variety of ceramic restorations. Celay uses a precise copy milling system, Cerec is a CAD/CAM system while Empress employs a pressure molding fabrication technique. This study investigated the flexural strength of the different types of ceramic used in these systems. The ceramics used are; Type 1) Aluminous porcelain (Vitadur Alpha, Vita Zahnfabrik); Type 2) Dicor-MGC (Dentsply); Type 3) Vitablocs (Vita Zahnfabrik); Type 4) IPS-Empress; Type 5) In-Ceram blocks (Vita Zahnfabrik); and Type 6) Spinell blocks (Vita Zahnfabrik). Type 3, 5, 6 are specially designed for Celay machine. 10 bars (2.0 x 1.50 x 25 mm) of each type were fabricated. Bars were tested in three-point flexure (crosshead speed 0.2 mm/min) on a universal testing machine (Instron, Canton, MA, USA), according to ASTM Standard C-1161-90. Flexural strengths ($X \pm SD$, MPa) are; Type 1) 64.92 ± 10.32, Type 2) 231.99 ± 17.88, Type 3) 119.94 ± 4.13, Type 4) 98.30 ± 14.00. Type 5) 384.50 ± 40.01, and Type 6) 259.10 ± 31.49. ANOVA and Tukey statistical analyses revealed that In-Ceram was the strongest ($p \leq 0.05$) ceramic tested and Vitadur Alpha has the lowest flexural strength ($p \leq 0.05$). Spinell was the next strongest ($p \leq 0.05$) one. There was no significant difference ($p \leq 0.05$) between IPS-Empress and Vitablocs and between Dicor-MGC and Spinell.

20 Effect of storage condition on mechanical properties of composite resin.

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This study was conducted to confirm the effect of storage condition on mechanical properties of composite resins. Three light-activated (CH, Z1, HM) and one chemically-cured (CN) composite resins were selected and tested immediately after being received from their manufacturers (control) and after 6 months storage at 4°C or 30°C. Knoop hardness (KH) of cured composite surface was measured 3 minutes after light exposure or 10 minutes after mixture; direct tensile strength (DTS) was measured using dumbbell-shape specimen after 24 hours storage in 37°C distilled water. Means (s.d.) are summarized in table below and were analyzed with one-way ANOVA and Scheff's test ($p<0.05$).

KH (KHN)	control	4°C	30°C	DTS (MPa)	control	4°C	30°C
CH	19.7 (0.6)	20.8 (1.7)	21.6 (2.1)		66.9 (7.9)	62.9 (6.6)	60.4 (7.9)
Z1	69.6 (2.1)	61.3 (5.2)	63.9 (5.0)		88.0 (11.2)	67.6 (12.3)	65.0 (6.8)
HM	17.4 (0.5)	17.5 (1.7)	16.1 (2.1)		59.8 (4.9)	57.4 (3.5)	52.7 (8.4)
CN	53.4 (5.0)	34.1 (4.1)	13.0 (1.8)		69.6 (5.3)	70.3 (4.2)	62.2 (7.2)

KH of CH and HM did not show significant difference among storage conditions, while that of Z1(4°C) and CN(4°Cand 30°C) decreased after 6 months storage. DTSs of Z1, HM, and CN decreased after 6 months storage, especially at 30°C. These results suggested that storage condition, even for only 6 months, affected mechanical properties of composite resins.

21 Effect of Thermocycling on the Fracture Toughness of Composites.

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Fracture toughness has been recognised to be one of the most important mechanical property for restorative materials. It is the aim of this study to investigate the effect of thermocycling on fracture toughness of a range of dental composites; P50(P)[1], Silux Plus(S) [2], Heliomolar(H)[3],Clearfil Photo Posterior-light activated(CLA) [4] and Clearfil Posterior-chemically activated(CC) [5]. 110 rectangular pre-notched specimens was prepared for each material utilising a stainless steel mould. The specimens were divided into 11 groups of 10 each. Test groups 1-6 were subjected to 0, 250, 500, 750, 1000 and 10,000 thermal cycles respectively. Each cycle consisted of 1min immersion time of 50 seconds per change. The control groups 7-11 were stored in water at 37°C for a time equivalent to complete 250, 500, 750, 1000 and 10,000 thermal cycles respectively. All specimens were subjected to a 3 point bend test and loaded at a crosshead speed of 1mm min^{-1} on an Instron Testing Machine. The fracture toughess of all materials decreases with the number of thermal cycles and length of water storage except for CC where the fracture toughness increases during the earlier stages of thermocycling and water storage. However the lowest fracture toughness values were for groups 6 and 11. One way analysis of variance showed that Group 1 was significantly different from groups 6 and 11 ($P < .05$), the thermally cycled and the water storage groups were not different from each other for all materials. The decrease in fracture toughness exhibited by all light acitvated composites could be explained by interfacial stress formation and resin-filler debonding while the increase in fracture tooughness during the earlier stages of thermocycling and water storage of chemically-activated composite be explained by continued polymerisation. Thermocycling did not cause any significant reduction in fracture toughness composites over and above by water storage.

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22 Comparison of Four Microleakage Tracers.

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There is an assumption that different microleakage tests would yield similar results when used to determine leakage of the same restorative material. This in vitro study compared the ability of four different tracers to detect microleakage of amalgam restorations, using the same experimental methodology. Class V amalgam were inserted in extracted human teeth, then stored in water for two weeks at 37°C. Within this period, they were subjected to 2500 thermal cycles at a 40°C temperature differential. Microleakage was tested at the end of the storage period. Fifteen teeth were randomly assigned to one of four test groups: (A) 0.5 percent basic fuchsin dye, (B) 2.0 percent fluorescent dye, (C) 1.5 percent reactive orange 14, and (D) 45Ca. Microleakage was examined at both the cervical and occlusal margins. The Newman-Keuls test was used for multiple comparison of the individual tracers. There was significant difference in the degree of leakage indicated by the four tracers ($p \leq 0.05$), except for one instance. Only 45Ca and the fluorescent dye (Zyglo) indicated the same degree of leakage at the gingival margin. The 0.5 percent basic fuchsin dye indicated the greatest amount of leakage followed in descending order by reactive orange 14, 45Ca and the fluorescent dye. The reactive orange 14 was difficult to evaluate because of its color, making the reliability of scores questionable. With respect to the fluorescent dye, this was sometimes apparent along the axial walls but not at the occlusal or gingival margins. Thus, the source of leakage was not discernible.

Overall, the results of this study indicate that the results of leakage studies that have utilized different tracers should not be compared.