AIOP Poster Awards

The following are the three best scientific posters that were presented at the 28th International Congress of the Italian Academy of Prosthetic Dentistry held in Bologna on November 19 and 20, 2010.

First Prize

Different Origin BGMs Associated to MSC: A Tissue Engineering Approach to GBR

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Objectives: Bone augmentation in oral surgery relies on osteogenic and osteoconductive properties of bone graft material (BGM). Several types of BGMs with different chemical compositions and microstructures are available today, including naturally derived or artificially modified heterologous bone and synthetically syntherized bioceramics. A further improvement is represented by the tissue engineering approach, where autologous mesenchymal stem cells (MSCs), expanded in vitro, are seeded on BGM prior to implantation in the bone defect. In this study, the effect of different bone substitutes on MSC differentiation when they were adopted as cell culture substrates has been evaluated. ***Methods:*** Human MSCs were cultured in vitro in the presence of BGMs of different origins (natural bone–derived, synthetic, and mixed). Cellular adhesion on BGMs was analyzed with SEM. Alkaline phosphatase (ALP, early marker of the osteogenic differentiation) gene expression was evaluated by real time PCR, and ALP enzyme activity was determined at different culture time points (7, 14, and 28 days). In vivo osteogenic differentiation of implanted tissue constructs (BGM + MSC) was investigated, taking advantage of an ectopic bone formation in an immunodeficient mouse model, and analyzed by histology. ***Results:*** Good cell adhesion to all BGMs was observed 6 hours after plating, and cells were successfully cultured for 28 days. ALP gene expression and enzymatic activity was detectable at 14 days. The ALP gene expression analysis indicated that the MSCs cultured with BGM derived from natural bone (BioGen, Bio-Oss) presented a steady increase of the ALP expression reaching a significantly higher level at the 28th day of osteoinduction compared to the other BGMs. Instead, cells cultured in the presence of BGMs of synthetic origin (Bonit, Skelite) presented the maximum level of ALP gene expression at day 14, with a subsequent stabilization in the expression at day 28. Interestingly, the cells cultured in the presence of mixed origin (Pepgen P-15) BGM presented a peak in gene expression at day 7. The in vivo osteogenic test showed good bone formation at the periphery of all BGM particles seeded with BMSCs. Neo-formed bone progressively filled the gap between the particles bridging them after 8 weeks, maintaining a peripheral vasculature. ***Conclusions:*** All tested BGMs implemented bone formation in guided bone regeneration. BGMs of animal origin showed greater ALP expression at 28 days.

Second Prize

Immediate Function with Fixed Implant-Supported Maxillary Dentures: A 36-Month Follow-up Study

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Objectives: Immediate occlusal loading of dental implants in the edentulous mandible has proven to be an effective, reliable, and predictable procedure. There is little long-term data available on similar treatments in the edentulous maxilla. The purpose of this study was to evaluate the 36-month implant survival after immediate loading of 4 to 6 implants with fixed screw-retained prostheses in edentulous maxillae. ***Methods:*** Thirty-four patients, edentulous or with remaining teeth to be extracted in the maxilla, received 4 to 6 implants (n = 163). The patients were restored with screw-retained fixed provisional prostheses supported by palladium alloy frameworks within 24 hours after surgery. Insertion torques for implants were at least 40 Ncm. Implants, grouped as tapered or cylindrical screws, were placed in healed bone or extraction sockets. Implants were also classified as either vertical or off-angle. Definitive prostheses were placed after a mean healing time of 18 weeks. Radiographic examinations were made at the time of placement of provisional prostheses and 12, 24, and 36 months later. Between-groups bone resorption was compared using two-way analysis of variance (α= .05). ***Results:*** The mean follow-up time for all patients was 44 months (range, 37 to 50 months). The cumulative implant survival rate at the 36-month follow-up visits (after surgery) was 93.9%; the prosthesis survival rate was 100%. No significant differences were found between the survival of tapered or cylindrical screw-type implants placed in postextraction sockets versus those in healed edentulous sites or between vertical and off-angle placed implants. Ten implants failed during the first 3 months, 6 of which were the most distal implants. The mean reduction in marginal bone height over the 36-month observation period was 1.05 mm. ***Conclusions:*** It is concluded that the immediate loading protocol described in this study for supporting full-arch maxillary prostheses represents a therapeutic option for edentulous maxillae.

Third Prize

Osseotite vs Nanotite Implants in Bio-Oss–Grafted Sinus

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Objectives: Maxillary sinus lifting has become a routine operation in rehabilitating the distal maxillary sector when the bone available to insert implants is less than 6 mm in height. In these cases, grafting with alloplastic material alone, or alloplastic material combined with autologous bone, is the gold standard technique. Concomitant implant insertion and substitute bone grafting is possible when the bone height is sufficient to ensure primary stability. Scientific literature and clinical practice have clearly shown that Osseotite and Nanotite surfaces ensure faster integration times and a higher percentage of bone-implant contact (BIC) than smooth (ie, machined) titanium surfaces. Furthermore, Nanotite surfaces are expected to achieve higher percentage of bone/Bio-Oss/implant contact (BBIC) than Osseotite surfaces. This study aimed to compare, by means of a histomorphometric analysis, the percentage of BBIC between the Osseotite surface and a new surface known as Nanotite on implants inserted in the maxillary sinus augmented with alloplastic material (Bio-Oss). ***Methods:*** A monocentric, prospective, randomized, double-blind clinical trial was performed on seven patients (nine sites) showing the following characteristics: either interrelated or distal maxillary edentulism with at least two teeth missing in which insertion of implants involved the maxillary sinus and a maximum ridge height of 4 to 5 mm. In each of the nine sites, a maxillary sinus elevation was performed with graft of Bio-Oss and concomitant positioning of two threaded mini-implants of 2.18-mm diameter and 10-mm length with Osseotite and Nanotite surfaces. Mini-implants, along with adherent bone, were removed with a customized harvester 9 months after sinus graft operation at the same time of definitive implant insertion and underwent histologic analysis. ***Results:*** A histologic analysis of the 18 biopsy samples was performed. BBIC averages were 37% and 48% for Nanotite and Osseotite surfaces, respectively. ***Conclusions:*** Based on the histomorphometric analysis, there was no statistically significant difference in the percentage of BBIC that was achieved by Osseotite and Nanotite dental implants.