"Use of New Magnetic Attachments for Implant-Supported Overdentures," by T. Fujimoto, A. Niimi, I. Murakami, and M. Ueda. J Oral Implantol 1998; 24:147–151.

The authors have developed a newly designed magnetic system for external hexed implants that use a standard abutment platform made out of neodymium-iron-boron alloy magnet developed into a thin attachment for Branemark implants. Some of the advantages of this system over bar and ball attachments are for cases with reduced vertical dimension and low attractive forces horizontally. Disadvantages include less retention with few implants and the need to remove the magnet during magnetic resonance imaging. Favorable clinical results have been obtained, and this system may be considered a useful addition to overdenture therapy. (D. Kim)

"Ultrasonic Ostectomy for the Surgical Approach of the Maxillary Sinus: A Technical Note," by F. Torrella, J. Pitarch, G. Cabanes, and E. Anitua. Int J Oral Maxillofac Implants 13:697–700, 1998.

Currently, the creation of an osseous window for the purpose of a sinus lift is performed with diamond drills. The major complication of this approach is perforation of the membrane that lines the antrum. The authors suggest the use of a periodontal ultrasonic generator in creating the fenestration. This more conservative approach yields a reduced risk of membrane perforation and also provides improved vision and hygiene of the surgical area.

The conventional periodontal ultrasonic generator is augmented with an independent irrigation system with sterile saline solution. Micromovements of 20 to 200 μm and a frequency of more than 20,000 Hz (20,000 micromovements/s) at the device tip. Thus, the osteotomy line is made by microfracturing and dispersing the osseous table in a progressive, precise, and controlled manner. At the same time, perforation of the soft tissue is avoided. The oscillations at the active tip can be controlled by the operator. The tips are made of the highest quality surgical steel. The thinnest active tip is used to concentrate the ultrasonic effect. The tip is positioned perpendicularly to the osseous surface to yield maximum power. High irrigation flow is maintained. Combined with mechanical vibration, the irrigation generates aerosol and cavitation. Cavitation creates bubbles of saturated steam, which increases the mechanical effect of the device. Overall, a thinner and more conservative osseous incision is created than with a round drill. Once the ostectomy is complete, the procedure continues as usual. This is a new technique, and further study is needed to determine its advantages and safety over other techniques. (M. Katzap)

"Treatment of Peri-implant Defects with Guided Bone Regeneration: A Comparative Clinical Study with Various Membranes and Bone Grafts," by M. Lorenzoni, C. Pertl, C. Keil, and W. A. Wegscheider. Int J Oral Maxillofac Implants 13:639–646, 1998.

The purpose of this study was to investigate the use of different membranes for guided bone regeneration around implants. A resorbable membrane, a standard expanded polytetrafluoroethylene (e-PTFE) (Gore-Tex), and a titanium-reinforced e-PTFE were compared in terms of their capacity to induce new bone formation. The clinical and histologic findings of regeneration using bovine bone matrix Bio-oss as a filling material beneath the membrane were evaluated. Defects were measured using a periodontal probe.

All surgeries were sutured to achieve primary closure. If a nonresorbable membrane was exposed, the exposed portion was cleaned with 0.1% chlorohexidine, and a second operation was carried out within 2 weeks to remove the membrane. Early detection of dehiscence is an important factor in determining the final amount of regenerated bone. Exposed membranes yielded diminished regeneration. Titanium-reinforced membranes exhibited improved stability and maintained their shape and space throughout the healing and regeneration period. If a resorbable membrane became dehiscent, it did not require removal, since none of the patients showed signs of infection along the wound margins. After 6 months, at uncovering, the sites were measured using a periodontal probe to measure bone regeneration.

The results showed that bone repair is significantly improved by using membranes. Nonresorbable membranes regenerated 84%, titanium-reinforced membranes yielded 81%, and resorbable membranes 60%. These differences were found to be statistically significant. (M. Katzap)

"Simplified Guide for Precise Implant Placement: A Technical Note," by B. D. Kennedy, T. A. Collins Jr, and P. C. W. Kline. Int J Oral Maxillofac Implants 13:684–688, 1998.

Implant surgery is ultimately driven by the final restoration that is planned for the patient. The authors describe a technique to predictably insert implants in positions acceptable to the restoring practitioner and the surgeon. A surgical guide is fabricated, and stainless steel sleeves are incorporated into it. The sleeves are made of 912-gauge surgical-grade steel. The internal diameter is milled to accept the final drill of the implant system, with very low tolerance of 0.001 in. This provides a very smooth and precise guide. Unlike acrylic, these sleeves cannot be damaged by the drills. The sleeves are 4 mm in height and include paralleling pins, which match the size of the final drill. These are used to determine implant position and correct the degree of parallelism.

An acrylic template is fabricated in the usual manner (either the denture is

duplicated or an acrylic template with flanges is placed over the edentulous area). The template is ground to accept the sleeves. The paralleling pins are used to align the sleeves; they are then secured to the template with resin. Once the flap is elevated and there are no anatomical or physical aberrations, the template can be held firmly in place. Important placement can proceed rapidly, accurately, and predictably. (M. Katzap)

"The Use of a New Allograft Material for Osseous Reconstruction Associated With Dental Implants," by C. A. Babbush. Implant Dent 7(3):205–212, 1998.

Demineralized freeze-dried bone allograft (DFDBA) has been widely used as a bone regenerative graft material. However, clinical studies have demonstrated a lack of osteoinductivity of DFDBA in human extraction sockets and poor handling capabilities.

Human tendon glycoprotein in the form of a porous matrix or sponge (Cynagraft-30, Gensci, Inc, Costa Mesa, Calif) to carry DFDBA enhances the handling properties of the resulting regenerative matrix material. This material has been successfully used in both humans and baboons. It is actively hemostatic, expands to fill the osseous defect, and is well retained. It has also been found to prevent the apical migration of epithelial cells, and it possesses intrinsic guided tissue regenerative properties.

Three case reports are presented that demonstrate extraction and the immediate implant placement with accompanying osseous defects. Human tendon glycoprotein impregnated with DFDBA was used to graft these sites. The three implants were uncovered at 6, 5, and 4 months after the initial surgery. A 4.0 mm hollow-core trephine burr was used to harvest a bone core, which was histologically studied. It was found that the core contained hematopoietic marrow and associated unilocular fat cells. Cement lines between the area of new bone and the remodeling matrix and the collagen portion of the matrix were remodeled and replaced with new bone 4 to 6 months after implantation. Histologic conclusions found that the formulated matrix initiates new bone formation, after the matrix is remodeled and replaced by new bone, and the microscopic morphology of this bone is that of trabecular bone. The new bone regeneration material is recovered and supplied by tissue banks certified by the American Association of Tissue Banks. (S. Seu)

"Autogenous Mandibular Bone Grafts in the Treatment of the Resorbed Maxillary Anterior Alveolar Ridge: Rationale and Approach," by A. K. Garg, M. J. Morales, I. Navarro, and F. Duarte. Implant Dent. 7:169–176, 1998.

The most critical region of the mouth for replacement of teeth is the maxillary anterior because of its importance in esthetics, phonetics, function, occlusal pattern, and patient awareness. There are several factors that result in a decreased implant survival, an increase in phonetic complication, or a combination of both. Conditions that limit or prevent the placement of implants include an insufficient amount of bone in the maxillary anterior ridge. The facial cortical plate over the roots of the maxillary teeth is very thin and porous and may resorb from periodontal disease or be fractured during extraction of teeth. Other factors that can cause resorption of the maxillary ridge are periodontal disease, extraction, pathologic destruction, and anatomic limitations such as the proximity of nasal and maxillary sinus cavities, lateral extension of the incisive canal, and facial concavities.

The authors recommend topographical analysis of the edentulous ridge from the incisogingival and faciolingual positions. Surgical correction of the ridge is required for crests of less than 5 mm. A minimum of 1 mm of bone is required around the implant for it to succeed. Augmentation procedures can be used to increase the amount of bone in the maxillary alveolar ridge. Autogenous bone grafting can be used to enlarge the maxillary anterior alveolar ridge. The iliac crest is the most common donor site for harvesting the bone graft. However, the mandibular symphysis as a donor site for small grafts offers ease of access, good bone quality for localized repair, a corticocancellous block graft morphology, low morbidity, and minimal graft resorption.

The authors also recommend preoperative evaluation using Panorax to evaluate the donor site as well as a lateral cephalometric radiograph for anterioposterior dimension of the anterior mandible. Periapical films are recommended to measure mandibular anterior tooth roots. A crestal incision is made and flaps reflected. The recipient site is debrided and irrigated. A bone can be placed into the defect area and molded to approximate the dimensions of the requisite bone graft. The graft is harvested from the mandibular symphysis with the use of osteotomes. The harvested bone includes the facial cortical plate and attached trabecular bone. Freeze-dried bone particles can be packed in the donor site to restore the defect.

The graft is contoured before placement to eliminate sharp edges. Titanium alloy screws 1.0 mm in diameter are used to fix the graft onto the maxilla. The final reconstructed recipient ridge should be at least 7 to 8 mm in width. The area is allowed to heal for a period of 6 to 8 months, after which surgical reentry is done to remove the mesh. Implant placement then proceeds after sufficient bone is present. (S. Seu)

"Comparison Between Freestanding and Tooth-Connected Partially Stabilized Zirconia Implants After Two Years' Function in Monkeys: A Clinical and Historical Study," by Y. Akagawa, Y. Sato, R. Hosokaw, and H. Kamayama. J Prosthet Dent 80:551–558, 1998.

The main purpose of this study was to clarify the role of osseointegration

around the first-stage partially stabilized zirconia screw implant with different conditions of loading support after 2 years of functional use in monkeys. Thirty-two partially stabilized zirconic implants were placed into the mandibles of eight monkeys. After 12–24 months of loading, dental, histologic, and histomorphometric evaluations of perioimplant tissue were performed on 28 implants. Direct bone opposition to the implant was generally seen in all groups. The authors concluded that partially stabilized zirconia implants achieved long stability of osseointegration with the use of single freestanding, connected freestanding, and implant-tooth supports. (J. Gulbenkian)

"Establishing Soft Tissue Integration With Natural Tooth-Shaped Abutments," by T. Salinas and A. Sadan. Practical Periodont Aesthetic Dent 10: 35–42, 1998.

There is always a disparity between implant fixtures and exposed extraction sockets. Thus, anatomically shaped abutments were developed. There are systems that fabricate abutments to the configuration of natural teeth for the anterior maxilla. Since the configurations are identical to healing abutments, impression post, and definitive abutments, only minimal or no soft-tissue modifications are required following second-stage surgery. (J. Gulbenkian)

"Photoelastic Stress Patterns Produced by Implant-Retained Overdentures," by R. Kenney and M. Richards. J Prosthet Dent 80:559–564, 1998.

When two implants are used to support a removable overdenture, optimal stress distribution is necessary to minimize the forces on the implants. This study used photoelastic analysis to compare the stress patterns generated around implants.

Vertical forces were transferred with minimal stress using the ball/O-ring attachment. Vertical stress forces applied to the overdenture created immediate stress patterns on both implants. This study showed that ball/O-ring attachments transferred less stress to implants than do clip bar attachments. (A. Heffez)

"Managing Malcentered Arches and Limited Vertical Space for Implant-Supported Overdentures," by A. Raigrodski, A. Sadan, and T. Salinar. Practical Periodont Aesthetic Dent 10:163–170, 1998.

Skeletal relationships, arch malalignment, implant angulation, and ridge morphology must be evaluated in some patients. Class III horizontal relationships, reduced interarch space, and an unfavorable denture-bearing area are often presented by patients. A good alternative is the use of a palateless, implant-supported, milled overdenture as a successful mode of treatment for the maladaptive patient. (A. Heffez)

"Use of the Fixed Mandibular Implant in Oral Cancer Patients: A Retrospective Study," by M. August, B. Bast, M. Jackson, and D. Perrott. J Oral Maxillofac Surg 56:297–301, 1998.

Dental rehabilitation of the oral cancer patient remains a challenging problem. As reconstructive techniques have become more sophisticated, the restoration of lost bone and soft tissue has allowed for further rehabilitation with the use of specially designed denture prostheses. The capacity of radiated bone to accept endosseous implants continues to be evaluated. Tumorcidal radiation doses to the mandible and maxilla are no longer considered contraindications to implant placement. However, the optimal time between radiation treatment and implant insertion, and the longevity of these implants is still uncertain.

This study was a retrospective review of the fixed mandibular implant (FMI) in oral cancer patients that discussed the success and associated complications of the device. Eighteen oral cancer patients with an FMI were identified. All were treated at a single institution. Information was obtained from medical records, radiographs, and recall examination. Demographic data, prosthesis design, surgical history, and functional data were analyzed. The results were compared to the outcome of FMI in noncancer patients. Early complications included soft tissue overgrowth around pins, tongue ulceration, and intraoral wound dehiscence. Late complications included fistula formation, submental erythema, and persistent tissue overgrowth around pins. None of the complications required the removal of the implants. Only the rate of fistula formation was statistically greater than in controls. The average time between FMI placement and prosthesis delivery was 3.6 months. The patients reported improved ability to eat solid foods and improved articulation. The patients also reported improved self-confidence and increased comfort in social settings due to the improved aesthetics that implants provide.

The FMI is a valuable device for dental rehabilitation in oral cancer patients. Success was shown in radiated patients. The complication rate was found to be acceptable, and stability was shown over the follow-up period. Rapid rehabilitation and functional and aesthetic improvements were also reported. (M. Eisenberger)

"Maxillary Implant Surgery on a Patient with Thalassemia," by C. M. Misch, R. L. Jolly, D. R. Williams, and C. J. Chanavez. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 86: 401–405, 1998.

Thalassemia is considered the most common genetic disorder worldwide. The thalassemias are a group of inherited hemoglobinopathies caused by the defective synthesis of hemoglobin. There are two main groups, α-thalassemia, where the α-globin chain synthesis is reduced, and β-globin thalas-

semia, where there is a deficiency of the β-globin chain formation. The pathophysiology of β-thalassemia has three major components: An overall reduction in hemoglobin synthesis, ineffective erythropoiesis with intermedullary destruction of developing red cell precursors, and hemolysis of mature cells containing only α-chain inclusions. A compensatory erythropoiesis leads to an expansion of marrow cavities, and extramedullary hematopoiesis in the liver and spleen. β-Thalassemia syndromes are classified as major, intermedia, minor, and minima.

The authors describe a case report. A 64-year-old woman presented for maxillary dental implants. Her medical history included positive for anemia, recurrent epistaxis, and arthritis. The patient had been treated for anemia with iron supplements in the past. She had no other unusual findings and no complaints of sinusitis. A clinical oral exam found partial maxillary edentulism with pale intraoral soft tissues and no malocclusion. A panoramic radiograph showed asymmetry of the maxillary sinuses, with apparent hypoplasia of the right antrum and osteopenia of the maxilla. A computerized tomography scan confirmed the sinus hypoplasia and decreased bone density. It also revealed bilateral radiopacities within the maxillary sinuses that appeared to be consistent with mucosal thickening. The study found adequate bone width and height for implants in the posterior maxilla without the need for sinus grafting or ridge augmentation. The patient's treatment plan included placement of endosseous dental implants with a fixed replacement of her maxillary dentition. Because of poor bone quality, implants were planned to restore the arch to the second premolars. Preoperative hematologic studies found a microcytic hypochromic anemia. Hemoglobin electrophoresis confirmed the diagnosis of thalassemia minor. The patient was cleared for outpatient implant surgery. The patient had surgical placement of endosseous root form implants in the maxilla under intravenous sedation. She was given antibiotics intravenously before surgery, and antibiotic coverage was continued for 1 week postoperatively. On drilling, the bone quality was found to be quite poor and was graded as type IV. Copious irrigation with saline was used during bone preparation. Tapered osteotomes were malleted into the soft bone to compress the trabeculae and to minimize bone removal. The implant osteotomies were undersized to allow threading of the screw-type implants within bone. An emphasis was placed on atraumatic surgery. Eight hydroxyapatite-coated implants, each 3.7 mm in diameter, were placed in the maxilla distal to the central incisors. Hydroxyapatite has been shown to enhance bone apposition to the implant surface and to improve implant success in bone of poor quality.

The patient healed uneventfully: all eight implants were found to be well integrated, with no mobility, no marginal bone loss, and no bone defects. Radiographic examination found no evidence of peri-implant radiolucencies or delayed bone healing. Gradual loading of implants with an acrylic bridge allowed continued development of the supporting osseous interface. Cement-retained porcelain-to-metal implant bridges were fabricated. The mandibular arch was restored with porcelain-to-metal crowns and a removable partial denture. The patient has been functionally restored for more than 1 year. (S. Honikman)

"Histologic Observations on 230 Retrieved Dental Implants: 8 Years' Experience (1989–1996)," by A. Piattelli, A. Scarano, and M. Piattelli. J Periodontol 69:178–184, 1998.

Successful management of ailing and failing implants is an important field in dental research. The problems concerning the treatment of implants for peri-implantitis or premature or excessive loading are highly relevant. Histological reports of implants retrieved from humans have rarely appeared in the literature. The data gained from the histologic examination of these implants are extremely important. The aim of this paper was to histologically examine dental implants retrieved from humans and establish causal determinants of implant failure as well as to compare and validate the results obtained from animal studies.

The study presents a retrospective review of the histologic features of 230 implants retrieved in an 8-year period between 1989 and 1996. The results were divided into four groups as follows: (1) Implant failure due to peri-implantitis before loading. In about 70–80% of the cases, there was a bone sequestrum consisting of partially demineralized necrotic bone and empty osteocytic lucanae. The bone was also completely surrounded by bacteria. (2) Implants removed due to peri-implantitus after loading. Bone sequestra were present. Bacteria were present on the most coronal portion of the implant, whereas bone was present in the most apical part. An inflammatory infiltrate was present in the connective tissue around the implants. There was a large quantity of plaque on implants with rough surfaces. (3) Implant removal due to mobility. The implants were usually surrounded by a dense fibrous connective tissue. No inflammatory infiltrate was present. In the most coronal portion, there was a predominance of resorption areas with many osteoclasts. (4) Implants removed because of fracture. The bone around the implants was mature, compact with few marrow spaces, and, in most cases, it was possible to observe the presence of a high percentage of bone implant contact.

This study found that host tissue factors (*ie,* peri-implantitis, mobility) were implicated as causative factors more than biomaterials problems (*ie,* fractures). Histologic examinations of the implants that failed because of peri-implantitus implicated overheating of the bone during implant insertion, occurrence of an infection caused by a dis-

eased tooth nearby, or tissue breakdown arising from pathogens in the natural dentition as causative factors. Peri-implantitis after connection of the prosthetic was most frequently seen between 1 and 2 years and is probably related to poor oral hygiene, or possibly to the presence of crestal bone resorption in the most coronal part of the implant. A large quantity of plaque was observed on the surface of these implants. However, no mobility was present in the postloading peri-implants. The long-term predictability of HA-coated implants is controversial because some reports have suggested that they are unstable and seem to have an increased susceptibility to bacterial infection. Because of its rougher surfaces, HA and plasma-sprayed implants are more difficult to clean than titanium; therefore, they attract more plaque. However, microbiologic studies showed that microbial colonization of rough-surface implants and titanium implants were similar.

Implants retrieved for mobility were rarely lost in the first 2 years after the connection of the prosthetic restoration. Mobility occurred after a mean period of 4.07 years. Epitheleal cells were present with subsequent spontaneous exfoliation. This seems to be pathognomic of traumatic failure arising from the placement of implants in ill-fitted sites. Traumatic failures occurring in stage I were usually due to an improper surgical technique, improper design of the transitional prosthesis, premature loading of the implant, or improper initial diagnosis. Failures in stages II through IV are most often the result of improper prosthetic trauma. Histology showed that in implants removed because of fracture, there was a very high percentage of peri-implant bone, and the fractures tended to occur after several years. (M. Eisenberger)

These reviews were contributed by the Residents and Fellows of the Department of Dental and Oral Surgery of the Brookdale University Hospital and Medical Center.