Immediate Placement of Implants after Extraction: A Literature Review

by Drs. Bertrand Bonnick, Andrew Kelly, Richard Nguyen, Alex Resnansky, Jean Woods

There are mixed opinions on the success of immediate implant placement at the time of extraction. Immediate placement of implants brings into the success equation many variables not found in routine implant placement. Issues such as bone density, bone preservation, bone grafting, the presence of infection, trajectory of placement, types of implants, use of membranes are some of the factors considered. Various techniques, complications, and retrospective studies were used to examine the efficacy of immediate implant placement. Immediate placement shortens the time that it takes before a patient can have a restored dentition; it also lessens the amount of surgical exposure for the patient. The practitioner should be careful because the choice of cases and technique influences the overall success rate of the implant.

Traditional implant placement and predictable outcomes first came to us through the work of Adell, Lekholm, Rockler, and Branemark. In 1988-1992 a study done by Mensdorff-Pouilly et al. comprising 190 immediate implantation (93 primary immediate implantations and 97 secondary immediate implantations performed 6 to 8 weeks postextraction) showed that the group of primary immediate implants showed a tendency towards deeper pocket formation and an increased frequency of membrane dehiscences that may be due to the poorer quality of the soft tissue covering.

In 1993 Barzilay presented a paper on Immediate Implants: Their Current Status. He refers to the change of prosthetic treatment in North America after the introduction of “osseointegration technology” at the 1982 Toronto Conference. In theory the concept provided many advantages including fewer surgical sessions, reduced overall costs, and preservation of alveolar bone height. He refers to the poor success rates with soft tissue noted at the interface in earlier studies; however he hinted that short-term research using animals and humans has shown that immediate implants are comparable to implants placed using the conventional technique. He concluded that long-term studies were needed.

As knowledge of immediate implant surgery and tissue management increased reported success was more encouraging for this modality. Covani et al. in his 2004 study was able to achieve a 4 year cumulative success rate of 97% and moreover, no statistically significant differences were observed in terms of clinical attachment level between those implants treated with GBR and those without

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Tibits

Internet Resources

Broken screws in implants and/or abutments may lead to implant failure. Zimmer has some good information on removing broken screws at http://www.zimmerdental.com/lib_techTipBrokeScr.asp. They also sell a Thread Retrieval Kit that can be used to remove broken screws. Nobel Biocare has a well-done instructive video on live “all-on-4” implant surgery by Dr. Paulo Malô of Lisbon, Portugal at http://www.nobelbiocare.com/global/en/ ClinicalProcedures/EdentulousJaws/default. There is a second video on delivering the bridge.

Book

Quintessence Publishing [1.800.621.0387] is promoting their new book, Bone Biology, Harvesting, and Grafting For Dental Implants: Rationale and Clinical Applications edited by Arun K Garg and retailing for $158. Many patients who are otherwise ideal candidates for implant therapy lack sufficient alveolar bone to support dental implants. This book presents all facets of bone augmentation in preparation for implant placement, including techniques for harvesting bone from the ramus, the anterior mandible, and the tibia; the various types of bone-grafting materials and their indications; step-by-step procedures for grafting the maxillary sinus and anterior alveolar ridge and for subnasal elevation and augmentation; and guidelines for the use of adjuncts such as platelet-rich plasma to enhance healing and predictability. Practitioners of implant dentistry at all levels will learn much from this book.

Dr. Garg states in his preface, “For the past 10 years, many of the questions raised during my hands-on cadaver, live-surgery, and lecture programs have pertained to bone biology, graft materials, membranes, bone harvesting, or bone grafting. While it seems that most practitioners today have been adequately trained in the technical aspects of placing implants, I find that many lack knowledge of the basic biologic processes that allow us to harvest bone from one area of the mouth and graft it in another. Since the format of a short lecture or even a one-day course does not allow me to delve very far beyond the step-by-step procedures associated with harvesting and grafting bone, I conceived the idea of writing a book that would explain not only how to perform these and other procedures, but also why we do them one way and not another and what makes the procedures work. Above all, my aim in writing this book was to arm the clinician with a sufficient understanding of bone and bone grafting to be able to make decisions that will benefit individual patients, without overwhelming him or her with information that is not directly relevant to that purpose...It is truly remarkable to consider how much implant dentistry has evolved over the past two decades. Today we are able to restore function in patients with as little as 1 mm of crestal bone height, providing they have adequate ridge width to accommodate the intended implant. This has significantly expanded the number of patients who qualify as candidates for implant therapy, but the clinician must be knowledgeable about the needs of these individual patients, without overwhelming him or her with information that is not directly relevant to that purpose.”

Consultation Tool

Recently we ran across a company, Consult-Pro [1-800-519-6569] out of Toronto, Canada that sells a CD with comprehensive education modules used for case presentation and patient consultations. There is an excellent implant section with high quality graphics that make the concept of implant treatment easy to understand. Its use should lead to higher patient acceptance of implant therapy. Dr. Craig Misch and Dr. Sam Strong have given very positive testimonials on its benefits. You may visit them online at www.consult-pro.com.
Are Dental Implants a Predictable Alternative for Organ Transplant Recipients and HIV Patients?

by Cheryl Thomas, RDH, Lynne Slim, RDH, BSDH, MSDH and Lisa Wadsworth, RDH

As the overall health of the American population has increased, so has life expectancy. Americans are living longer than at any other point in our history and people who survive to the age of 65 can expect to live an average of 18 additional years. This year, the oldest baby boomers have turned 55 and this is the official age in which many are referred to as “seniors”. These new “seniors” are entering the second half of their lives with a youthful and vibrant self-image. Boomers are entering into retirement and into active retirement communities with far-reaching agendas. Many of these “Zoomers” are financially established, healthy and very demanding.

For the young and old, dental implants will continue to be a superior and predictable alternative to a fixed or removable prosthesis. As the “Zoomers” age, medical challenges will emerge that will affect dental treatment planning for this particular population group. Those who are medically compromised present with complex medical histories that demand physician consultation and collaboration.

Organ donation and HIV status are two medical conditions that are rarely discussed in the implant literature and by practicing implantologists. The purpose of this article is to review what is known about the two aforementioned medical conditions and their impact on implant placement and retention.

Are organ transplant recipients suitable candidates for dental implants?

Organ transplants are one of the modern day miracles of medicine. Demand for organ transplants will undoubtedly increase due to the rapid rise in the aging ‘Zoomer’ population along with a steady increase in the incidence of diabetes and Hepatitis C. There are currently 87,000+ people on the organ waiting list according to UNOS (United Network for Organ Sharing)\(^2\) Pam Silvestri, Director of The Southwest Transplant Alliance, states: “In the last 10 years the list has grown by more than 300 percent. By 2010 estimates say 1 in 10 people will need an organ or tissue transplant.”\(^2\) The Southwest Transplant Alliance is an agency that works directly with UNOS on a regional basis representing organ transplantation in Texas and Oklahoma.

Infection

Organ transplant recipients are susceptible to infection due to immunosuppressive medications. Cyclosporine, Cellcept, Tacrolimus, Rapimune, and Prednisone are still the model drugs for immunosuppressive therapy. These medications are necessary to prevent graft rejection; however, they leave patients susceptible to life-threatening sepsis. Will susceptibility to infection prove to be an obstacle for dental implants? Medically stable transplant recipients recover well from various surgeries. Hip replacement surgery was addressed by Lo, NN et al and this surgical procedure was deemed a success in renal transplant recipients.\(^3\) Keep in mind, however, that in hip replacement surgery “THR is the treatment of choice for patients with painful osteonecrosis of the hip after renal transplant, but has higher rates of both early and late complications. Surgery should be performed in close association with a renal transplant unit.”\(^4\) To avoid the complication of infection for any surgical procedure, the implant team should work closely with the renal transplant unit and will need to recognize and treat any sign of infection early.

Antibiotics

The American Academy of Orthopaedic Surgeons (AAOS) recommends antibiotic prophylaxis for surgical procedures performed on drug-induced immunosuppressed patients in its advisory statement “Antibiotic Prophylaxis for Dental Patients with Total Joint Replacements.”\(^5\) (The document in its entirety may be found at: http://www.aaos.org/wordhtml/papers/advistmt/1014.htm). The transplant community is divided on the topic of antibiotic prophylaxis for invasive dental procedures. The implant team should thoroughly evaluate the risk of infection and determine if antibiotic therapy is indicated for prevention of host infection.

Patient Selection

In selecting patients for dental implants, systemic diseases must be taken into consideration. For example, it is well recognized that a poorly managed diabetic patient would not warrant a favorable dental implant prognosis. Pre-operative blood work, CT scans, bone density scans, and medical evaluations of the organ transplant recipient by the patient’s primary care physician are recommended. The primary care physician and dental implant team must work hand in hand to evaluate the medical stability of the candidate.

Renal Transplant

Renal transplants are the most commonly performed transplants. When determining a medically stable transplant recipient, one must evaluate the whole picture and not only the organ involved because these patients frequently present with multiple organ involvement. The ideal candidate for a dental implant is one that is monitored routinely by an appropriate health care provider. The nephrotoxicity of immunosuppressive medications may subject hepatic and cardiac transplant recipients to end stage renal disease and possibly renal transplantation. The most common causes of end stage renal disease are diabetes, hypertension, and glomerulo diseases. The etiology of the patient’s renal disease should be well controlled before elective surgery.

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Testing

Creatinine and bilirubin are routine blood tests that establish renal and hepatic function respectively. “Creatinine (kree-AT-uh-nin) is a waste product that comes from the normal wear and tear on muscles of the body. Creatinine levels in the blood can vary depending on age, race and body size. A creatinine level of greater than 1.2 for women and greater than 1.4 for men may be an early sign that the kidneys are not working properly. The level of creatinine in the blood rises, if kidney disease progresses.” However, a renal transplant recipient with level of 1.6 may prove to be an ideal candidate. This level may be the patient’s new “norm.” Body mass, weight, and fluid retention may elevate creatinine levels and not be a true indication of renal function. Protein or blood in the urine is an indication of failing renal function. Twenty-four hour urine analysis, blood urea nitrogen levels, and Glowfils are an intricate piece of the puzzle and should be evaluated. Among the important substances the kidneys help to control are sodium, potassium, chloride, bicarbonate HCO3- (measured indirectly as CO2), pH, calcium, phosphate, and magnesium and any abnormality in these levels could be indicative of an underlying renal problem.

Liver Transplant

Cirrhosis of the liver due to hepatitis and alcoholism are the most common cause of liver failure. Liver transplantation is the second most commonly performed transplant. Bilirubin is produced in bone marrow cells and in the liver as the end product of red-blood-cell, hemoglobin breakdown. The amount of bilirubin manufactured relates directly to the quantity of blood cells destroyed. Normal values of direct bilirubin are 0 to 0.3 mg/dl and for total bilirubin: 0.3 to 1.9 mg/dl. Most important, the patient’s red and white blood cells should be within normal limits. The liver converts nutrients derived from food into essential blood components, stores vitamins and minerals, regulates blood clotting, produces proteins and enzymes, maintains hormone balances, and metabolizes and detoxifies substances that would otherwise be harmful to the body. The liver is an integral part of the immune system in fighting infection and removes bacteria from the blood. Any infection is a contraindication to surgical procedures in organ transplant recipients.

Vital Signs

Regardless of the organ transplanted, stable vital signs are necessary as they would be for any implant candidate. Side effects of medications should be researched. Prednisone is a common medication taken by organ transplant recipients. The side effects of prednisone include: delayed wound healing, susceptibility to infection, osteoporosis, osteonecrosis, and the possibility of adrenal crisis with surgical procedures. Prolonged therapy with prednisone causes the adrenal glands to atrophy and stop producing cortisol; therefore, a medical consultation is warranted to determine if a temporary elevation of prednisone is indicated for surgical procedures.

Implant Studies

Though organ transplants have been successfully performed for over 50 years, few studies have addressed the possibility of dental implants for organ transplant recipients. In one particular study that included a ten-year period of tracking a liver transplant recipient, the cause of liver disease resulted from cirrhosis and hepatocellular carcinoma. The patient’s last two teeth were removed prior to transplantation. The patient received a liver transplant in 1992 at age 61. Six months after transplant, two implants (solid screw, diameter: 3.3mm, length: 12.0mm) were placed in the interforaminal region [fig. 1]. Osseointegration was achieved and an overdenture was fabricated. In 2004, a ten-year follow-up showed stable liver function. In addition, the dental implants were deemed a success [fig. 2]. “This case report suggests that immunocompromised patients can be successfully rehabilitated with dental implants.” Dr. Heckman, the principal author of the aforementioned research paper, was asked if renal transplant recipients would also prove to be good dental implant candidates. Dr. Heckman responded as follows: “From my experience, a renal transplant recipient with stable bone density can be treated with dental implants.”

Cyclosporine

It is estimated that 10% of transplant recipients treated with cyclosporine develop gingival overgrowth. “Its severity reflects the interaction of effective dental hygiene, cyclosporine dose, and concomitant administration of calcium antagonists (particularly dihydropyridines). This complication does not seem to occur with use of tacrolimus, and complete resolution of gingival hyperplasia has been noted with the conversion from cyclosporine-based therapy.” Furthermore, research has shown that Human Leukocyte Antigen (HLA), used in organ matching criteria, may explain why some patients have a higher incidence of gingival hyperplasia. By testing lymphocytes, the transplant team is able to determine which HLA antigens the patient has as a part of their genetic makeup to determine which tissues would have the “best genetic match.”

Radiographs courtesy of Dr. Siegfried Heckmann and the Journal of Periodontology.
Today, 118 different known HLA antigens have been discovered. Though some transplants are performed without any HLA matches, a majority of the transplant community believes that the better the antigen match, the less likelihood of rejection. The success of dental implants relies upon proper placement and technique. If an implant is placed correctly, gingival overgrowth should not be a concern given the smooth surfaces of dental implant structures; however, if chronic gingival overgrowth manifests, changing immunosuppression therapy from cyclosporine to tacrolimus is a viable option.

### Side Effects of Anti-Rejection Medications

Cyclosporine is notorious for causing gingival overgrowth; however, the list of oral side effects also includes gingival bleeding, salivary gland enlargement, tongue disorders, taste perversion, xerostomia, candidiasis, hyperkalemia, abscess, bacterial and viral infection. Carcinoma, bone fracture, and secondary diabetes mellitus are also side effects that could have a dental impact. Cellcept oral side effects include gingivitis, gingival overgrowth, xerostomia, Cushing syndrome, parathyroid disorder (which may be indicative of renal osteodystrophy), infection, mouth ulcerations, stomatitis, hypercalcemia, osteoporosis, coagulation disorder, and some cases of infectious endocarditis have been reported.

Secondary diabetes mellitus is also observed as a side effect of anti-rejection medications. Rapimune oral side effects consist of gingivitis, gingival overgrowth, parathesia, mouth ulcers, stomatitis, abnormal healing. Hypocalcemia, Cushing syndrome, diabetes mellitus, bone necrosis, osteoporosis, sepsis, and viral infections may also develop. Comparatively, Tacrolimus has relatively few listed oral side effects (taste perversion and tooth disorder). All of these medications are nephrotoxic. Hypertension, hypotension, cardiac disorders, hematologic disorders, convulsions, and susceptibility to infection are also common side effects of all the aforementioned medications. Experimental anti-rejection medications are introduced daily. Many transplant recipients participate in drug research and often the side effects of these medications are unknown.

### Bone Disease

Bone diseases pose the biggest obstacle for implantologists. For instance, end stage renal disease and dialysis commonly result in degenerative bone disease due to secondary hyperparathyroidism. “Bone loss is rapid after transplant, most likely as a result of corticosteroid therapy. The rate of bone loss is greatest in the first 6 months, after which it slows somewhat.”10 Although the majority of bone loss from prednisone occurs during the first 6 months of therapy, it is known that people who are on more than 5 mg of prednisone long term will continue to be at risk for bone loss.”11 “Patients taking long-term prednisone often receive supplements of calcium and vitamin D to counteract the effects on bones. Calcium and vitamin D probably are not enough, however, and treatment with bisphosphonates such as alendronate (Fosamax) and risedronate (Actonel) may be necessary. Calcitonin (Miacalcin) is also an effective supplement. The development of osteoporosis and the need for treatment can be monitored using bone density scans.”12 The loss of bone density experienced by a person taking corticosteroids varies on a number of factors. For example, bone loss appears to be greatest when corticosteroids are taken orally than by other means and when they are used in higher doses and over longer periods of time.

### Secondary Osteoporosis

Secondary osteoporosis is also seen in patients taking phenytoin (Dilantin®), barbiturates, methotrexate (Rheumatrex®, Immunex®, Folex PFS®), cyclosporine (Sandimmune®, Neoral®), Tacrolimus (Prograf®), luteinizing hormone-releasing hormone agonists (Lupron®, Zoladex®), heparin (Calciparine®, Liquaemin®), and cholestyramine (Questran®) and colestipol (Colestid®). Post-menopausal women and men with low testosterone levels are at high risk for osteoporosis. Patients with diabetes prove to be at high risk for low-turnover bone disease. “Plain radiographs are insensitive for the diagnosis of osteopenia, and the current standard of measurement is BMD, performed by dual X-ray absorptiometry (DXA). Osteoporosis has been categorized into three subtypes: - Type I is due to decreased estrogen exposure in post-menopausal woman and decreased testosterone production in males; - Type II is the generalized bone loss that occurs as a result of aging; and - Type III, or secondary osteoporosis, is due to the administration of drugs such as corticosteroids, liver disease, immobilization, or hyperthyroidism.”103 Magnetic resonance imaging is a sensitive diagnostic method allowing detection of osteonecrosis at a very early stage and would be a useful tool in evaluating bone integrity. Careful evaluation of the integrity of the bone and the location of the implant site must be taken into consideration. A peri-implant infection may pose a hazard to the patient’s general health and to the transplanted organ. A patient may become septic to infection or the infection may activate an immune response that leads to a rejection episode.

Is there a cure for bone disease in sight? Researchers from the Renal Divisions, Departments of Medicine and Pediatrics, Washington University School of Medicine, St. Louis, MO, injected mice that had been subjected to electrocautery of the right kidney followed by nephrectomy of the left were injected with the protein, bone morphogenetic protein-7 (BMP-7). The study was controlled for hyperparathyroidism. The researchers discovered that the mouse group that received BMP-7 had nearly normal bone structure while the control group did not. According to one of the clinicians, Keith A. Hruska, MD, BMP-7 may “totally eliminate the development of skeletal deformity.” Hruska told ScienCentral News that he also plans to study the effect of BMP-7 on heart disease in kidney failure and that the protein may even eventually reverse CKD itself. According to a report in the Journal of the American Society of Nephrology, “ABD produced in mice with CKD in the absence of hyperparathyroidism was successfully reversed with a bone anabolic, BMP-7, associated with a reduction in plasma phosphorus.”14

After organ transplantation, patients need to avoid habits that prove detrimental to their health and oral health professionals need to offer them an opportunity for improved oral health. Patients who continue to smoke or imbibe alcohol are not good candidates for dental implants. Smokers demonstrate poor wound healing and a predisposition to periodontal diseases. “In alcoholics these diseases appear to be caused primarily by bad oral hygiene and poor dental care.”15

Because infections may be masked in immunosuppressed patients, frequent continuing care appointments including examinations should be emphasized. Patients should be instructed to identify the signs of implant failure or infection. These signs should be stressed, and patients should be urged to seek care immediately should any signs of infection appear.

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**Table Clinics**

**Key Factors in Immediately Loading Dental Implants**
by Dr. George Mantikas

This table clinic was presented in November 2004 at the American Academy of Implant Dentistry’s Annual Meeting held in New York, NY.

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**Immediate Provisional Implant**
The placement and temporization of a dental implant at the time of surgery in a •Previous Edentulous Area •At the Time of Extraction.

**Treatment Options to Replace a Single Tooth**

**Vincent Kokich, DDS, MSD**
• Reported the Following by Early loading dental implants
  1. The crestal bone is maintained. The reports indicate that by delaying the load on implants a significant amount of crestal bone is lost.
  2. In periodontally infected areas, the immediate placement and loading enhance the maintenance of bone and does not affect the success of the implant.
  3. Osseointegration is more favorable with immediate placement of implant following an extraction.

**Implant Considerations**
These are basic factors affecting the success of any oral surgery: • Patient’s Health • Smoker • Bruxism • Bone Level • Bone Width • Condition of Surrounding Teeth • Missing Teeth on Arch • Patient’s Hygiene.

**Advantages of Provisional Load Implant**
• Esthetic considerations • Ridge Preservation • Papilla Preservation • Single Phase Healing • Single Surgery • Ease of Temporization • Cost Consideration • Time Consideration.

**Immediate Implant Cautions**
• Quality of Bone • Surgical Procedure • Possible Allergy • Poor Dentition.

**Preparation**
The most important aspect is the preparation prior to the surgical procedure. You can not skip steps! In order to have predictable successful results, certain steps must be taken. Cutting corners reduces success rate.

1. Impressions for: a. Diagnostic wax-up b. Surgical template c. Temporary fabrication

**Treatment Sequence and Appointments**
1. Diagnostic models and wax-up. 2. Extraction and placement of implant, final impression and temporary placement. 3. Suture removal 7-10 days later. 4. One-month post-op radiograph. 5. Three-four month radiograph and try in (placement) of final restoration.

**Case History #1**
• 32 year old Male • Negative Health History • Failing post and core and crown on tooth number 5 • Surrounding dentition unremarkable [figs. 1-12].

**Case History #2**
• 51 year-old female • Negative health history • History of failed RCT/P&C/Crown • Tooth #28 [figs. 13-16].

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Summary
Immediately loading of dental implants is a good alternative treatment involving simple surgery. When you have good preparation, the results are very predictable.

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GBR. Covani adhered to strict guidelines that included patients were placed on a strict oral hygiene, the use of GBR procedures were reduced, implant surfaces were acid etched/sandblasted, and all prosthetic restorations were single crowns 4.

Current implant systems with reliable internal connection ensure predictable success of restorations if guidelines are followed. Castellon et al. summarized guidelines for single tooth immediate provisionalization so we can go one step further after immediate placement of the implant. Hard tissue, soft tissue, and space available were the criteria used. Bone height greater than 10mm and width buccal-lingually of 2mm, soft tissue with papilla and keratinized gingival and interocclusal space of 1.5mm to 2mm mesiodistal 2mm buccolingual and 7mm apicocoronal were the best criteria 5 [figs. 1-2]. Garber and Salama and Salama documented the technique for immediate implant placement in a site where external resorption was taking place [figs 3-4]. Use of peritomes is contraindicated because osteoclastic activity is indiscriminate in its destruction of the periodontal ligament space and lamina dura of the bone. The coronal part of the tooth is removed and osteotomy is performed through the remaining tooth structure into underlying bone. Tooth remnants can then be removed and socket cleared of any left over debris. Immediate temporization can be accomplished so the patient does not have to wear a removable appliance in the esthetic zone. The temporary is kept out of occlusion to allow time for bone fill and osteointegration 6.

Dehiscence Coverage, Preservation of Esthetics and Histologic Studies

Wilson carried out histological analysis of immediately placed implants in 1998. 15 ITI TPS implants were placed, 6 in the maxilla and 9 in the mandible. All implants were osseointegrated at the light microscopic level with varying percentage of direct bone-implant contact. This study provides histological evidence that immediately placed implants become osseointegrated 7.

In 2000 Nemcovsky discussed the clinical coverage of dehiscence defects in immediate implant placement. 61 implants were placed in 61 healthy patients with primary tissue closure. The use of barrier membrane was not mandatory provided the implant was placed within a boney envelope, even if that envelope had partially missing bone. This study showed short-term successful results with bone graft and soft tissue coverage 8.

Bone Regeneration, Horizontal Fractures

Tooth Fractures, Placement Without Augmentation

Gher et al. studied the grafting and guided bone regeneration for immediate dental implants in humans. The study evaluated bone regeneration and osseointegration of hydroxyapatite (HA) and titanium plasma sprayed (TPS) implants place in sockets immediately after extraction in 36 adults with a mean age of 55.2 years. This study showed no significant difference in the osseointegration of implants whether HA or TPS implants were used. Implants grafted with demineralized freeze-dried bone allograft (DFDBA) along with a barrier material showed a +1.32 mm in crestal bone apposition at the apical socket crest (ASC) than implants without grafting and barrier material, which showed a -0.11 mm crestal resorption. The barrier material became clinically exposed in 24 of the 36 patients during initial post-surgical healing [fig. 5]. Sites that retained the barrier material uncontaminated for the full 6 months had significantly greater bone apposition (+1.92 mm) at the ASC versus sites where the material required early removal (-0.21mm). There was no statistically significant difference in bone changes between the maxillary and mandibular arches. While the study group of 36 humans can be considered small the viability of immediate implant placement is encouraged because all 44 implants were osseointegrated at the six-month re-entry surgery 9.

Krauser et al. gave a case study for immediate implantation after extraction of a horizontally fractured maxillary lateral incisor. This case is one in which fractured tooth #7 [fig. 6] needs to be extracted because of a horizontal fracture but the abutment teeth #6 and #8 do not require restoration. A full thickness flap is elevated preserving the interproximal papillae. Both sections of the tooth are removed with as little trauma as possible. Socket debridement is performed with a #8 surgical bur and hand curettes. Place as large an implant as possible so it is snug and stable [fig. 7].

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Densely pack graft material and cover it with a membrane, then cover with an occlusive barrier. After one month insert a transitional prosthesis. This is a disadvantage for this technique because the tooth loss is in an esthetic area and it would be hard to convince the patient to go one month without a prosthesis. The authors warn that if the site is angled or the trajectory is off close and allow the site to heal, then re-enter at another date. Another disadvantage of immediate insertion is the uncertainty of not knowing your outcome earlier in the surgery.

Cohen and Shenoy gave a similar case report involving a maxillary central incisor with similar success yet they had immediate use of a provisional maxillary removable partial denture. They obtained primary coverage by sliding the full-thickness buccal mucogingival flap to the palatal flap without the use of grafting materials.

Becker et al. did an extensive study with 134 implants in 81 patients without augmentation or barrier membrane. Forty-seven implants were followed over 4 to 5 years with a 93.3% success rate. This indicates that implants placed at the time of extraction without augmentation or grafting have excellent long-term cumulative success rates.

Cosci and Cosci reported on 423 hydroxyapatite coated implants over 7 years (1989-1995). During the one year follow-up one implant was lost, and an additional implant failed during the 7 year follow-up, with a final success rate of 99.53%.

In the early 1990's Mason discusses his technique of immediate placement using HA coated implants. He found that at the uncovering stage he would find bone growing over the implant. One the other hand Wallace prefers to use titanium implants because of their long-term success record and less possibility of periodontal problems due to HA degradation.

Werbit and Goldberg demonstrate with several cases that an intact extraction site is not necessary for successful integration of a titanium fixture. Guided tissue regeneration and bone grafting can be used successfully in compromised sites.

Parel and Triplett described immediate placement of fixtures beneath the apices of extracted teeth in the anterior mandible. This procedure was described as a radical departure from conventional mandibular protocol.

Krump and Barnett compared results of placing endosseous implants into the anterior mandible at the time of extractions with appropriate radical alveolectomies versus a control group. The success of the immediate group was 92.7% while the control group was 98.1%.

Landsberg describes a novel approach called the “socket seal surgery.” A 3 to 4mm thick soft tissue graft that contains part of submucosa is obtained from the palate, the implant is placed in the socket and the soft tissue sutured around the socket. A space screw can also be used when the implant head is almost level with the labial crestal bone.

In 1995 Evian and Cutler present cases where a failed screw type pure titanium implants were replaced immediately with a HA coated Ti-6Al-4V implants. This negated the common protocol at the time where the failing implant was extracted, socket curetted and a one year healing period was observed. Success was enhanced when the sockets were prepared to remove grooves and soft tissue, the replacement implant was larger in diameter than the original implant, and sufficient available bone remained for the procedure.

Enhancing Placement, Alveoloplasty and Resorbable Membranes

In 1991 Tolman and Keller reported their results from immediate placement of 301 implants in 61 patients over a six-year period. They concluded that placement of implants were contraindicated in the presence of acute periodontal or periapical infections. However if these areas can be eliminated with alveoloplasty, drilling, or tapping procedures then success can be expected. All 301 implants were osseointegrated and prosthetically loaded.

Delayed Immediate, Posterior Maxilla, and Retrospective Analyses

Grunder et al report compared the Immediate Placement and Delayed-Immediate placement over a 3-year loading period. It was found that there was no difference in survival rate between Immediate and Delayed-immediate placements. The success rate was 92.4% for the 264 units placed. There was some clinical correlation of higher failure rate when periodontitis was the reason for tooth loss.

Rosenquist and Grenthe studied the survival rate of Immediate Placed implants into extraction sockets. Of the 109 nobelpharma implants placed there was a 93.6% survival rate, 92% for periodontally involved extracted teeth and 95.8% for teeth extracted for other reasons. It was found that bone preservation and less treatment time was the greatest advantage for placing implants in extraction sockets. The main disadvantage was more complicated tissue handling technique to gain satisfactory esthetics.

Conclusion

Immediate placement of implant after extraction is a procedure that will become the standard of care in the circumstances outlined.
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Careful use of adjunctive procedures and consideration of the variations in technique will greatly enhance our success using this modality.

Recent success can be attributed to the improvements in the texture of implant surfaces and its ability to cause fibrin to stick encouraging the migration of osteoblasts.

The bone growth around HA coated implants is one of its advantages and the current method of plasma spraying as well as the use of HA below the first few titanium threads have helped to make HA coated implants more desirable for immediate placement.

From the entire information available immediate implant placement after extraction is most successful in the anterior maxilla and anterior mandible after alveoloplasty to remove infected sockets. The presence of vital structures in the posterior maxilla and posterior mandible contraindicates immediate placement except under extreme circumstances. Most guidelines recommend preparation of the osteotomy 4mm apical to the apex of the tooth socket to achieve primary stability. Presence of boney septums after extractions in these areas serves to deflect osteotomy drills and make it difficult to obtain proper implant trajectory.

Footnotes and Bibliography

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CE Programs

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1- 2 - Clinical Advantages of Shorter Implants: Making Short Implants a Predictable Clinical Reality - Dr. Nicholas Elian, Dr. Douglas Deporter, Dr. Craig Cooper, New York, NY - $695 - NYU College of Dentistry - 212.998.9771.

7- 9 - Why, When and How to Create Long-Term Predictable Implant Restorations - Dr. J. Daulton Keith, Jr, Dr James River & Henry Martin, CDT, Charleston, SC - $2,600 - 800.752.6751.


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The article will be continued in the May/June 2005 issue of Implant News & Views and will discuss dental implant treatment with HIV-AIDS patients.

7- 9 - Advanced Implant Dentistry and Bone Grafting - Dr. Joel Rosenlicht, Manchester, CT - $2,500 - 860.649.2272.

7- 9 - Clinical Training Program - Drs. Shadi Daher and Mauro Marincola Cartagena, Columbia - $8,500 - Bicon - 800.882.4266.

8- 9 - Practical Skills for the Advanced Dental Implant Practice - Dr. Jack Krauser, Boca Raton, FL - $1,975 - 561.392.4747.

8- 9 - Immediate Restoraton of Dental Implants - Dr. Paul Petrungaro Lake Elmo, MN - $2,995 - 651.351.9660.

9- 10 - Success with Dental Implants - Dr. Arun Garg, Dr. Lillieth Ayangco & Dr. Avi Schettitt, Memphis, TN - $2,950 - 305.281.7125.

13 - Occlusion in Implant Dentistry - Dr. Spyridon Condos and Dr. Jeffrey McClendon, New York, NY - $225 - NYU College of Dentistry - 212.998.9771.

14- 16 - Treatment Management & Prosthetic Applications - Dr. A. Schaffran, Toronto, Ontario, Canada - $2195 - 416.977.6355.
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16 - Mini Implants in Removable Prosthodontics - Dr. Eugene LaBarre, San Francisco, Ca - $450 - 415.929.6486.
21-23 - Advanced Bone Grafting - Dr. Mike Pikos, Palm Harbor, FL - $3400 - 727.785.8477.
22-23 - Crash Course on Implant Dentistry - Dr. Leon Chen, Dr. Jennifer Cha & Dr. David Sarment, Las Vegas, NV - $1,949 - 702.220.5000.
22-24 - Removable Prosthetic Options - Dr. Carl Misch, Beverly Hills, MI - 248.642.3199.
24-27 - CV-B Implant Dentistry - Dr. Irwin Becker and Dr. Steve Ratcliff, Key Biscayne, FL - Pankey Institute - 305.428.5551.
28-29 - Advanced Surgical & Restorative Implant Training - Various Clinical Instructors, Boston, MA - $1100 - Bicon - 800.882.4266.
29-30 - Hydraulic Sinus Condensing - Dr. Leon Chen & Dr. Jennifer Cha, Las Vegas, NV - $2,995 - 702.220.5000.
29 - Integrating Esthetic Principles with Biology and Implant Design in Simplified & Complex Therapy - Dr. Maurice Salama and Dr. Henry Salama, New York, NY - $225 - NYU College of Dentistry - 212.998.9771.

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6 - The Biologically-Driven Era of Implant Dentistry: Doing What We Already Know How to Do Better! - Dr. Jean-Francois Bedard, New York, NY - $225 - NYU College of Dentistry - 212.998.9771.
6-8 - Clinical Training Program - Drs. Shadi Daher and Mauro Marincola Cartagena, Columbia - $8500 - Bicon - 800.882.4266.
12-14 - Placing and Restoring Implants - Dr. I. Schecter, Toronto, Canada - $1495 - 416.665.1145.
12-13 - Bone Biology, Harvesting and Grafting - Dr. Arun Garg, Dr. Lillibeth Ayangco & Dr. Avi Schetritt, Orlando, FL - $2500 - 305.281.7125.
13-14 - Immediate Restoraton of Dental Implants - Dr. Paul Petrungaro, Lake Elmo, MN - 651.351.9660.
13-14 - Removable Prosthetic Options - Dr. Carl Misch, Beverly Hills, MI - 248.642.3199.
19-21 - Advanced Bone Grafting - Dr. Mike Pikos, Palm Harbor, FL - $3400 - 727.785.8477.
20-21 - Crash Course on Implant Dentistry - Dr. Leon Chen, Dr. Jennifer Cha & Dr. David Sarment, Las Vegas, NV - $2500 - 305.281.7125.

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