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Literature review and critical analysis from the publisher of *Practical Reviews*

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Issue Highlights

These articles have been selected by the Coordinating Editor as Key Reviews.

Critical Discussion and Commentary

Allogenic Grafts Versus Autogenous Bone: Comparing Costs and Outcomes

When augmenting bone for future implants, consider using allogenic bone, tenting screws, and membranes instead of iliac crest

By J. Bruce Bavitz, DMD

Based on: Dahlin C, Johansson A. Iliac Crest Autogenous Bone Graft Versus Alloplastic Graft and Guided Bone Regeneration in the Reconstruction of Atrophic Maxillae: A 5-Year Retrospective Study on Cost-Effectiveness and Clinical Outcome. *Clin Implant Dent Relat Res* 2011; 13 (December): 305-310.

Most of us have faced a patient with an edentulous but atrophic maxilla that finally decides they want implants. Our clinical and radiographic examination reveals adequate bone height, but insufficient buccal-lingual width necessitating the need for some type of bone graft. Reconstructing the atrophic maxilla has traditionally been done with autogenous iliac crest bone grafts. Although effective, the technique is expensive and results in some donor site morbidity. Alternative methods exist, including the use of alloplastic or allogenic grafting materials with or without membranes.

> At five years there was no statistical difference in the number of implants that survived.

This was a five-year retrospective study involving 26 patients. Thirteen received the traditional iliac crest bone grafting, which was harvested from the medial surface of the anterior ilium in monocortical blocks. The other 13 patients received demineralized freeze-dried bone grafts with tenting screws and resorbable collagen membranes. In both groups the grafts were allowed to mature for six months prior to implant placement. These implants were left buried for four months prior to abutment connection and prosthesis construction. Implant survival was assessed at the stage 2 abutment connection surgery, as well as five years post-function.

At five years there was no statistical difference in the number of implants that survived, and in both groups they were in the high 90%. The authors had access to time in the operating room, as well as personnel expenses, and analyzed these in addition to the costs of the bone grafts and associated materials. Not surprisingly, when they analyzed costs, the demineralized freeze-dried bone group was significantly less, in fact, 22% of the costs of the iliac crest bone graft with the authors therefore concluding that when faced with this clinical situation, surgeons should consider the use of some type of alloplastic or allogeneic agents opposed to iliac crest bone grafting.

I believe several additional points need to be made. One, obviously the allogeneic agent had no donor site morbidity and could likely be performed in an office setting, two significant pluses for that technique over the more traditional iliac crest graft. The paper was fairly light in details, not really explaining the type of prostheses nor even giving the total number of implants placed in the reconstructive arch. It also failed to list the size of the implants placed or provide any radiographs. Finally, I would have liked to see some type of pre- and post-operative CT scans showing how much bone was actually augmented in each group. However, in cases where perhaps all we need is 2 to 3 mm of additional width, surgeons should at least consider using some type of bone in a bottle as opposed to the more traditional iliac crest grafting.

Practical Reviews in Research
Critiques
Oral & Maxillofacial Surgery
Literature review and critical analysis from the publisher of *Practical Reviews*

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Dr Michael L. Ellis reports: *Board Membership:* American Board of Oral and Maxillofacial Surgery; *Employment:* TAMHSC/Baylor College of Dentistry; *Expert Testimony:* various medical malpractice defense.

Dr Melanie S. Lang reports: *Consultant:* American Dental Association Medical Advisory Committee, and American Association of Oral and Maxillofacial Surgery Committee on Hospital & Interprofessional Affairs.

The following faculty report no relevant financial interests: Drs J. Bruce Bavitz, and Rod M. Griffeth.

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Lag Screw Versus Plate Fixation for Mandibular Symphysis Fractures

Lag screw fixation is equal to plate fixation for occlusal and osseous healing with less postoperative dehiscence, plate exposure, and need for hardware removal

By Rod M. Griffeth, DDS
Based on: Ellis E III. Is Lag Screw Fixation Superior to Plate Fixation to Treat Fractures of the Mandibular Symphysis? *J Oral Maxillofac Surg* 2011; December 29: epub ahead of print.

There is an old adage that states, "there is power in numbers." If that saying is true, a recent article by Dr. Edward Ellis definitely has power. It is a retrospective cohort study spanning over 20 years comparing two internal fixation methods for treatment of mandibular symphysis fractures.

An outstanding 887 patients met the inclusion criteria. The study compares lag screw to bone plate fixation for fractures of the mandibular symphysis. While treatment outcomes for each method have been previously reported separately, no study in the literature until now directly compares them and definitely not with this number of patients. The purpose of this study was to compare the frequency and types of complications between the two groups to determine if one method was superior to the other. Fractures of the mandibular symphysis are extremely common. The unique anatomy of this region allows for various internal fixations schemes.

Mandibular symphysis in this paper is defined as a fracture between but not including the mental foramen. Patients meeting inclusion criteria had simple, noncomminuted fractures with teeth present in the area and were approached via an intraoral incision. All had an arch bar placed during surgery, which was maintained for at least 5 weeks with no postoperative intermaxillary fixation. The patients had a minimum of five weeks of follow-up. Besides a comparison between the demographic data, outcomes collected and compared were postoperative infection, dehiscence, exposure to hardware, and need for hardware removal. Also compared was damage to tooth roots, malocclusion attributable to the symphysis fracture and clinical union at the last visit. Roughly an equal number of patients had either lag screw or plate fixation method with more than 400 participants in each group. In the plate fixation group, approximately half received two, 2.0 miniplates, and half were treated with one larger inferior bicortical plate. All lag screw patients had a minimum of two screws placed. All patients had intraoperative maxillomandibular fixation with arch bars, and the arch bar was kept in place for a minimum of five weeks, but no patient had postoperative intermaxillary fixation. Patients were not randomly assigned to the treatment groups, but rather were chosen on the whim of the faculty or resident surgeon.

There were no statistical differences between the two treatment groups for any demographic variables. Also, and more important, no difference was found for clinical union and postoperative malocclusions. However, patients treated with bone plates had significantly higher rates of infection, incision dehiscence, hardware exposure, and need for hardware

removal when compared to the lag screw group. The rate was low in both groups at 3% versus 1% between the two groups.

An interesting discussion point highlighted in the article was the increased intraoperative difficulties associated with the lag screw technique. These include inability for fracture stabilization due to over counter sinking the near cortex or over drilling of the far cortex. Damage to the inferior alveolar nerve due to iatrogenic placement of the lag screw was also a complication. Until recently, placement of lag screws was a partially blind technique requiring estimation of the exiting location of the screw. A recent drill guide instrument with exit locator has made this a more predictable procedure. The take home message of this paper is that the plating and lag screw techniques for fixation of mandibular symphysis fractures both showed excellent outcomes with low complication rates. The plating method had greater postoperative complications, but less intraoperative difficulties. New advances with instrumentation may make the lag screw technique more predictable. Not discussed was the difference in the expense between the two methods, which should favor the lag screw technique.

Oral Piercings Often Done on Minors Without Parental Consent

Be aware when discussing oral piercing on minors that the parents may not be aware of the piercings

By Melanie S. Lang, DDS
Based on: Vieira EP, Ribeiro ALR, et al. Oral Piercings: Immediate and Late Complications. *J Oral Maxillofac Surg* 2011; 69 (12): 3032-3037.

Historically, piercings have been performed for various religious, sexual, and cultural identification indications. However, in more recent years, total piercings both in the body and oral region have become more popular, mainstream, and socially acceptable. Various body parts from the ears, nostrils, eyebrows, naval, and tongue are generally the preferred sites. Currently in the Western World, oral piercings are becoming more popular with piercings of the cheeks, lips, tongue, lingual frenum, and uvula. The tongue and lips are the most frequently pierced oral sites. Unfortunately, there are certainly potential, both early and more long term, local and systemic complications with oral piercings. However, relatively little dental or medical professional literature is available concerning these complications and even less public knowledge.

The objective of this study was assessing the prevalence of immediate and late complications of oral piercings done in the tongue and lips. The study involved 39 adult dental students. Study participants were identified between October and November of 2009. During that time, detailed interviews and clinical evaluations were conducted for associated data collection. The participant's ages at the time of the study ranged from ages 18 to 24. A total of 42 oral piercings were identified and included in this study. Sixty percent of the study participants were female, and 33% were male. Of the original 42 oral piercings, 88% of these piercings were in the tongue and 12% in the lips. Of the original piercings, 64% had been removed at the time of this study with 36% remaining for an average time of use of 15 months, ranging from as short as two months to as long as four years. In the individuals where a piercing had been removed, a visible scar remained in 78% of those individuals. Based on a retrospective recollection, original healing time ranged from four to six weeks with reported complications occurring in 41 of 42 of the piercings for a total rate of complications at 97.6%. Immediate complications included excessive prolonged bleeding, pain, and several episodes of syncope. Late complications included pain, bleeding, swelling, ongoing discharge, reactive tissue, and surrounding oral tissue trauma. There was a 90% incidence of surrounding oral tissue injury, which encompassed dental pain, tooth fracture, gingival resection, and local trauma to the tongue, palate, gums, and floor of mouth. Eighty-one percent of the piercings were done on minors with 59.5% of these piercings being done without parental consent.

In day-to-day practice, I certainly see various oral and facial piercings, and, as noted in this study, oral piercings are now quite mainstream and socially acceptable, particularly in the younger population. In the U.S., piercing regulations vary from state to state. However, when performed by unlicensed, relatively inexperienced individuals with limited knowledge of anatomy, sterile technique, and management of emergency situations, a higher incidence of complications may occur. Although this study only identified oral piercings related to the tongue and lips, which are certainly the most frequently encountered sites, other oral piercing sites including the lingual frenum, cheeks, and uvula are being encountered. I found it of particular interest as to the number of oral piercings done on minors, particularly without parental consent in nearly 60% of this study in Brazil. This number may certainly be different here in the U.S., however, it is certainly occurring, as in clinical practice on a number of occasions I have seen patients under 18 accompanied by a parent or guardian for routine clinical evaluation in which an oral piercing has been noted on clinical exam. Frequently these oral piercings require removal prior to upcoming associated surgical procedures, and in discussing this with the patient and parent or legal guardian, it becomes evident that the parent or guardian was previously not aware of the oral piercing. In my clinical experience, this seems to be more frequent with piercings of the lingual frenum since this site is somewhat easier to disguise. This study concluded that oral piercings are frequently associated with local complications, and individuals choosing to proceed with various oral piercings should be made aware of these potential complications and undergo routine dental visits on a regular basis to assure prompt detection of any associated complications.

Pediatric Facial Fractures Portend Concomitant Trauma

Pediatric facial fractures account for approximately 15% of all facial fractures

By Michael L. Ellis, DDS
Based on: Grunwaldt L, Smith DM, et al. Pediatric Facial Fractures: Demographics, Injury Patterns, and Associated Injuries in 772 Consecutive Patients. *Plast Reconstr Surg* 2011; 128 (December): 1263-1271.

Pediatric patients with a facial fracture that present to the emergency room for evaluation and treatment can suffer a variety of injuries. Concussive injuries and cervical spine trauma should always be considered no matter the described mechanism of injury. Injury patterns to the facial bones in a pediatric population are unique due to dynamic anatomical differences based on age and development. Grunwaldt, Smith, and others provide an excellent review of a large pediatric population assessed in a children's hospital for facial and other fractures. Their objective was to review and describe comprehensive demographic data on pediatric facial fractures through a retrospective chart review.

The participants in this study included all patients from birth to 18 years admitted through the emergency room at a children's hospital with a –9 code indicating any facial fracture. Seven hundred seventy-two patients met the inclusion criteria, presenting with at least one facial fracture. Three groups were identified–patient age of zero to five years, six to 11 years, and 12 to 18 years. Demographics, mode of injury, fracture type, additional injuries, and outcomes were all recorded for statistical analysis.

Sixty-three percent of the patients were hospitalized, and there were 11 deaths. The mean age of the entire study population was 10.7 years, and 70% were male. The largest group of patients presenting with a facial fracture was the 12- to 18-year age group, representing 47% of the injuries. Twenty percent of the injuries were found in the zero- to five-year age group, and 33% in the six- to 11-year age group. Eighty-two percent of the injuries were suffered by Caucasians, 15% by African Americans, and 3% by other ethnicities. The predilection of fractures by ethnicity was statistically different than the ethnic representation in the city of the study, Pittsburg, where 68% are Caucasian, 27% are African American, and 5% are other ethnicities. Orbital fracture was the most common fracture found in all three groups, with concomitant skull fractures seen more commonly in younger patients and zygomaticomaxillary complex fractures seen in the older age groups. Fall was the most common mechanism of injury in the zero- to five-year-olds; motor vehicle related injuries were most common in the six- to 11-year-olds; and violence or sports-related injuries were the most common mechanisms in the 12- to 18-year-olds. About one-third of patients required operative intervention, a little less in the zero- to five-year-olds, and a little more in the 12- to 18-year-olds. More zero- to five-year-olds, about 28%, were admitted to the ICU than the older groups, averaging 20% or less. Neurologic trauma was the most frequently seen additional injury in all groups, mostly concussions. Two percent had C-spine injuries, and one-half of one percent, or 4 patients, experienced blindness.

Pediatric facial fractures are associated with significant and severe concomitant injuries and are predominantly seen in males. About one-third require operative intervention. Fractures secondary to violence, as expected, are seen more frequently in older children, while falls account for a significant percentage of injury in those less than five years old. This is a great review of a significant sample size of pediatric facial fractures. The authors report a preponderance of orbital fractures in this study, whereas other studies report the mandible as most commonly fractured. Take a look at this paper; this is a good one.

Is Cryoanalgesia Effective for Intractable TMJ Pain?

Hyperstimulation analgesia through the use of cryoprobes can result in positive, but only temporary, improvements for intractable TMJ pain

By Michael L. Ellis, DDS
Based on: Sidebottom AJ, Carey EC, Madahar AK. Cryoanalgesia in the Management of Intractable Pain in the Temporomandibular Joint: A Five-Year Retrospective Review. *Br J Oral Maxillofac Surg* 2011; 49 (December): 653-656.

Patients with intractable temporomandibular joint (TMJ) pain are often difficult management issues. With the failure of conservative therapy, whether it involves encouragement, nonsteroidal antiinflammatory agents, and diet alteration, or is stepped up to orthotic therapy followed by arthrocentesis or arthroscopy, many surgeons remain reticent to progress to total joint replacement. In many cases, patient finances and ability to obtain any needed therapies play a large role in the selection of therapy. Discriminating tests and imaging are important to identify the exact source and etiology of the malady, and this may result in multiple referrals of this patient base to orthodontists, prosthodontists, endodontists, neurologists, and pain specialty clinics. The surgeon is left with only a few treatment options. Sidebottom, Carey, and Madahar in their article explore the use of hyperstimulation therapy with cryoprobes as a possible treatment alternative in this population of pain patients. The authors' objective was to describe the efficacy of cryoanalgesia for the relief and management of TMJ pain in a retrospective clinical report of 17 patients with intractable TMJ pain treated with cryoanalgesia at a single medical center between 2002 and 2006.

Demographics and multiple clinical parameters were assessed pre- and post-operatively including, but not limited to, maximum incisal opening, visual analog scale (VAS), duration of relief, complications, and long-term outcomes. Diagnostic intraarticular nerve blocks were utilized to identify inclusion into the cryoanalgesia treatment regimen. If the block temporarily relieved the TMJ pain, the patient was offered the cryoanalgesia approach. Cryoanalgesia involved

surgical access to the joint capsule and three freeze-thaw cycles with the cryoprobe for 90 seconds each to the exposed capsule. Arthrocentesis followed prior to closure, and the patients were followed at six weeks and up to one year.

At six weeks the maximum incisal opening increased from a mean of 35.4 mm to only 36.7 mm representing an insignificant difference. The mean VAS pre-operatively was 6.8 on a zero to 10 scale and reduced to 2.0 at six weeks. A mean of 4.8 improvement in the VAS was found in the group of 17 patients representing a statistically significant improvement of decreased pain intensity. Two patients did not improve, and two others had complete relief from pain at six weeks. The mean length of pain relief was 14.7 months in this population following cryoanalgesia. Twelve of seventeen patients reported returned pain at 12 months, and six of these graduated to total joint replacement. Two had complications, one had temporary temporal numbness, and one had temporal branch palsy that completely resolved.

What can we conclude from this paper? Cryoanalgesia with simultaneous arthrocentesis may result in a temporary decrease of symptoms in those with intractable TMJ pain. The technique provides variable pain relief over time with minimal morbidity. Cryoanalgesia was considered by the authors as a treatment of last resort prior to joint replacement. The outcomes in this retrospective report are confounded by poorly explained concomitant arthrocentesis. Additionally, range of motion data illustrates no significant improvement after surgery. It is an interesting technique that may provide an additional, albeit temporary, therapeutic adjunct in the management of this difficult cohort of patients.

Are Implants Placed at Lower Torque Values Better Than What We Previously Believed?

The insertion torque value of 35 Ncm accepted by many as the value needed for immediate loading may be higher than necessary and may actually contribute to marginal bone loss

By J. Bruce Bavitz, DMD
Based on: Norton MR. The Influence of Insertion Torque on the Survival of Immediately Placed and Restored Single-Tooth Implants. *Int J Oral Maxillofac Implants* 2011; 26 (November): 1333-1343.

I just placed an implant, and the patient and his dentist want it restored as soon as possible. When can this safely be done? Does insertion torque make a difference? A currently accepted tenant is insertion torque values of 35 Ncm or higher portends a favorable prognosis for early temporization and loading.

In a recent article, the author's hypothesis was tighter is not necessarily better and in fact may exacerbate marginal bone loss. His study was performed on 61 patients who had extractions, implants immediately placed, temporary crowns fabricated, and all had insertion torques of less than or equal to 25 Ncm. The vast majority of these teeth were anterior, and I believe it is important to emphasize that the average implant length was more than 15 mm long with 4.5 mm average diameter. Antibiotics, typically amoxicillin, were given preoperatively and continued for five days. Success rate and marginal bone loss were assessed. The average insertion torque was only 22.5 Ncm with an overall survival rate of the implants an impressive 95.5% measured at an average of 46 months. Two years postoperatively the mean marginal and distal bone loss was a scant 0.2 mm. Relative to marginal bone loss, the age of the patient, gender, tooth position, implant length, nor measured insertion torque, had any statistical difference. His conclusion based on this interesting study was that the 35 Ncm insertion torque value, currently held to be a necessary value, is too high.

While I was certainly impressed by this article, again it bears emphasizing that the teeth were extracted, the implants placed, and temporized immediately at this low torque value. Most of the cases were temporized by the author, and I am sure he paid careful attention at keeping them out of occlusion. He also had some intraoperative techniques that I found very interesting. He would soak a gauze in chlorhexidine and leave it in the socket for about five minutes prior to placing the implant, obviously with the goal of disinfecting the implant recipient site. In addition, on selected infected cases, he would irrigate or lavage the socket with a tetracycline slurry as advocated by many who perform immediate implants, and he kept the implant palatal or lingual to the labial plate, aiming for about a 1 mm distance.

I have several additional thoughts relative to this intriguing paper. Most people now believe that the type of integration that is achieved initially, while still important, may not reflect what is going on with the implant after several months. Much of the initial bone implant contact is remodeled in response to the initial trauma. I certainly get a good feeling when my implants torque down tight initially, but realize that if the bone suffered serious thermal trauma during osteotomy creation, that the implant probably will not survive at six months. Another factor that I have increasing appreciation for is that each individual implant design probably has a different ideal insertion torque. Conical implants by their design tend to tighten up as they are inserted, and if our osteotomy is perhaps undersized, this can lead, if over tightened, to early marginal bone loss. Again, it is important to emphasize that these implants used in this study were performed on immediate extractions, where some of us are somewhat nervous and tend to want to have those implants torque out as high as possible.

The author also discussed whether resonance frequency analysis, as suggested by many, may be an even better measure of when an implant should be loaded as opposed to insertion torque. Certainly the answer to this question is being investigated by many skilled clinicians. Finally, to digress somewhat, I find it extremely interesting that when I first started placing implants some 20 years ago, a case like this would have been treated by extraction, waiting for about

three or four months for osseous fill of the socket, implant placement, then waiting approximately three to four months in the mandible and six months in the maxilla, and finally referring the patient for their final restoration. I still tend to be a little conservative relative to when I suggest my patients have their implants restored, but certainly there is very good evidence that early temporization and function can occur much sooner than previously thought. I would certainly encourage readers to look at this well-done article.

How Effective Is Cell-Based Bone Engineering?

Basic Science & Research

Take Home Pearl:

The pulp from teeth extracted from patients may be used to grow cells capable of acting as an effective tissue-engineered bone graft.

Background: Oral and maxillofacial surgeons are often called on to graft bone before implant placement, with current research always striving to do away with autogenous sources with their known limitations. Tissue engineering holds promise, requiring the acquisition of only small quantities of pluripotent cells.

Objective: To compare the efficacy of grafts engineered from 3 different sources: periosteal cells (PC), bone marrow stem cells (BMSC), or dental pulp stem cells (DPSC).

Design: This animal study was performed with dogs.

Methods: The pulp cells were obtained from extracting posterior teeth. Periosteal cells were harvested from the mandible, and bone marrow was obtained from the iliac crest. These cells were cultured, with different techniques, and then mixed (at a concentration of 1×10^7 cells /mL) with platelet-rich plasma and used to graft defects created in the mandible with trephine burs. The control defect received no graft. After graft healing, dental implants were placed with core biopsies taken at the same time. Eight weeks after implantation, the osteogenic potential of each graft was evaluated by assessing bone-implant contact.

Results: The core biopsies taken from the control group and the PC grafts revealed fibrous tissue but little new bone compared to good bony regeneration with the BMSC and DPSC grafts. These results were not quantitated or statistically analyzed. However, the bone-implant contact was quantified and found to be statistically superior with the BMSC and DPSC grafts compared to the PC or the control sites.

Conclusions: "DPSC showed the highest osteogenic potential and may be a useful cell source for tissue-engineered bone around dental implants."

Reviewer's Comments: All things being equal, most surgeons would prefer to use bone grafts composed of live autogenous cells. The morbidity of harvesting from other sites, as well as the finite quantity of available bone, has made the use of "bone in a bottle" products increasingly popular. The ability to obtain small quantities of pluripotent cells, grow them outside of the patient's body, and then re-implant them has made the field of regenerative medicine explode over the last 10 years. This study showed that it is possible to use dental pulp cells as a source to grow bone in dogs. It is reasonable to believe it can be done in humans, with the pulp of third molars and the obvious donor source. This is fascinating in principle, with cost effectiveness a probable major hurdle.

Reviewer: J. Bruce Bavitz, DMD
Article Reviewed: Ito K, Yamada Y, et al. Osteogenic Potential of Effective Bone Engineering Using Dental Pulp Stem Cells, Bone Marrow Stem Cells, and Periosteal Cells for Osseointegration of Dental Implants. *Int J Oral Maxillofac Implants* 2011; 26 (November): 947-954.

Discover Why Teriparatide May Help Resolve Bisphosphonate-Associated Osteonecrosis

Bone

Take Home Pearl:

Teriparatide stimulates osteoblasts, whose improved function is known to help recruit and activate osteoclasts; this fits in well with the proposed model of bisphosphonate-associated osteonecrosis and explains why teriparatide may be of some help.

Background: The pathogenesis of bisphosphonate-associated osteonecrosis of the jaw (BON) is certainly better understood now versus even 5 years ago. Recently, teriparatide (Forteo; Eli Lilly and Company) has shown some promise in the treatment of this disease, giving further hints and insight into the pathophysiology of BON.

Objective: To propose a theory on why this disease occurs, and why teriparatide may help.

Methods: The authors performed a thorough review of the current BON literature.

Conclusions: According to this paper, there is ineffective bone remodeling in patients suffering from BON that is thought to be the result of 3 interrelated things: (1) suppression of osteoblast function, typically secondary to the patient's underlying disease (osteoporosis, cancer, etc); (2) suppression of osteoclast function, typically secondary to the bisphosphonates;

and (3) impaired communication, signaling, and recruitment between the cells responsible for physiologic bone remodeling leading to impaired function. In patients suffering from this triad of pathosis, BON is ready to occur. Often, the demands placed upon the maxillofacial bones in response to trauma, such as an extraction or pressure from an ill-fitting prosthesis, tip the scale in favor of breakdown and lead to necrotic and secondarily infected bone; BON occurs. The antiangiogenic actions of the bisphosphonates likely exacerbate this whole problem. Teriparatide, an osteoanabolic drug, is known to stimulate osteoblast function and also recruit and activate osteoclasts. It is given via a once daily subcutaneous injection for a period of up to 2 years. It may, based upon early and preliminary results, tip the scale back in favor of bone healing.

Reviewer's Comments: There are at least 6 papers suggesting that teriparatide may help in the treatment of BON. Surgeons should stay alert for the results of some well done clinical trials using this osteoanabolic agent, as they are sure to be published soon. As the authors point out, other antiresorptive agents, such as denosumab, are associated with osteonecrosis, prompting some to suggest that the term antiresorptive agent-induced osteonecrosis of the jaw (ARONJ) is more appropriate than BON. It will be interesting to see if teriparatide is helpful in treating denosumab-associated necrosis. This whole relatively new disease spectrum isn't going away anytime soon.

Reviewer: J. Bruce Bavitz, DMD
Article Reviewed: Subramanian G, Cohen HV, Quek SYP. A Model for the Pathogenesis of Bisphosphonate-Associated Osteonecrosis of the Jaw and Teriparatide's Potential Role in Its Resolution. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2011; 112 (December): 744-753.

Can Extracted Teeth Be Used as Grafts?

Bone

Take Home Pearl:
Freezing, grinding, and mixing extracted teeth with a cellulose carrier shows some promise for bone grafting, at least in a rat model.

Background/Objective: Socket preservation, or the grafting of fresh extraction sockets, has become popular over the last decade with the goal of preventing alveolar bone loss. Myriads of grafting products exist, each with advantages and disadvantages. This study investigates using the extracted tooth itself as a graft source.

Design/Methods: A rat model was used, with results evaluated both histologically and with 3-D micro-CT scans. The incisors were extracted, frozen, ground, or milled to a particle size between 10 and 50 µm, mixed with hydroxypropyl cellulose (HPC) and injected back into the fresh sockets. Control sites received no graft or just the HPC alone. The animals were scanned and sacrificed at either 2 or 4 weeks.

Results: The CT scans were evaluated in a way to measure the regenerating bone volume to total tissue volume (BV/TV) ratio, as well as the bone mineral content (BMC) or density. The experimental group had a significantly higher BV/TV ratio than both controls at week 2, and more than the no graft control at week 4. However at week 4, there was no statistical difference in BMC, but the trend favored the experimental group. Histologically, the experimental group exhibited more mature and more rapid healing compared to either control.

Conclusions: Ground extracted tooth mixed with an HPC carrier shows promise as a graft material.

Reviewer's Comments: The idea of grinding up the tooth you just extracted, somehow sterilizing it, then injecting it back into the fresh socket is appealing. No bone product derived from other humans or animals is needed, eliminating the rare, but possible, transmission of graft-derived infectious diseases. This proof of principle article shows some promise. Dentin is composed of type 1 collagen, calcium, bone morphogenic proteins, and other possible growth factors; logically, it should work as a grafting material. The carrier itself was chosen, in part, because it showed some efficacy in preserving the socket, which was verified in the results of this study. Pragmatic subplots in the human model included disinfecting the donor teeth, removing any restorations or endodontic filling materials, and having a quick and cost-effective way of grinding it into the ideal particle size. The grinding apparatus would also have to be sterilized between patients, but if these hurdles can be overcome, this grafting option may become viable.

Reviewer: J. Bruce Bavitz, DMD
Article Reviewed: Miyata Y, Ozawa S, et al. An Experimental Study of Bone Grafting Using Rat Milled Tooth. *Int J Oral Maxillofac Implants* 2011; 26 (November): 1210-1216.

How to Prevent & Manage Anesthetic-Related Respiratory Complications

Complications

Take Home Pearl:
Although rare, sedation-related respiratory complications do occur.

Background: Oral and maxillofacial surgeons have a long and successful history of providing advanced anesthesia to our patients. Albeit rare, complications can sometimes occur. Complications involving the respiratory system, specifically, airway obstruction and depression in rate and depth, are the most common culprits.

Design/Objective: This review article discusses strategies to prevent and treat respiratory complications during IV sedation.

Results: The authors stress the importance of obtaining a thorough medical history and documenting

pre-sedation vital signs, including initial oxygen saturations. Assessment of the airway should also be made. The authors strongly suggest recording the Mallampati classification and noting any unusual potential mask seal problems (eg, heavy beards or obese patients with short thyromental projection). The proper equipment for managing complications includes portable oxygen tanks (E cylinders) and airway adjuncts. The relatively new supraglottic laryngeal mask airway device is useful in the unconscious patient who cannot have their airway opened with oropharyngeal airways, and it is preferable to endotracheal intubation in most scenarios. A useful formula for estimating the reserve in the E cylinder is 0.3 times the remaining tank volume (in pound-force per square inch) divided by the flow rate. Oxygen should be delivered to ensure the oxygen saturation is >90%, with the current thinking that its use in the patient with chronic obstructive pulmonary disease is no longer a relative contraindication. For respiratory depression caused by drugs, the reversal agents, naloxone and flumazenil, should be available. However, the practitioner must also have the skills to use a bag valve mask (BVM) device in the hypoxic or apneic patient. This skill can, and should be, practiced on the now widely available high fidelity human simulators. On rare occasions, laryngospasm will occur in the deeply sedated patient. This obstruction may result in a bucking or rocking ventilatory motion. Thorough suctioning with a tonsillar suction, aggressive opening of the airway, and BVM ventilation will often reverse the problem. However, low-dose succinylcholine may be needed at a suggested dose of 0.1 to 0.2 mg /kg. Laryngeal edema is manifested by crowing sounds, with bronchospasm exhibiting wheezing. The former will respond to low-dose intramuscular epinephrine (0.3 mg), with the latter responding best to inhaled bronchodilators like albuterol. Final mention is made for surgical airways in the "cannot ventilate and cannot intubate" patient. This is extremely rare and is perhaps most likely in a foreign body aspiration scenario. The needle cricothyrotomy is the advised route in this situation; a commercially available kit just for this purpose is recommended.

Reviewer's Comments: Subscribers are encouraged to read this well-written review article by these respected authors. The diagnosis and management of complications are concisely summarized.

Reviewer: J. Bruce Bavitz, DMD
Article Reviewed: Becker DF, Haas DA. Recognition and Management of Complications During Moderate and Deep Sedation Part 1: Respiratory Considerations. *Anesth Prog* 2011; 58 (Summer): 82-92.

Treatment of Necrotizing Fasciitis Requires Aggressive Surgical Intervention

General

Take Home Pearl:
In a patient with swelling and no obvious odontogenic etiology, the possibility of necrotizing fasciitis should be entertained.

Background: Necrotizing fasciitis (NF) is rare in the head and neck area, but has dire consequences when it does occur.

Objective/Methods: This review article discusses contemporary knowledge of risk factors, microbiology, diagnostic criteria, pathophysiology, treatment, and prognosis of NF and reports on a case of NF.

Case Report: The patient is a 58-year-old African-American woman. She has a history of poorly controlled insulin-dependent diabetes. In addition to her diabetes, she has chronic renal insufficiency and hypertension. She presented to the emergency department with lower lip swelling.

Results: Certainly, compromised host resistance is a known risk factor with the patient in this report having poorly controlled insulin-dependent diabetes and chronic renal failure. What differentiates NF from other common head and neck infections is the primary involvement of the superficial musculoaponeurotic system (SMAS) fascia, with much lesser involvement of the bone and muscle. Subcutaneous liquifactive necrosis and skin undermining result, during which time the patient is often numb. Modern microbiological identification indicates the infection is usually polymicrobial, and it is important to differentiate this disease from methicillin-resistant *Staphylococcus aureus,* which is more common but initially involves the skin. Aggressive surgical management remains the cornerstone of therapy, with debridement of necrotic tissue and packing of the wound; this typically needs to be repeated several times. Unless cultures dictate otherwise, triple antibiotic empiric therapy is employed, using a penicillinase-/methicillinase-resistant penicillin, an agent aimed at gram-negative organisms such as a third generation cephalosporin, as well as something for anaerobes (eg, clindamycin or metronidazole). Factors impacting the prognosis of NF of the head and neck are similar to those of other serious infections, with the securing of the airway an early and critical necessary step. Spread into the mediastinum is associated with a poor prognosis. This case report was noteworthy for a 3-week inpatient stay, with irrigation and dressing changes required the majority of that time. Fortunately, the outcome was positive, with no need for reconstructive surgery.

Conclusions: It is important to recognize necrotizing fasciitis early and to promptly provide surgical and medical treatment as this disease process can progress rapidly.

Reviewer's Comments: The management of head and neck infections remains an important part of the oral and maxillofacial surgeon's (OMFS) practice, and indeed can often save the life of our patients. Fortunately, NF is quite rare; this review article nicely summarizes contemporary thoughts. In a patient with swelling and no obvious odontogenic etiology, the possibility of NF should be entertained. Other than perhaps for gunshot wounds, the OMFS may never need to use packing and dressing changes like they do for the effective management of this disease. Mention is made of using hyperbaric oxygen therapy, but the results are too preliminary to recommend this at the present time. Aggressive debridement of necrotic fascia and skin

along with aggressive antibiotic therapy is often lifesaving. Soft tissue reconstruction of the resulting tissue deficits, which was not addressed in this paper, is often needed once the infection has resolved.

Reviewer: J. Bruce Bavitz, DMD

Article Reviewed: Weiss A, Nelson P, et al. Necrotizing Fasciitis: Review of the Literature and Case Report. *J Oral Maxillofac Surg* 2011; 69 (November): 2786-2794.

Aspirate and Grow Cells From Iliac Crest Before Your Next Cleft Graft

Grafting

Take Home Pearl:
Growing the patient's own osteogenic cells in vitro and using them to graft clefts is a viable option.

Background: Classically, the grafting of alveolar clefts involved harvesting bone from the ilium. Although patients did reasonably well afterward, and the grafts yielded predictable results, researchers have looked for a way to avoid obtaining bone and viable osteoprogenitor cells from a second surgical site. Xenogenic, allogenic, and alloplastic products do not transplant live progenitor cells, and, therefore, require that the recipient site supply them for a successful outcome.

Objective: To examine another option, harvesting stem cells, growing them in vitro, and then injecting them back into the patient along with platelet-derived growth factors (PDGF).

Participants/Methods: 3 patients were studied, one of whom had bilateral clefts. Preoperative CT scans were obtained, and aspirates of the posterior ileum were performed to obtain the mesenchymal stem cells. These cells were cultured in a manner to make them osteogenic and then were loaded onto a hydroxyapatite/tricalcium phosphate scaffold; the scaffold particle size was 0.3 to 0.5 mm. This cell/scaffold substrate was mixed with PDGF collected and prepared in the usual fashion, and all three materials were used as the only grafting agent. The cleft repair was performed using the typical soft tissue flaps and closure. Postoperative CT scans were obtained at 3 months, with bone fill assessed by comparison of the preoperative and postoperative scans.

Results: The soft-tissue closure was successful in all cases, with no fistula formation. The reported defect fill was 51%.

Conclusions: Although the 51% bone fill rate was not outstanding, this study shows some promise of an alternative method to conventional grafting options.

Reviewer's Comments: This was a labor intensive study, and the authors should be commended. I am concerned about assessing bone fill with CT scans when hydroxyapatite is used as a scaffold, as some of the radiographic density may be due to this very slowly resorbing substance. In contrast, although autogenous iliac crest grafts are invasive, there is no question on what is filling up the cleft when postoperative radiographs are obtained. The authors mention using bone morphogenic protein as another new grafting option for clefts; although expensive, it may be less so than these tissue engineering techniques. Transforming mesenchymal cells into bone forming cells and then cultivating them into numbers large enough to serve as a graft is a fascinating process. I encourage you to read the original article for details. The quest to replace autogenous bone graft with a cheap and effective product will continue for some time.

Reviewer: J. Bruce Bavitz, DMD
Article Reviewed: Behnia H, Khojasteh A, et al. Repair of Alveolar Cleft Defect With Mesenchymal Stem Cells and Platelet Derived Growth Factors: A Preliminary Report. *J Craniomaxillofacial Surg* 2012; 40 (January): 2-7.

Single-Tension Band Plate at the Superior Border for Treatment of Mandibular Angle Fractures

Mandible

Take Home Pearl:
Single-tension band plating of the superior border provides a less invasive fixation approach for fixation of mandibular angle fractures with biomechanical advantages.

Background: Despite numerous clinical studies by Ellis and others supporting minimal fixation for the treatment of mandibular angle fractures, significant controversy still exists.

Objective: This article uses a detailed biomechanical model to compare and contrast 3 fixation methods: (1) a 4-hole tension band at the superior border; (2) a 6-hole bicortical compression plate at the inferior border; and (3) a combination of plates used in schemes 1 and 2.

Methods: A finite element analysis was used to measure complex biomechanics of mandibular fracture deformation using the 3 fixation scheme. The study measured stress and strain relationships common to postoperative complications with rigid internal fixation.

Results: The combination plate system provided the greatest degree of fracture stabilization but the highest bone-to-screw stress. The single tension band has more stability than the bicortical inferior border plate but has higher plate stress, leading to possible plate failure.

Conclusions: Taking into account previous clinical studies showing increased infection rates with the 2-plate method, results from this study suggest that placing an additional inferior border plate is not worth the minimal increase in stability gained. Biomechanical results from this study support the use of single tension band fixation for mandibular angle fractures.

Reviewer's Comments: The controversy of plating schemes for fixation of mandibular angle fractures remain despite many articles supporting the use of less invasive techniques. Through a complex biomechanical analysis of stress/strain relationships created during unilateral molar mastication, this study supports the use of

the single-tension band plating technique. While this study does a good job explaining the biomechanics of an uncomplicated angle fracture for the CT model of a 22-year-old man with a full dentition and normal occlusion, several other complicating factors are often encountered that should influence the decision-making process for the treatment of angle fractures. My concern, and one that I have seen with multiple complications related to the treatment of mandibular angle fractures, is that less experienced trauma surgeons will read a study like this and try to apply it to all angle fractures. In my experience, this happens all too often and leads to complications that most likely could be avoided rather than a "one size fits all" mentality. Many factors must be considered when treating trauma patients, including facture pattern (ie, comminution), bone quality, patient compliance, ability to heal, etc.

Reviewer: Rod M. Griffeth, DDS
Article Reviewed: Kimsal J, Baack B, et al. Biomechanical Analysis of Mandibular Angle Fractures. *J Oral Maxillofac Surg* 2011; 69 (December): 3010-3014.

Clear Surgical Margins Trump Staging, Grading for Prognosis of Maxillary SCC

Neoplasia

Take Home Pearl:
Obtaining clear surgical margins is the most important variable in the prognosis of maxillary squamous cell carcinoma patients.

Background: Maxillary squamous cell carcinoma (SCC) is relatively rare and often grows undetected until it reaches a large size (eg, T3 or T4) before treatment. As classically taught, the higher the stage and histological grade at the time of surgery, the worse the prognosis.

Objective/Participants: To evaluate the prognosis of 93 patients treated between 1992 and 2007 by evaluating the impact of size, therapy rendered, and grade on prognosis.

Methods: Neck dissections were performed only when suspicious nodes were present. Radiation was employed when clear surgical margins <5 mm were obtained.

Results: The 93 patients were composed of 60 men and 33 women with a mean age of 63 years. The overall 5-year survival rate was 71%. Neither the initial size of the lesion nor histological grade impacted prognosis. Surprisingly, the less aggressive grade 1 lesions trended toward a poorer prognosis than grade 2 and 3 lesions.

Conclusions: At least with respect to SCC of the maxillary complex, initial size and grade should not deter aggressive surgery as a rational treatment option.

Reviewer's Comments: SCC of the maxillary complex is rare, making studies on treatment options difficult. This 15-year study involving 93 patients is therefore important. New nonsurgical options are always being investigated. Immunotherapy using monoclonal antibodies is currently in vogue. Until good, long-term data on such therapy are known, aggressive surgery (although disfiguring) remains an option. Seven of the 93 patients followed in this study had no surgery because of intracranial extension, poor systemic health, or refusal, and all died secondary to tumor-related reasons. As expected, patients whose tumors recurred had a very poor prognosis (5-year survival rate, 40%) versus an excellent prognosis for those without recurrence (10-year survival rate, 96%). The most important variable found in this study that impacted prognosis was the obtainment of tumor-free margins. Surgeons need to note this when planning procedures so as to be appropriately aggressive. The size of the initial lesion, assuming free margins are obtainable, should not be a deterrent.

Reviewer: J. Bruce Bavitz, DMD
Article Reviewed: Poeschl PW, Russmueller G, et al. Staging and Grading as Prognostic Factors in Maxillary Squamous Cell Carcinoma. *J Oral Maxillofac Surg* 2011; 69 (December): 3038-3044.

New Photodynamic Laser Therapy for Oral Precancerous Lesions Shows Promise

Neoplasia

Take Home Pearl:
Photodynamic therapy using 5-aminolevulinic acid and lasers is fast, minimally invasive, and reasonably effective for treating oral leukoplakia.

Background: Large areas of oral leukoplakia are difficult to surgically excise, and the use of topical medicines has been disappointing.

Objective: To evaluate the effectiveness and the safety of "photodynamic therapy in the treatment of oral leukoplakia with 5-aminolevulinic acid (5-ALA) and pulsed dye laser."

Design: Prospective, nonrandomized, single-arm, single-site, phase 1&2 pilot study.

Participants/Methods: 17 patients with biopsy-confirmed hyperkeratosis or dysplasia were enrolled. For each patient, a gauze was saturated with 5-ALA and topically applied to the lesion for 1.5 hours or had the 5-ALA injected directly into the lesion. A pulse dye laser with a 585-nm wavelength was targeted at the lesion (8 J/cm^2, 7 mm spot size, 1.5 ms pulse time). At 90 days, a clinical examination for effectiveness was performed, and biopsies of the lesion, as well as from a normal site, were obtained.

Results: Following treatment with 5-ALA and photodynamic therapy, 7 patients showed significant clinical improvement, 9 showed partial improvement, and only 1 patient failed to improve. The biopsy results looked at the expression of p53 and Ki-67 markers, but not enough data were obtained

to make any conclusions. There were no significant adverse effects, with only approximately 50% of the patients needing local anesthesia for procedural pain control.

Conclusions: With the laser treatment time taking only minutes and with good preliminary results, the use of 5-ALA and a laser that is set at the specified wavelength, power, and spot size, shows promise in treating oral leukoplakia.

Reviewer's Comments: The 5-ALA used in this study is taken up preferentially by dysplastic cells as compared to normal cells and metabolized into protoporphyrin IX (PPIX). The PPIX absorbs energy at wavelengths of 585 nm, for which a pulse dye laser can be set. Cells with high concentration of PPIX produce cytotoxic free radicals when exposed to such laser energy, making this therapy harmful to the precancerous cells but less toxic to the normal cells of the host. Such targeted therapy that harms the bad but leaves the good is appealing, with the ability to administer the drug topically or by intralesional injection conducive to lesions found in the mouth. (Systemic administration of photodynamic agents often leads to photosensitivity.) As noted by the authors, the 1 lesion that failed to improve was thick, likely necessitating several 5-ALA applications and subsequent laser sessions for effective treatment. As most surgeons see patients with leukoplakia, this technique could quickly become an effective new tool against this difficult to treat malady.

Reviewer: J. Bruce Bavitz, DMD
Article Reviewed: Shafirstein G, Friedman A, et al. Using 5-Aminolevulinic Acid and Pulsed Dye Laser for Photodynamic Treatment of Oral Leukoplakia. *Arch Otolaryngol Head Neck Surg* 2011; 137 (November): 1117-1123.

Are Sural or Greater Auricular Nerve Grafts a Thing of the Past?

Nerve

Take Home Pearl:
For cases of dysesthesia following damage to the inferior alveolar nerve, bioabsorbable nerve conduits show promise at relieving pain.

Background: The inferior alveolar nerve (IAN) is occasionally permanently damaged following maxillofacial surgery. The resultant anesthesia, or worse dysesthesia, often motivates patients to seek a surgical solution. The classic nerve repair procedures frequently mandate harvesting the greater auricular or sural nerve to obtain a tension-free anastomosis, but, by necessity, leave the donor site with an area of anesthesia and increase operating room time and costs.

Objective: To evaluate the efficacy of polyglycolic nerve conduits as an aid in repairing the IAN.

Design/Participants: This retrospective study involved 5 patients. Costs, assessment of pain medicines used, and self-reported recovery were analyzed.

Methods: The procedure was done via an extraoral approach, with an osteotomy made at the site of the nerve injury. The damaged portion of the nerve was resected, and the nerve conduit was placed over the proximal and distal ends. An 8-0 suture was used to align the nerve ends within the tube, but a direct anastomosis was not accomplished. Functional recovery was determined by patients self-rating using a "Ten Test," a self-reporting touch test, where the normal side of the face is given a value of 10 and the repaired side is then assessed using the same light touch to the lip and chin.

Results: All patients stopped taking the narcotic and neuropathic pain medications they were on prior to the procedure. Functional improvement was modest, with Ten Test results averaging 3.3.

Conclusions: For cases where direct anastomosis of injured nerves is not possible, the use of polyglycolic nerve conduits should be considered as an alternative to autogenous nerve grafting.

Reviewer's Comments: Damage to the lingual nerves and IANs is sometimes permanent, prompting the need for microsurgical repair. The IAN, being encased in a bony conduit, is generally regarded as having superior self-repair capabilities, as the damaged ends are rigidly held in proximity. However, this same anatomic reality makes resecting the damaged portion and affording a tension-free reanastomosis problematic, except in cases of small resections. Various nerve conduits have been experimented with for at least 20 years, with the authors reporting their experience with a bioabsorbable polyglycolic acid form. The extremely small number of these operations performed worldwide makes designing powerful studies challenging, and this retrospective paper suffers from some flaws. There is no objective pre- and postoperative assessment of nerve function; the patient performing their own Ten Test is the only data obtained. It should be noted, however, that 3 of the 5 patients had previous nerve repair attempts, and the time from injury to repair using this technique averaged 14 months. Improvement in pain was impressive, with the patient survey yielding an average of a 50% reduction in pain. Surgeons should consider this reconstructive method when faced with repairing the IAN.

Reviewer: J. Bruce Bavitz, DMD
Article Reviewed: Mundinger GS, Prucz RB, et al. Reconstruction of the Inferior Alveolar Nerve With Bioabsorbable Polyglycolic Acid Nerve Conduits. *Plast Reconstr Surg* 2012; 129 (January): 110e-117e.

Consider Prednisone Premedication for Hyaluronic Acid Injection

Take Home Pearl:

One in four individuals experience prolonged periorbital edema after hyaluronic acid gel injections, with no consistent pre-treatment risk factors being identified.

Background: Facial soft-tissue volume enhancement for cosmetic or post-traumatic indications with various fillers has become more commonplace in recent years. However, there are various potential side effects with prolonged periorbital edema, with periorbital rejuvenation being one of these.

Objective: To review the incidence, clinical features, and treatment of prolonged edema (≥1 month) in the periorbital region after hyaluronic acid gel injection in the infraorbital area.

Design/Methods: A retrospective chart review of 4 ophthalmologic physician practices over a 3-year period was completed, identifying patients with prolonged periorbital edema after isolated hyaluronic acid gel administration to the infraorbital hollows. All injections were pre-periosteal via a linear threading and/or serial puncture technique along the length of the infraorbital rim.

Results: 51 charts of patients treated for cosmetic enhancement of the lower periorbital region from 2008 to 2011 were reviewed; 12 patients were identified (24%) with prolonged periorbital edema. Length of follow-up ranged from 1.5 to 15.3 months, with 3 of the 12 patients being treated with hyaluronidase at 3.0 to 5.7 months after their initial hyaluronic acid gel treatment. The average length of prolonged post-injection periorbital edema was approximately 6 months. No pretreatment clinical signs or symptoms were noted to consistently correlate with increased patient susceptibility for post-injection prolonged periorbital edema.

Conclusions: In this study, about 1 in 4 individuals experienced prolonged periorbital edema after hyaluronic acid gel injections, with no consistent pretreatment risk factors being identified.

Reviewer's Comments: As with any retrospective review, this study has limitations, and the sample size was relatively small. Soft-tissue fillers such as hyaluronic acid are used fairly often during facial cosmetic rejuvenation procedures. However, potential complications may occur, such as bruising, color differential, under-contouring, and over-contouring; in the periorbital region, retinal artery occlusion or prolonged periorbital edema may exist. In this study, Juvederm Ultra or Ultra Plus XC was used for the majority of injections. With 1 in 4 patients experiencing prolonged periorbital edema, it is certainly important to discuss this not uncommon complication with patients preoperatively. In addition, it would be beneficial if pre-treatment history and clinical exam could help identify potentially higher-risk patients. However, despite looking at a history of lower eyelid of midface procedures, seasonal allergies, history of fluid retention, or festooning on clinical exam, this study was inconclusive in identifying consistent pre-treatment risk factors. The valuable note I found in this article was that 2 of 12 patients with prolonged periorbital edema did undergo subsequent re-treatment with an infraorbital filler. They were premedicated with 30 mg of prednisone for 3 days and had no subsequent issues with prolonged periorbital edema during re-treatment, despite comparable material, dosing, and injection techniques.

Reviewer: Melanie S. Lang, DDS
Article Reviewed: Griepentrog GJ, Lucarelli MJ, et al. Periorbital Edema Following Hyaluronic Acid Gel Injection: A Retrospective Review. *Am J Cosmetic Surg* 2011; 28 (4): 251-254.

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1. Demineralized freeze-dried bone (DFDB) grafts cost only about one fourth of the cost of iliac crest grafts; however, at 5 years, implant survival using the DFDB graft is statistically much lower.

   Practice: T F ***Answer Submitted:*** **T F**

2. Surprisingly, sockets grafted with the milled tooth/hydroxypropyl cellulose carrier show delayed healing relative to controls.

   Practice: T F ***Answer Submitted:*** **T F**

3. Bone grafts using cells derived from the pulp are no better at improving the bone implant contact values compared to the no graft control sites.

   Practice: T F ***Answer Submitted:*** **T F**

4. Using plating for the treatment of mandibular symphysis fractures instead of lag screw fixation has significantly better occlusal and osseous results.

   Practice: T F ***Answer Submitted:*** **T F**

5. Using a single-tension band superior border plate for fixation of mandibular angle fractures creates significantly less stability than the two plate model.

   Practice: T F ***Answer Submitted:*** **T F**

6. According to a recent study, approximately one in four individuals undergoing hyaluronic acid gel injections experience prolonged periorbital edema, with no consistent pre-treatment risk factors being identified.

   Practice: T F ***Answer Submitted:*** **T F**

7. Patients with oral piercings should be informed of the importance of regular dental visits for early detection of local complications.

   Practice: T F ***Answer Submitted:*** **T F**

8. Intensive care unit admissions are more common in children aged 0 to 5 years with a facial fracture than in older children with similar injuries.

   Practice: T F ***Answer Submitted:*** **T F**

9. Cryoanalgesia of the TMJ results in a predictable return of pain symptoms at 12 months.

   Practice: T F ***Answer Submitted:*** **T F**

10. Using a low torque technique of 22.5 Ncm, the average marginal bone loss measure at 2 years is approximately 0.2 mm.

    Practice: T F ***Answer Submitted:*** **T F**

11. Hyperbaric oxygen therapy is now the standard of care in the management of necrotizing fasciitis of the head and neck area.

    Practice: T F ***Answer Submitted:*** **T F**

12. Denosumab is a new agent that stimulates osteoblast function.

    Practice: T F ***Answer Submitted:*** **T F**

13. Obtaining clear surgical margins is the most important variable that affects the prognosis of patients with maxillary squamous cell carcinoma.

    Practice: T F ***Answer Submitted:*** **T F**

14. For laryngospasms recalcitrant to bag valve mouth ventilation, succinylcholine at a dose of 1 to 2 mg/kg is recommended.

    Practice: T F ***Answer Submitted:*** **T F**

15. Due to the poor bone fill rate, using a patient's stem cells with a scaffold and platelet-derived growth factors for bone grafting does not seem to be an alternative to conventional bone grafting methods.

    Practice: T F ***Answer Submitted:*** **T F**

16. For cases where direct anastomosis of injured nerves is not possible, the use of polyglycolic nerve conduits should not be considered as an alternative to autogenous nerve grafting.

    Practice: T F ***Answer Submitted:*** **T F**

17. 5-Aminolevulinic acid is converted into protoporphyrin IX by dysplastic cells, making such cells preferentially absorb 585-nm laser light.

    Practice: T F ***Answer Submitted:*** **T F**

1. **T** Minor neurosensory disturbances are common with both chin and ramus bone donor sites.

2. **T** The removal of impacted mandibular third molars improves the periodontal condition of the second molar.

3. **F** In a military environment, the posterior mandible is most often fractured due to blast trauma exposure.

4. **T** Marked improvement in symptoms can follow open reduction of the temporomandibular joint with replacement of the disk in its normal position using Mitek mini anchors.

5. **T** Aerosolized intraoral or buccal midazolam is effective for pediatric sedation.

6. **F** A Le Fort I maxillary osteotomy results in a decrease in alar width of about 3 mm.

7. **T** Postoperative pain after the removal of a third molar can be predicted by simple preoperative testing of pain sensitivity.

8. **T** Mandibles <10 mm in height may fracture in implant sites.

9. **T** About 73% of medical students report that they have never received instruction in examination of the oral cavity.

10. **T** The length of the upper airway after maxillomandibular advancement can be accurately measured using a lateral cephalometric x-ray.

11. **F** Both the lip advancement and lip lift procedures can help restore a senile upper lip to a more natural and youthful appearance, though the results are not stable over the long term.

12. **F** Childhood tracheotomy has no effect on facial growth patterns.

13. **F** Recombinant activated factor VII has no effect on clopidogrel-induced bleeding.

14. **T** Salvage rates for maxillary squamous carcinoma with neck involvement are low.

15. **T** Use of zoledronic acid in adjuvant management of breast cancer does not improve survival or disease-free rates.

16. **T** Utilizing microdialysis for monitoring, approximately 16% of microvascular free-flap reconstructions are returned to the operating room for re-establishment of a blood supply.

17. **F** Administration of intramuscular nerve growth factor leads to marked increases in myelinated axonal density of the inferior alveolar nerve after only a single week of distraction osteogenesis.

18. **T** Virtual planning for fibular reconstructions allows superimposition of the digital fibula over the intended ablative mandibular site to enhance fit and contour of the graft.

19. **T** The most frequently encountered tumor of infancy is the hemangioma, with a 73% female predilection.

20. **T** Up to 12% of patients taking warfarin for anticoagulation to prevent thromboembolic events associated with cardiac valve replacement are not within the prescribed international normalized ratio therapeutic range.

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