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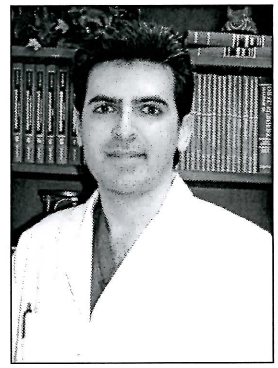

Report on
ORAL SURGERY™
Focusing on Dental Implants

Success of Implants vs Endodontically Treated Teeth

Hannahan and Eleazer from the University of Alabama at Birmingham compared the outcome of 2 treatment modalities—implants and endodontically treated teeth. Success was determined by the use of clinical chart notes and radiographs, whereas failure was defined as the removal of the tooth or implant. Uncertain findings for implants were defined as mobility class I or greater, radiographic signs of bone loss or an additional surgical procedure; uncertain findings for endodontically treated teeth were determined by mobility, a periapical index (PAI) ≥3 or the need for apical surgery.

PAI scoring system to grade endodontic treatment

- PAI 1: Intact periodontal ligament (PDL)
- PAI 2: Possible broken PDL
- PAI 3: Broken PDL
- PAI 4: Break in PDL with possible radiolucency
- PAI 5: Broken PDL with definite radiolucency

If the implant or tooth remained in place, the outcome was considered successful. The endodontic treatments and the implant placements were performed by specialists in group practices, and the restorations were completed by general dentists.

One hundred twenty-nine implants that met inclusion criteria were included in the study. At an average follow-up of 36 months, the implants had a successful outcome rate of 98.4%. One hundred forty-three endodontically treated teeth had an average follow-up of 22 months with a successful outcome rate of 99.3%. No statistically significant difference between the groups was identified.

When uncertain findings were included with the number of failures, the implant success rate was reduced to 87.6%; the endodontic success rate was reduced to 90.2%. The difference between the 12.4% of implants placed that required additional postoperative care and the 1.4% of endodontically managed

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teeth that required intervention was statistically significant. Two implants and 1 endodontically treated tooth were lost (Figure 1).

Predictability of implants and endodontically treated teeth

For implants, studies have linked success to

- location
- type of restoration
- systemic disease
- smoking
- bone quality
- occlusion
- esthetics

For endodontically treated teeth, studies have linked success to

- preoperative radiolucency
- periodontal condition
- quality of the fill and length
- quality of the coronal seal

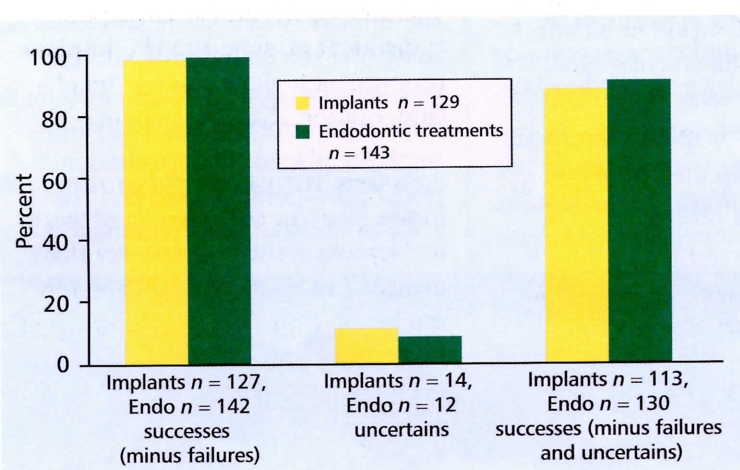

Figure 1. Outcomes. No statistically significant differences were found. Successes minus failures ($p = .56$); uncertain group ($p = .69$); successes minus failures and uncertains ($p = .61$).

Conclusion

The results of this study demonstrated little difference in the success rate of the 2 treatments. The only significant difference was the increased percentage of patients in the implant group requiring post-treatment intervention.

Hannahan JP, Eleazer PD. Comparison of success of implants versus endodontically treated teeth. J Endod *2008;34:1302-1305.*

Management Protocol for Anaphylaxis

Currently, there is neither concordance on the definition of anaphylaxis nor criteria for determining its diagnosis. It is generally accepted that anaphylaxis is a type I immune-mediated, life-threatening, severe systemic allergic reaction. Sharma et al from the Military Dental Center, India, delineated new concepts of characterizing and managing anaphylaxis on the basis of current literature in the discipline of emergency medicine.

Anaphylaxis is considered to be a specific immunoglobulin E (IgE)-mediated, antigen-induced reaction to a variety of foreign substances (allergens). The occurrence of anaphylaxis is estimated to be 1/10,000 per year in the general population, with a notable increased risk in women of 3–10:1. Anaphylactic reactions have a comparable clinical presentation to anaphylactoid reactions, lacking only an IgE contribution (Table 1).

Anaphylaxis results in the release of preformed mediators of inflammation. Synthesis of specific IgE antibodies by lymphocytes and plasma cells happens as a primary exposure to the antigen. When re-exposure to the antigen occurs, degranulation is triggered, causing the release of preformed mediators, such as histamine, chemotactic factors or enzymes, which are stored in the cellular cytoplasmic granules. These substances can be divided into 3 groups:

1. inflammatory activators that induce vasodilatation and edema
2. spasmogens that cause bronchial smooth muscle contraction
3. neutrophil and eosinophil chemotactic factors that attract various new cells to the region

Diagnosis of anaphylaxis

Anaphylaxis is highly probable when any of the following 3 criteria is met:

1. Acute onset of symptoms (minutes to several hours) with evidence of skin and/or mucosal effects, such as hives, pruritis, flushing, swollen lips, swollen tongue and swollen uvula, and either (a) respiratory compromise; (b) reduced blood pressure or associated symptoms of end-organ dysfunction; or (c) both.
2. After exposure, rapid evidence of ≥2 of the following: (a) skin/mucosal symptoms; (b) respiratory compromise; (c) reduced blood pressure or associated symptoms; and (d) persistent gastrointestinal symptoms.
3. Reduced blood pressure after exposure to known allergen for that particular patient within minutes to several hours.

Management of anaphylaxis

Basic life support involving early recognition, the summoning of help and maintenance of airway, breathing and circulation are the basic components of anaphylaxis management. Once the diagnosis has been determined, epinephrine by injection should be administered immediately. If the patient does not manifest the criteria of anaphylaxis established above, it would still be prudent to administer epinephrine in certain situations (i.e., a patient with a history of an anaphylactic reaction to peanuts, who recently ingested peanuts and within minutes experiences urticaria and generalized flushing). Management of anaphylaxis should involve

- Epinephrine 0.01 mg/kg administered intramuscularly every 5 to 15 minutes as needed. Peak plasma levels are higher when the epinephrine is injected intramuscularly in the thigh rather than in the upper arm (deltoid).
- Positioning patients experiencing anaphylactic shock in a recumbent position with their legs elevated to augment the stroke volume and cardiac output by shifting fluid centrally.
- Fluid resuscitation for patients who remain hypotensive after epinephrine injection. Large volumes of intravenous crystalloid might be required due to possible extravasation of blood volume, vasodilation and pooling of blood.
- Vasopressors to overcome vasodilation if epinephrine and fluid resuscitation are ineffective in maintaining the systolic blood pressure >90 mm Hg.

Ephinephrine injections and patient positioning are within the scope of practice for the general dentist.

Conclusion

The patient must be observed after treatment for the possibility of a recurrent attack after the epinephrine wears off. Referral to a hospital emergency room would be prudent.

Sharma R, Sinha R, Menon PS, Sirohi D. Management protocol for anaphylaxis. J Oral Maxillofac Surg *2010;68:855-862.*

Table 1. Anaphylactic and anaphylactoid causes

Anaphylactic causes	Anaphylactoid causes
Food	Muscle relaxants
Drugs	Opioids
Local anesthetics containing methyl paraben	Radiological contrast media
Vaccines	Immunoglobulins
Venoms	Aspirin and nonsteroidal anti-inflammatory drugs
Allergen extracts	Dextran and gelatin
Foreign proteins	
Parasites	
Latex	
Hormones, enzymes	
Muscle relaxants	
Exercise and food triggers	

Functional Dynamics During Osseointegration And Oral Implants

Chang et al from the University of Michigan electronically investigated the literature on functional assessments of osseointegration and assessed correlations to the peri-implant structure. Osseointegration, defined as direct bone-to-implant contact, is believed to provide rigid fixation of a dental implant within the alveolar bone and may promote the long-term success of dental implants.

During the process of osseointegration, a cascade of protein and cell apposition, vascular infiltration, de novo bone formation and eventual maturation occurs; this process results in primary and secondary dental-implant stability and may be enhanced and accelerated through modification of the implant surface roughness, development of a biometric interface or local deposition of growth-promoting factors. One of the main determinants of osseointegration is the stiffness of the tissue-implant interface and the supporting tissues.

Biomechanical assessments for osseointegration

1 Periotest technique (Siemens, Bensheim, Germany) assesses the damping (dynamic tissue recovery processes after loading) characteristics of the implant-bone interface. However, there is a lack of sensitivity in determining the degree of osseointegration.

2 Ostell (Integration Diagnostic AB, Goteborg, Sweden) uses the concept of resonance frequency analysis to determine the implant stability quotient. An L-shaped transducer attached to the implant produces a high-frequency mechanical vibration that can be recorded.

Analysis for osseointegration

Finite element analysis is used as a tool by which the functional performance of the dental implant system can be presented as specific values of stress and strain. This technique can enable evaluation of peri-implant osseous wound repair and interfacial biomechanics in experimental models.

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Conclusion

Although clinical and model analysis tools to assess implant stability exist, there are still limitations with the techniques. Further development of new methods is warranted.

Chang P-C, Lang NP, Giannobile WV. Evaluation of functional dynamics during osseointegration and regeneration associated with oral implants. Clin Oral Impl Res *2010;21:1-12.*

Inferior Alveolar Neurovascular Bundle in the Third Molar Region

Because the arrangement of structures within the neurovascular bundle has not been clearly defined, Pogrel et al from the University of California used 3 investigative tools to study the neurovascular bundle:

- dissection of teeth to determine the orientation of the inferior alveolar artery, vein and nerve
- analysis of histological sections from the dissection
- exposure of the neurovascular bundle as part of a clinical surgical procedure for a marginal resection of the mandible

Eight preserved cadaveric hemimandibles were harvested from the Anatomy Laboratory at the University of California, San Francisco. The overlying bone was removed, exposing the inferior alveolar neurovascular bundle from the lingual to the mental foramen. The vein, artery and nerve were separated and identified to ascertain their specific orientation in the canal, with attention focused on the third molar region. Anatomic cross-sections from this region were prepared for histologic examination of the relationships of the structures of the neurovascular bundle.

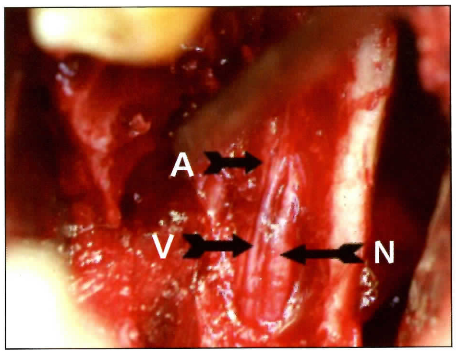

Figure 2. The inferior alveolar canal deroofed as part of a marginal mandibular resection showing neurovascular vessels in the third molar region. The vein (V) lies superiorly, and the artery (A) lies lingually and superiorly. The inferior alveolar nerve (N) lies below. (*Reprinted with permission from Pogrel MA, Dorfman D, Fallah H. The anatomic structure of the inferior alveolar neurovascular bundle in the third molar region.* J Oral Maxillofac Surg *2009;67:2453.*)

During a marginal mandibular resection procedure to remove an ameloblastoma in 1 patient, the inferior alveolar nerve was deroofed, and the undisturbed neurovascular bundle was observed and photographed for comparison with the cadaveric and histologic specimens.

In every case, the vein was located on top of the nerve in the 12-o'clock position. When the right inferior alveolar bundle was viewed posteriorly, the artery was located on the lingual side of the nerve in approximately the 9:30 position; there was no apparent change in this relationship from the lingual to the mental foramen. The histologic specimen confirmed the relationship of the 3 structures. The artery was a single vessel, whereas the "vein" was usually made up of 3 to 5 separate veins. The intra-operative photograph of the patient undergoing a marginal mandibular resection confirmed the arrangement of the neurovascular bundle, with the vein positioned superiorly and the artery situated lingual to the vein in close relationship to the nerve (Figure 2).

Conclusion

Bleeding, in the form of oozing from injury to the overlying vein, may occur if the roof of the inferior alveolar canal is breached. However, contact with the vessel occurs prior to contact with the nerve; if further drilling or implant insertion ceases, potential damage to the nerve can be prevented. When arterial bleeding is observed during third molar surgery, damage to the inferior alveolar nerve may occur simultaneously.

Pogrel MA, Dorfman D, Fallah H. The anatomic structure of the inferior alveolar neurovascular bundle in the third molar region. J Oral Maxillofac Surg *2009;67:2452-2454.*

In the next issue:

- Survival rates of immediately vs delayed loaded implants
- Prognosis of implants replaced after removal of failed implants
- Predicting risk for bisphosphonate-related osteonecrosis of the jaw
- Surgical and orthodontic management of impacted maxillary canines

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