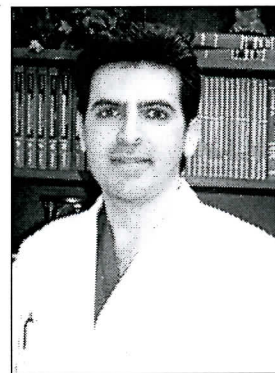


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Report on ORAL SURGERY™

Focusing on Dental Implants



Diabetes Mellitus: Considerations for Dentistry

An estimated 20.8 million Americans (7%) have been diagnosed with diabetes mellitus (DM), with 85%–90% of patients classified as type 2 diabetics and 5%–10% classified as type 1 diabetics. Kidambi and Patel from the Medical College of Wisconsin focused on the characteristics of this disease for consideration by dental practices.

It is well recognized that DM is associated with complications including premature cardiovascular disease, peripheral vascular disease, renal disease, retinopathy and neuropathy. Additionally, approximately one-third of patients with diabetes have severe periodontal disease, which may be attributed to attenuated immunity associated with hypoglycemia. Furthermore, peri-

odontal disease appears to be associated with atherosclerotic cardiovascular disease, and having both periodontal disease and DM enhances the risk of cardiovascular disease.

Managing the dental care of patients with DM

The most significant issue confronting the dental practitioner managing patients with diabetes is the potential for hypoglycemia. It is important that the clinician be able to recognize and treat patients with diabetes who may become hypoglycemic and manifest unusual behavior in the office. It is wise to have a snack, oral glucose gels or tablets available for such situations. A glucometer could check the blood glucose levels (normal fasting blood glucose is between 70 and 110 mg/dL). Patients at most risk of

developing hypoglycemia are those taking insulin.

Dental practitioners can also actively screen, diagnose and treat periodontal disease in the diabetic population. The dental practitioner, in a health care questionnaire, should ask about the patient's frequency of blood glucose determination and the latest recordings. Also, the dental practitioner may ask the patient or the patient's physician about the patient's last HbA_{1c} (glycated hemoglobin) level to determine the level of control of the person's diabetes (normal is <6.5, excellent is 6.5–7.5, good is 7.5–8.5, fair is 8.5–9.5 and poor is >9.5).

Conclusion

DM is a chronic, systemic metabolic disorder, the orosystemic connection of which is becoming better understood by the dental practitioner.

Kidambi S, Patel SB. Diabetes mellitus: considerations for dentistry. J Am Dent Assoc 2008;139(suppl):8S-18S.

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Local Risk Factors For Implant Therapy

Certain local risk factors have been demonstrated to possess a potential influence on dental implant outcomes. These risk factors classically are statistically associated with, but not necessarily causally related to, an enhanced risk of complications. Local risk factors can occur in any situation that might be predisposed to failed osseointegration and implant restoration.

Early dental implant failures are frequently related to a disruption of the early healing phase, during which a fibrous scar forms between the implant and its surrounding bone. This fibrous tissue permits epithelial downgrowth, which can result in mobility of the implant and ultimately implant failure. Late dental implant failures are frequently characterized by a number of factors, including the microbial environment and prosthetic restoration.

Martin et al from the University of Florida reviewed 2681 articles in the literature and selected 19 that studied the effect of particular potential local risk factors on dental implant survival and success. The risk factors included interdental space, infected sites, soft-tissue thickness, width of keratinized soft tissue, bone density and implant stability (rigid fixation of the implant with the host bone and absence of micromotion).

Primary outcomes measured included

- Absence of mobility
- Absence of persistent subjective complaints (pain, foreign-body sensation and/or dysesthesia)
- Absence of recurrent peri-implant infection with suppuration
- Absence of a continuous radiolucency around the implant
- Absence of pocket probing depths >5 mm
- Absence of pocket probing depths ≥5 mm and no bleeding on probing
- Annual vertical bone loss after the first year of service not exceeding 0.2 mm (mesially or distally)

Secondary outcomes measured included

- Mucosal recession
- Bleeding on probing
- Proximal marginal bone loss

Results

- 1** One study reported a strong correlation between implants on 4.1-mm platforms placed within 3 mm of the adjacent tooth and proximal bone loss, with the greatest bone loss occurring when implants were inserted next to maxillary lateral incisors. Another study suggested that a 5- to 6-mm gap should be regarded as the minimal space for 4.1-mm implant platforms.
- 2** Placement of dental implants into infected sites may be possible, but there is insufficient evidence of long-term survival.
- 3** Insufficient evidence exists to show whether soft-tissue thickness is a risk factor in implant survival.
- 4** No evidence currently supports a relationship between the widths of keratinized tissue and implant survival.
- 5** No studies revealed a direct relationship between bone density and survival of the implant (bone den-

sity should not be confused with bone quality).

6 The primary stability of the implant at the time of its placement is a critical factor in the survival of the implant; currently, there is no validated measure of implant stability, only methods such as subjective evaluation and resonance frequency analysis.

Conclusion

Conclusions were limited by the deficiency of quality clinical trials related to this topic and the multifactorial nature of implant therapy. The authors recommended further prospective, randomized clinical trials to validate the local risk factors for implant survival and success.

Martin W, Lewis E, Nicol A. Local risk factors for implant therapy. Int J Oral Maxillofac Implants 2009;24(suppl):28-38.

Impact of Systemic Diseases and Treatments for Implant Therapy

Certain systemic diseases may influence the oral tissues by escalating their vulnerability to other diseases or by interfering with the healing process. Furthermore, systemic conditions managed with medications or other therapeutic modalities may potentially affect dental implants as well as the peri-implant tissues. In patients with certain diseases, dental implants are not recommended or are questionable, but frequently the evidence for such contraindications has been ambiguous.

Bornstein et al from the University of Bern, Switzerland, conducted a study to determine whether treating certain systemic diseases with and without systemic medication enhances the risk of implant failure and reduces success and survival rates of dental implants.

Table 1. Findings of the effect of systemic diseases on implant failure

Systemic disease(s)	Findings
Scleroderma, lichen planus, ectodermal dysplasia	No controlled studies found to demonstrate any positive or negative effects on the outcome of implant therapy; only case reports or case series could be identified.
Sjögren syndrome	There are no controlled studies and only one case series with 8 patients.
Neuropsychiatric disorders and Parkinson's disease	Only case reports on psychiatric diseases or neurologic disabilities, such as Down syndrome and autism, have been published.
AIDS and HIV	Only case reports have been published, demonstrating successful implant-prosthetic rehabilitation of immunocompromised but immunologically stable patients. One study that compared the short-term clinical outcomes of implant placement in a group of HIV-positive patients and a control group of HIV-negative patients reported a 100% success rate for both groups.
Crohn's disease	The literature regarding the performance of dental implants in patients with Crohn's disease is scarce. In one study, the authors speculated that the presence of antibody-antigen complexes might lead to autoimmune inflammatory processes, including in the bone-implant interface.
Transplantation (heart/liver/renal)	Immunosuppressive therapy with cyclosporine A combined with steroids may have negatively influenced bone healing around dental implants in animal studies and may even impair the mechanical retention of dental implants previously osseointegrated.
Cardiovascular diseases	The literature addressing dental implants and their success and failure rates in patients with cardiovascular diseases is scarce. No studies demonstrated significant increased failure rates in these groups.
Diabetes mellitus	The evidence that patients with diabetes tend to have higher failure rates is equivocal. The only available matched-control retrospective study indicated no increased risk of failure. The largest study, a retrospective cohort analysis of patients with type 2 diabetes treated by one clinician, indicated a statistically significant increase in the relative risk of implant failure with diabetes.
Osteoporosis	The density of peripheral bone, currently used to diagnose osteoporosis, demonstrated only a weak association with the risk of implant failure in 2 case-controlled studies.
Bisphosphonates	There are not enough data to estimate the risk for oral bisphosphonates in the context of implant therapy, with only 1 prospective and 2 retrospective studies available.
Radiotherapy	A systematic review of implants placed before and after radiotherapy reported failure rates between 0% and 12.6% for a follow-up period of up to 12 years. A recent systematic review found no beneficial effect of hyperbaric oxygen therapy.

The authors' methodology included a MEDLINE search to identify studies reporting implant survival in patients treated with osseointegrated dental implants who had been diagnosed or treated with ≥ 1

of the following systemic diseases or treatments:

- scleroderma
- Sjögren syndrome
- lichen planus

- neuropsychiatric disorders and Parkinson's disease
- AIDS or HIV
- ectodermal dysplasia
- Crohn's disease
- organ transplantation
- cardiovascular diseases
- diabetes mellitus
- osteoporosis
- oral bisphosphonates
- radiotherapy

The analysis focused on systemic diseases not generally perceived as absolute contraindications to implant therapy. The role of systemic factors in early failures (during the healing period up to the beginning of the prosthetic treatment) and late failures (after implant loading) were analyzed (Table 1).

Conclusion

The authors concluded that the level of evidence signifying absolute and relative contraindications for dental implant treatment from systemic conditions is sparse.

Bornstein MM, Cionca N, Mombelli A. Systemic conditions and treatments as risks for implant therapy. Int J Oral Maxillofac Implants 2009;24(suppl):12-27.

Periodontitis and The End-stage Renal Disease Patient

Moderate-to-severe periodontitis, with increased plaque and calculus formation, has been found to be prevalent in the renal hemodialysis patient population in a number of studies. Several studies, however, have suggested that enhanced systemic inflammation from periodontitis may contribute to chronic renal disease.

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Periodontitis has been linked with increased markers of systemic inflammation, such as C-reactive protein (CRP) levels, and endothelial dysfunction, both of which are early predictors of atherosclerotic complications. Atherosclerotic complications such as myocardial infarction and stroke are common and associated with increased inflammation in patients who have end-stage renal disease (ESRD) and are receiving renal hemodialysis (Figure 1).

Craig and Kotanko from New York University College of Dentistry and Renal Institute LLC, New York, reported on ESRD and the relationship between systemic inflammation and mortality, the possible contribution of periodontitis to systemic inflammation and the dental management of patients receiving hemodialysis.

Functions of the kidney

- Excretion and metabolism of metabolic end products
- Regulation of blood fluid volume and electrolyte concentrations
- Regulation of erythrocyte production in the bone marrow through secretion of erythropoietin
- Calcium homeostasis through hydroxylation of vitamin D₃ into active or inactive metabolites

Most common causes of ESRD

- Diabetes mellitus
- Hypertension

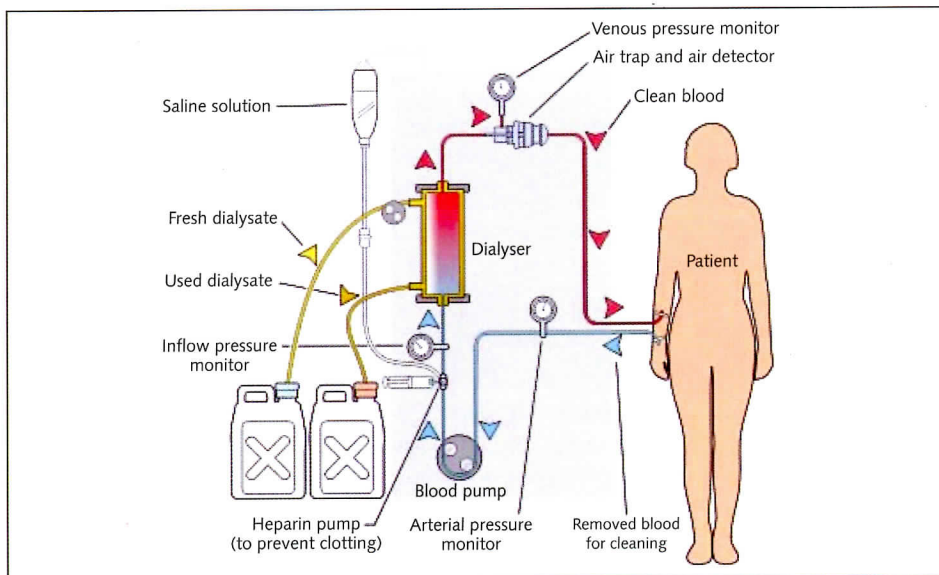


Figure 1. ESRD is fatal without intervention using renal dialysis, peritoneal dialysis or kidney transplantation. Renal hemodialysis, the most common therapy, involves utilization of a surgically created arteriovenous fistula, commonly placed in the forearm, to access the patient's vascular system. The hemodialysis machine uses a membrane to clean the blood; heparin is employed to inhibit clotting during the process. The death rate for hemodialysis patients is about 22%, with myocardial infarction, cardiac arrest, cardiac arrhythmia and stroke accounting for 44% of all reported deaths.

- Glomerulonephritis
- Cystic kidney disease

Management of the patient with ESRD on hemodialysis

- Consult the patient's nephrologist prior to dental treatment.
- Schedule a dental appointment the day after a hemodialysis session.
- Use systemic antibiotics if systemic bacteremia is anticipated.
- Determine from the nephrologist the presence of anemia or impaired blood clotting.
- Use care with vasoconstrictors because of the high prevalence of patients with hypertension.
- Avoid the vascular access site.
- Alter dosage of drugs due to diminished or absent kidney function.

Conclusion

Because periodontal disease is treatable, it may provide a reversible

source of systemic inflammation that contributes to ESRD and its complications.

Craig RG, Kotanko P. Periodontitis and the end-stage renal disease patient receiving hemodialysis maintenance therapy. Compend Contin Educ Dent 2009;30:546-552.

In the next issue:

- Review of implant surfaces
- Third molars and periodontal pathology in adolescents and young adults
- Comparative evaluation of anesthetic efficacy in patients with irreversible pulpitis
- Orthodontic extrusion

Do you or your staff have any questions or comments about Report on Oral Surgery? Please call or write our office. We would be happy to hear from you.