

REVIEW ARTICLE

DENTAL IMPLANTS: A MINI REVIEW

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ABSTRACT:

One of the common problems encountered in patients reporting to dental clinics is tooth loss. The success of maxillary and mandibular tissue supported implant prostheses varies in the literature, and the ideal protocol may be elusive from given the numerous studies. The oral rehabilitation option is an alternative to conventional dentures and should improve function, satisfaction, and retention. Hence, in this review, we aim to summarize the data available on dental implants.

Key words: Bone resorption, Dental implants, Hybrid prostheses.

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INTRODUCTION

Tooth loss is very common and it can happen as a result of disease and trauma; therefore, the use of dental implants to provide support for replacement of missing teeth has a long and multifaceted history. Research on dental implant designs, materials and techniques has increased in the past few years and is expected to expand in the future due to the recent growth of the global market for dental implants and the rising in the demand for cosmetic dentistry.^{1,2}

Bone resorption will occur in an edentulous alveolus. The ubiquitous phenomenon is a progressive and irreversible. The amount and rate of alveolar bone resorption depend on factors such as age, sex, facial anatomy, metabolism, oral hygiene, parafunctions, general health, nutritional status, systematic diseases, osteoporosis, drug administration and time of edentulism.³

Studies to verify the influence of conventional fully-removable dentures as factor of bone resorption are replete; patients wearing complete dentures will present with smaller edentulous ridges than edentulous patients with never receiving prosthetics. The implant-retained prosthesis is an alternative treatment option in edentulous patient's rehabilitation, providing more retention, stability, function and esthetics especially in the mandible. The use of implants for edentulous patients will actually preserve existing bone compared to conventional dentures.^{4,5}

Implant-supported hybrid prosthesis

Hybrid prostheses have a great number of advantages including reducing the impact force of dynamic occlusal loads, being less expensive to fabricate and highly esthetic restorations. Furthermore, they may be successfully used by a combination of tilted and axially placed implants in partial edentulism in the posterior part of resorbed maxillae. However, food impaction, speech problems or difficulties in dealing with hygiene were reported by authors.^{6,7}

Despite the favorable long-term outcomes achieved with prosthetic rehabilitations with implants, biological and technical complications such as surgical complications, implant loss, bone loss, peri-implant soft-tissue complications, mechanical complications, and aesthetic/phonetic complications are frequent. The authors implied that such complications are affected by many factors, including the operator's skills and judgments in treatment planning, prosthesis design, materials, patient-specific factors, and local and systemic conditions and habits such as bruxism, smoking, presence of periodontal disease, and maintenance. Furthermore, the communication between the prosthodontist and surgeon is emphasized as critical to ensure adequate restorative space for the various prosthetic designs, appropriate implant angulation, and minimizing cantilevers.⁸⁻¹¹

Dental implant survival in diabetic patients

The persistent hyperglycemia in diabetic individuals, inhibit osteoblastic activity and alters the response of parathyroid hormone that regulates metabolism of Ca and P, decreases collagen formation during callus formation, induces apoptosis in lining cells of bone and increases osteoclastic activity due to persistent inflammatory response. It also induces deleterious effect on bone matrix and diminishes growth and accumulation of extracellular matrix. The consequent result is diminished bone formation during healing, which is observed in number of experimental animal studies.¹²

Type -1 diabetes causes decreased bone mineral density, as well as reduced bone formation and higher bone resorption whereas Type -2 diabetes produces normal or greater bone mineral density in some patients. It has been observed that insulin not only reduces the deleterious effect of hyperglycemia by controlling it but also stimulates osteoblastic activity. Hence, bone matrix formation in insulin treated experimental models is similar to control ones.^{13, 14}

Occlusion for implant-supported fixed dental prostheses

Implant-supported fixed dental prostheses (ISFDPs) have become a desirable treatment option for replacing missing teeth in partially edentulous patients due to their high predictability and success rates. The goal of the ISFDP is to restore esthetics, form, and function. Most literature on implant occlusal concepts is based on expert opinion, anecdotal experiences, and *in vitro* and animal studies. Well-performed longitudinal clinical studies on ISFDP are insufficient. In addition, little evidence supports specific occlusal concepts for implant-supported prostheses. However, cautionary approaches lead by experts in the field have been practiced with clinically acceptable outcomes.^{15, 16} Evidence-based consensus for managing occlusion for ISFDPs is still lacking. Most of the available clinical data are controversial. Current clinical practices rely heavily on principles extrapolated from the natural dentition or removable dental prostheses on complete edentulous patients and on expert opinions. More clinical trials investigating occlusion for ISFDPs and its relationship with risk factors are warranted to determine best practices for our patients.¹⁷⁻¹⁹

Immediate dental implant placement with immediate loading following extraction of natural teeth

Most advanced way to replace missing teeth is dental implant which is designed to replicate the natural tooth root and crown of the natural tooth. This procedure preserves the gingival mucosa and bone with no damage to adjacent teeth. Conventional procedure for implant placement involves extraction of offending tooth, waiting 2–4 months for extraction socket to heal, insertion of implant, and again waiting for 3–6 months for integration of implant with surrounding bone; after this procedure, another surgery is necessary to expose the implant and to place a prosthetic abutment. Taking into consideration the prosthetic treatment, the patient had to wait up to 8–12 months for a lost tooth to be replaced. Because of these shortcomings related to conventional technique, strategies were developed to substantially shorten the entire treatment by placement of implant immediately after extraction of tooth followed by immediate loading of implant with prosthesis.²⁰⁻²⁴

Implant supported fixed partial denture

The use of dental implants in the rehabilitation of partially edentulous patients has become a well-established and accepted contemporary clinical method with predictable long-term success. The majority of studies examining implant success have emphasized the integrity of implant-bone support and the quality of osseointegration typically evaluated using parameters such as implant mobility, inflammation, infection around the implant site, and peri-implant bone loss. Predictable results are believed to depend on good initial implant stability, controlled loading conditions, and an osseointegrative implant surface. As implant therapy evolves and becomes the standard of care, and the population seeks out alternatives to traditional fixed partial dentures

(FPDs), success will be dependent on more than simply osseointegration.²⁵⁻²⁷

Restorative therapy using dental implants is considered a safe and predictable treatment procedure in edentulous and partially dentate patients. These therapies range from cantilevers, resin-bonded bridges, FPDs to implant-supported SCs, and bridges. Changes in the restorative treatment patterns and the introduction of new and improved restorative materials and techniques have greatly influenced the longevity and esthetic outcomes. The focus of implant research is shifting from descriptions of clinical success to the identification of factors associated with failure.²⁸

To date, most studies evaluating risk factors for failure are flawed in terms of their statistical analysis. Many researchers assessed survival in a binary manner (yes or no) or applied statistical methods assuming that the implant observations were independent of each other. Prospective and longitudinal studies related to partial edentulous indicate cumulative survival rates ranging from 89% to 95% and cumulative survival rates ranging from 93.6% to 96.7%, 3-7 years after loading. In addition, for a meaningful interpretation of the survival rate, a minimum of 5-year follow-up would be required.²⁹

Recent systematic reviews have evaluated the survival of tooth- and implant-supported reconstructions of different designs and described the incidence of biological and technical complications after a 5-year period. The survival of FPD with two different designs ranged from 92.5% for cantilever FPDs to 93.8% for conventional FPDs in this study. However, data toward the failures occurring in various implant-supported fixed prosthesis like single crowns (SCs), bridges, as well as implant and tooth connected prosthesis still have not been evaluated.³⁰

CONCLUSION

After tooth loss, an individual may seek tooth replacement so that his/her function and esthetics could be restored. Clinical prosthodontics, during the past decade, has significantly improved and developed according to the advancements in the science and patient's demands and needs. Dental implants have become the treatment of choice in patients undergoing prosthetic rehabilitation for missing teeth. This area requires further research for better exploration.

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