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Dental Implants: A Review.

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Review Article

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ABSTRACT

Dental caries and periodontal disease have historically been considered the most important global oral health burdens. More recent epidemiological data seem to show an increasing trend of tooth loss due to periodontal reasons rather than caries; the presence of initial attachment loss, bone height and the habit of smoking significantly increase the risk of tooth mortality. A dental implant is a titanium screw which is placed into bone to replace missing teeth. The implant mimics the root of a tooth in function. A key advance in dentistry has been the flourishing replacement of lost natural teeth by osseointegrated implants and the current and future application of implants to support intra- and extra-oral prostheses is a great implication in restoring dental health.

INTRODUCTION

Oral diseases such as dental caries, periodontal disease, tooth loss, oral mucosal lesions and oropharyngeal cancers, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS)-related oral disease and orodental trauma are major public health problems worldwide. Poor oral health may have a profound effect on general health, and several oral diseases are related to chronic diseases. Tooth loss in adult life may also be attributable to poor periodontal health. Severe periodontitis, which may result in tooth loss, is found in 5–20% of most adult populations worldwide [1]. Dental caries and periodontal disease have historically been considered the most important global oral health burdens. Numerous epidemiological studies have shown that caries is the main reason for tooth loss. More recent epidemiological data seem to show an increasing trend of tooth loss due to periodontal reasons rather than caries; the presence of initial attachment loss, bone height and the habit of smoking significantly increase the risk of tooth mortality. There is a strong correlation between smoking, the severity of periodontal disease and tooth mortality [2]. The other common causes for tooth loss include poor oral hygiene, trauma, sports injury, bruxism, jaw surgery, traumatic occlusion, eating disorders, root perforation, genetic predisposition, congenital defect, systemic disease (like diabetes) and lack of nutrients. The complications associated with tooth loss are listed in table 1.

Table 1: Complications associated with tooth loss

- Functional loss
- Aesthetics
- Facial support and masticatory insufficiency
- Pronunciation and phonetics
- Eating insufficiency
- Impede normal contour and comfort

Dental Implants

A dental implant is a titanium screw which is placed into bone to replace missing teeth. The implant mimics the root of a tooth in function. It is not only biocompatible, but actually fuses to bone by osseointegration. The

growth of osseointegrated implants symbolizes one of the most significant breakthroughs in current dental practice in the oral rehabilitation of partially or fully edentulous patients. The concept of osseointegration or functional ankylosis was first proposed by Branemark [3, 4] and Schroeder [5] through their revolutionary research work. Osseointegration is a direct structural and functional union between living bone and surface of the load carrying implant. A shift towards improved aesthetics and simplified use has resulted in the application of oral implants in the replacement of single teeth [6].

The common types of implants based on shape and form are listed in table 2 [7].

The various indications and contra indications of dental implants are listed in table 3.

Table 2: Common types of oral implants

Endosseous implants

Blade like
Pins
Cylindrical
Disk like
Screw shaped
Tapered and screw shaped

Subperiosteal frame like implants

Transmandibular implants

Table 3: Indications and contraindication of implants

Indications

- Complete edentulous patient
- Patient with oral deformities
- Partially edentulous

Contraindications

- Systemic disease (uncontrolled diabetes, pathological disorders)
- Smokers/tobacco chewers
- Immune compromised patients
- Poor oral hygiene
- Stress/ Psychological problems
- Traumatic occlusion
- Pathological disorders of bone, xerostomia etc.

Characteristics

Events leading to integration of an implant into bone, and hence determining the performance of the device, take place largely at the tissue implant interface. Development of this interface is complex and involves numerous factors. These include not only implant-related factors, such as material, shape, topography, and surface chemistry, but mechanical loading, surgical technique, and patient variables, such as bone quantity and quality, as well [8]. After implantation, titanium implants interact with biological fluids and tissues. Direct bone apposition onto the surface of the titanium is critical for the rapid loading of dental implants. After the initial stages of osseointegration, both prosthetic biomechanical factors and patient hygiene are crucial for the long-term success of the implants. There are two types of response after implantation. The first type involves the formation of a fibrous soft tissue capsule around the implant. This fibrous tissue capsule does not ensure proper biomechanical fixation and leads to clinical failure of the dental implant. The second type of bone response is related to direct bone-implant contact without an intervening connective tissue layer [9]. There are numerous reports that demonstrate that the surface roughness of titanium implants affects the rate of osseointegration and biomechanical fixation [10]. Titanium implants became the standard for choice metal because it is very reactive material that would not become integrated in tissue. The chemical nature of the implant surface can further be modified by coating with hydroxyapatite and titanium oxide layer because of their resemblance to bone tissue. Implant manufacturing process includes machining, acid etching and blasting or combination of all [7, 11]. Implants can be placed in mouth by two techniques either by one stage implant or two stage implant.

Complications

The complications associated with dental implants are biological, esthetic, technical and surgical. The various factors associated with each complication are listed in table 4 [7] complications and dental failures can be minimized when taking into account certain aspects of treatment such as correct pre surgical planning, the use of adequate surgical techniques, postsurgical follow-up, respecting the osseointegration period, appropriate design of the superstructure, the study and correct distribution of Occlusal loads, and meticulous hygiene during the maintenance phase [12, 13].

Table 4: Complications associated with implants

Biological

- Periimplantitis
- Implant failure
- Inflammatory host response
- Dehiscence

Esthetical

- Unacceptable
- Phonetics associated
- Patient rejection

Technical

- Implant fracture
- Restoration fracture
- Loosening of the abutment

Surgical

- Accidental damage to adjacent tissue
- Hematoma
- Nerve damage

CONCLUSION

A key advance in dentistry has been the flourishing replacement of lost natural teeth by osseointegrated implants. Implant dentistry has become successful with the discovery of the biological properties of titanium. The exercise of dental implants for the oral treatment of fully and partially edentulous patients has significantly broadened the scale of clinical dentistry, creating further treatment options in multifarious cases in which functional treatment was previously restricted or poor. The predictability and long-term success of dental implants have been well documented, both in removable and fixed prostheses. The current and future application of implants to support intra- and extra-oral prostheses is a great implication in restoring dental health.

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