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Review Article

Dental Implants and Infection: A review and Relation

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ABSTRACT:
The installation of dental implants, which are widely regarded as the most recent technological innovation in the area of prosthetics, is the treatment option that has the highest success rate for managing tooth loss brought on by neoplasia, caries, trauma, or surgical extraction. These are composed of inert materials, which are often found to be components of titanium alloys. There is also the possibility of using gold alloys and ceramic materials as alternatives. A dental implant may be drilled into the jaw bones if there is sufficient bone thickness, and there is a good likelihood that the implant will be successfully placed if the appropriate surgical method is used. Because it promotes osseointegration, the presence of titanium in an implant bone joint makes the joint much more robust. In spite of the fact that it is an excellent method for treating edentulous gaps in the jaws, there is a risk of infection after implantation. The illness known as peri implantitis describes an infection that occurs when microorganisms assault an implant, which weakens the implant and puts its health at risk. Numerous investigations of this kind have been carried out in order to investigate the possibility of the existence of microorganisms. The majority of the bacterial colonies that have been typed during the course of this study have been found to be Gram-negative bacteria of various species. The investigation into the potential presence of fungal components is currently ongoing and calls for further data gleaned from previous studies. After infection, it may cause a wide variety of complications, and the treatment of such instances is notoriously difficult. This article discusses the recent developments in dental implants as well as the risk of infection associated with them.

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INTRODUCTION

The field of dentistry has made significant progress in recovering tooth loss using methods that are the most effective thanks to the invention of spectacular dental implants. Dental implants are a huge breakthrough in a profession that is always changing and expanding, and its primary purpose is to make up the gap left by missing teeth in such a way that the patient's physiological function, look, correct phonetics, and optimum comfort are all restored to the greatest possible degree. (1) Loss of teeth due to dental caries, periodontitis, trauma, ineffective root canal therapy, teeth fracture, congenital abnormalities, and surgical loss to neoplasia treatment are the primary causes of edentulous speech in jaws. Other causes include congenital malformations. (2) Dental implants are the most effective method for restoring these unsightly voids because they do not compromise the overall health or stability of the teeth that are located next to the affected areas. (3) The endosseous kind of implant with a single unit that may take the form of a screw or cylinder is the most frequent type of implant used today. During the production process, a variety of compounds may be employed.

The composition of dental implants, which may range from alloys made of titanium to alloys made of gold including nickel, chromium, and vanadium. The coating of titanium or hydroxyapatitite that is coated over these end osseous implants assists in increasing the union of implant to underlying jaw bone, which ultimately results in a robust osseointegration. (5) The placement of the implants takes place inside the maxilla and the mandible following a radiological assessment of the quality of the bone. Drilling is used to create gaps inside the jawbones after it has been determined that there is adequate bone density and

thickness to sustain an implant in the jaws. (3) The risk of further bone loss in the jaws may be mitigated by the placement of endosseous implants in the jaws as soon as possible after the development of an edentulous gap. When a tooth is extracted, the alveolar bone density decreases because the bone is no longer stimulated in the same way. (6) The stimulation of the bone that results from the placement of a dental implant shortly after the extraction of a tooth results in a reduction in the loss of further bone. (7, 8) As a result of these benefits, implants are currently widely used by dentists all over the globe as a primary therapeutic choice for the management of tooth loss. There is currently a wide variety of dental implants available on the market to cater to the specific requirements of particular dental practises. Although the Branemark System introduced dental implants to the field of dentistry for the first time in 1971, (9) various manufacturers have developed various types of implants in this growing field of dentistry projecting about more than 200 brands of dental implants catering to approximately a million implant placements done each year throughout the world. This growing field of dentistry is referred to as implantology. (3) As new developments emerge, it is vital that the biocompatibility of the materials used in the production of dental implants takes the major emphasis. This is because dental implants are designed to replace missing teeth. Dental implants come with a host of potential complications, some of which include hypersensitivity to the materials used in the implants, which can manifest as a mucosal reaction; microbial engagement, which can result in inflammation at the implant site; corrosion of the implant material; and other issues that are related to the presence of metallic materials in close proximity to oral tissues for an extended period of time. (10) Despite the high success rate of dental implants, one of the most significant complications is an infection that develops at the location where the implant was placed. (11) It has the potential to hinder the osseointegration process of the implant, which may lead to the failure of the implant in a very short amount of time after its installation. (12) The primary variables that have been shown to contribute to infection of dental implants will be the primary emphasis of this study, as well as an update on how these factors relate to one another.

MECHANISM BEHIND THE PREVALENCE OF INFECTION AT IMPLANT LOCATION

A coating of germs known as biofilm may develop when microbes adhere to surfaces, whether those surfaces are alive or nonliving. (13) These biofilms are made up of many different kinds of organisms that live together in a complicated community atmosphere around the surface. (14) The bacteria that make up these biofilms are able to adhere to the surfaces they are growing on by secreting a slimy substance that is composed of extracellular polymers of proteins, nucleic acids, and carbohydrates. (15) These polymeric compounds also present themselves as having the following properties: a method for biological signalling as well as a source of nutrients for bacteria that are developing. (16) These biofilms may be home to a variety of bacterial species that are able to live peacefully with one another as a result of their ability to communicate with one another and work together. (17) Their resistance to disinfectants will significantly grow as a result of their collaboration, which will allow them to achieve structural and genetic advances. (18) As they become larger, they have a greater propensity to colonise and develop in new locations, which likewise rises with that propensity. (14) As a result, this creates dangerous dangers for the living surfaces and poses a variety of other challenges. (13) Dental plaque is the best example of a biofilm that adheres to teeth with the assistance of polymers derived from saliva. It is the most common form of this kind of biofilm. If it is not eliminated by brushing one's teeth and engaging in other forms of dental hygiene, it may lead to cavities and inflammation of the supporting tissues of one's teeth. (1) In a similar approach, dental implants serve as possible locations for the formation of biofilms that may lead to peri-implantitis. This condition can be quite painful.

MICROFLORA IN PERI-IMPLANTITIS MAY BE RATHER COMPLICATED

One of the primary factors that contributes to the failure of implants is peri implantitis, which is caused when biofilm forms on the surfaces of implants. Research has shown that the film that forms over an implant is a complicated layer that is colonised by a large number of different types of microorganisms and is not limited to any one particular organism.

The predominant microorganisms in implant biofilms are anaerobic Gram-negative bacteria. These bacteria include bacilli, Porphyromonas gingivitis and Prevotella intermedia, as well as cocci, Veillonella, and spirochetes, Treponema denticola. Bacilli are the most common kind of anaerobic Gram-negative bacteria. It has been shown that the presence of these bacteria in peri implant locations has an effect similar to that of chronic periodontitis. coagulase-negative staphylococci and staphylococci aureus Staphylococci may also be identified in infected areas, which provides evidence of the function they play in these biofilms and the complexity of their makeup. It is not clear how much of a role Candida species and Coliforms play in adherent biofilms, hence further study is needed to investigate this question. (3)

COMPLICATIONS RELATED TO THE PREVENTION OF DENTAL IMPLANT INFECTIONS

Infection at the implant site after surgery occurs in between 4 and 10 percent of people who have dental implants placed. (1) Although the field of medical

research has advanced to the point where many different kinds of antibiotics are now accessible and may be used to treat different kinds of bacterial species, biofilms continue to be an exception. Even after taking the prescribed amount of antibiotics, infections have a good chance of returning. (20) This is one of the most serious problems that may arise from the placement of dental implants. Antibiotic treatment is often unsuccessful, and implant failure occurs in around two-thirds of infected implant patients prior to prosthesis loading. (19) If an infection has already set in, removing the implant may seem like the wisest course of action, but it is not the best therapy. (20) Therefore, the most effective method to avoid the development of peri-implantitis is to prevent the formation of biofilm during the implant placement operation by adhering to stringent asepsis protocols. (14) A other approach would be to do research on better materials that do not attract germs and to avoid bacterial adherence to implant surfaces by ensuring that these agents are not present on those surfaces. (13, 17) An adequate approach should try to inhibit bacterial adherence by the use of multifunctional layers on zirconia, which is a surface consisting of titanium that has been constructed through nanotechnology. Antibiotics should also be released at the implant site in a regulated manner. (13, 21, 22)

CONCLUSION

The number of people getting dental implants has dramatically increased during the last several decades. The use of these tools as one of the most effective prosthetic substitutes for missing teeth is becoming more common. It is contradictory that these devices have a high likelihood of success when implanted under uncontrolled settings of bacteria free implant insertion site in a strongly loaded oral microflora environment in the oral cavity. A significant amount of insight into the pathophysiology of peri- implantitis may be gained via the compilation of data obtained from many studies that focused on the microbiology of implant surfaces and the failure rate owing to infection as the underlying reason. The development of improved and more secure treatment strategies for these patients may also benefit from the implementation of follow-up monitoring programmes that determine infection rates.

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