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Evaluation Of Prosthetic Failure In Dental Implant Therapy

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ABSTRACT

Abutment restorations, both fixed and removable, are well-established procedures for replacing missing teeth in patients with partial or total tooth loss. Implant/tooth failure is defined as having signs and symptoms that require removal of the implant/teeth. The Medline, Pubmed, Embase, NCBI, and Cochrane databases were searched to describe the factors and ways the implants can get infected and the treatments for implant infections. Focus was awarded to those studies that reported data on the type of antibiotics and surgical procedures applied to treat the infection. Failure of an implant prosthesis necessitates a detailed investigation. Factors such as incorrect integration, material selection, and patient health can all play a role. Multidisciplinary approaches are essential for increasing success rates and improving patient outcomes. Poor location, bone difficulties, infection, habits, and material selections can contribute to prosthetic failure in dental implants. To mitigate these hazards, successful outcomes necessitate precision surgery, good design, maintenance, and patient cooperation.

Key words: Dental implant failure, Osseointegration, Peri-implantitis, Fixed restorations.

Introduction

Implant-supported fixed and removable prostheses are well-established procedures for replacing missing teeth in patients with partial or total tooth loss. A failed implant/tooth was defined as exhibiting indications and symptoms that necessitated implant/tooth removal. Failure of a prosthesis was defined as (a) loss of one or more teeth and implants supporting the prosthesis and (b) replacement of the prosthesis by a new combination of tooth-implant-supported FDPs or another form of prosthesis due to technical issues. Dental implants are commonly utilized and have been shown to be a safe and effective treatment with a high success rate [1]. This high rate is attributed to the implanted material's capacity to integrate with the surrounding bone [2]. The surgical and prosthetic phases are the two stages of implant placement. The surgical phase includes all procedures required to insert the implant into the jaw bone and facilitate the prosthetic phase. Everything needed to place a tooth or teeth on top of the implant is included in the prosthetic phase. Following surgery, the implant is allowed to fuse with the jaw bone for up to 6 months [3]. However, technological advances have reduced the wait time to 8 weeks or less [4]. When the integrated implant is ready for the prosthetic phase, the prosthesis might be fixed or removable. The abutments and screws are usually part of the prosthetic component. The abutment is attached directly to the implant's top and extends through the gingiva to the mouth cavity. The abutment is attached to the implant with an abutment screw. The crown is then fastened or bonded onto the abutment using a prosthetic screw. The crown and abutment are sometimes constructed in one piece and screwed directly onto the implant. A corresponding hex surface will be present on the fitting surface of the abutments, allowing proper seating of the abutment onto the implant [4]. Endosseous dental implants have proven to be a viable therapeutic option for replacing lost teeth. Conversely, treatment continues to fail, as indicated by publications examining the causes of implant failure [5]. Implant Failure is described as the failure of an implant to fulfill its purpose (functional or esthetic) due to mechanical or biological reasons, within a range that has been distinguished between "failure" and "complication." The term complication was initially used in the literature to refer to reversible conditions or those that could be rectified. However, in recent literature, the term failure has been used to describe reversible and permanent dental implant problems [6]. According to Chee W. *et al*., implant failures are categorized into four major categories: A) loss of integration, B) positioning failures, C) soft tissue flaws, and D) biomechanical failures [7].

Symptoms and signs

Pain and discomfort around the implant site, especially when biting or chewing, can indicate possible prosthesis failure. This discomfort may be accompanied by gum inflammation

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or soreness. The movement or instability of the prosthetic tooth can be an indication of a lack of stability within the implant system. This instability can be caused by screw loosening, abutment instability, or complications with the implant's incorporation into the bone. Chipped or fractured prosthetic teeth can be caused by factors such as high bite force, material deterioration, or manufacturing flaws. These cracks can cause pain, inflammation, and damage to the surrounding soft tissues [8]. If the prosthetic tooth's alignment is wrong, leading it to not line properly with nearby natural teeth, it may impair your ability to chew comfortably. Furthermore, if the gum tissue surrounding the implant becomes swollen, red, or easily bleeds, it could indicate an underlying problem with the prosthetic component, possibly due to poor fit or discomfort [9].

Risk factors

A variety of factors covering various categories influence the success of prosthetic dental implants. Consider any previous instances of failure, as well as surface features such as roughness and the need to maintain purity and sterility [10]. It is critical to ensure a suitable fit, reduce implant exposure to the oral environment, and address mechanical variables such as avoiding early loading and occlusion trauma. Patient-related factors include oral cleanliness, gum health, nearby bone amount and quality, closeness to natural teeth, and the state of surrounding gum tissue. Patient systemic factors such as smoking habits, sensitivity to infections due to age or malnourishment, underlying illnesses such as diabetes, and the impact of therapies such as steroid therapy and chemotherapy are all important concerns. Finally, the surgical method and environment must be carefully regulated to avoid problems such as bone overheating and perioperative bacterial infection [11]. All of these factors, taken together, decide the eventual success of prosthesis over dental implant operations [12, 13].

Diagnosis

The evaluation of dental implant failure entails thoroughly examining several clinical and radiological factors. Several critical phases are included in the diagnostic approach for recognizing implant failure: Begin by documenting the patient's medical and dental history, particularly details regarding the implant process and any difficulties experienced. Determine any discomfort, pain, movement, or changes in the implant area. Perform a thorough clinical evaluation of the implant site [14]. When probing around the implant, look for signs of inflammation, redness, edema, and depth. Assess implant stability by exerting controlled pressure and looking for movement. To examine the bone-implant connection, use radiographic imaging modalities such as periapical or panoramic X-rays and, if necessary, cone-beam computed tomography (CBCT) scans. Recognize radiolucencies around the implant, changes in bone density, and probable symptoms of peri-implantitis. Measure the probing depth around the implant to see if the pocket depth has increased since the original measurements. Elevated pocket depths may indicate peri-implantitis and the possibility of implant failure [15]. Assess implant stability using clinical tools and mobility testing. Excessive movement may suggest that the implant is about to fail. Examine any stated pain or discomfort by the patient. Persistent pain around the prosthetic or implant site may signal underlying issues, especially when biting or under pressure. Examine the soft tissues that surround the implant for health and condition. Inflamed and bleeding perform microbiological testing to detect the presence of certain bacteria associated with peri-implant infections. Consider blood testing such as C-reactive protein (CRP) levels to determine inflammation and possibly systemic involvement in certain cases. Consider the patient's overall systemic health, lifestyle choices (such as smoking and alcohol consumption), and dental hygiene practices, as they can all contribute to implant failure, which can lead to prosthetic failure [16].

Treatment

Treating any underlying biological abnormalities is the first step in treating prosthesis failure. This may entail treating peri-implantitis, a significant cause of implant failure, with nonsurgical and surgical methods to limit infection and stimulate tissue regeneration. After dealing with the biological issues, the focus shifts to the prosthetic components. If mechanical issues are discovered, such as a fractured restoration or abutment screw loosening, the damaged components must be replaced [17]. Furthermore, assessing occlusion is critical because poor force distribution might lead to prosthetic failure. The occlusal scheme may need to be adjusted or modified to guarantee uniform loading and avoid future difficulties. Material degradation due to wear and tear might cause prosthetic failure in some situations. Replace worn-out prosthetic components with high-quality, long-lasting materials to increase durability. Furthermore, developments in prosthetic technology bring new restoration choices, including CAD/CAM-designed prostheses that provide exact fit and improved aesthetics. Several prosthetic solutions are available depending on the amount of failure, ranging from single crowns to implant-supported bridges or overdentures [18]. Patient education and oral hygiene reinforcement are key components of managing prosthesis failure. To monitor the health of their implants, patients must understand the need to maintain excellent oral hygiene practices and attend regular follow-up sessions. Dental professionals are critical in educating patients about the proper care of their restorations and implants in order to avoid future failures [18].

Results and Discussion

Prosthetic failure in relation to dental implants substantially influences patients, dental practitioners, and insurance companies; consequently, identifying critical characteristics connected to implant failure may reduce the likelihood of failure and enhance treatment success [19]. Understanding potential risk factors and signs of implant failure before therapy may help doctors plan appropriately and support a

long-term therapeutic outcome. There is still disagreement over the impact of implant-, patient-, and bone-related characteristics on the risk of implant failure. Appropriate patient selection is one of the most important aspects of the success of implant therapy [19].

Conclusion

Technical issues in fixed and removable implant-retained prostheses reveal that neither form of implant-retained prosthesis can be avoided. Technical problems can cause implant treatment to fail. A full pretreatment diagnostic work-up, including establishing the prosthetic aim with a wax-up or set-up and the related ideal, prosthetic-oriented three-dimensional implant position, is critical to reducing the likelihood of this failure. Furthermore, choosing the best type of prosthesis, including implant components and materials, is critical for the clinical long-term effectiveness of the reconstruction.

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