

Review Article

Immunocompromised patients and dental implant

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ABSTRACT

Dental implant is on rise in today's time and era due to its importance in improving quality of life of patients. However, the success of the dental implant is significantly associated with individuals' medical condition. Immunocompromised patients due to their weak immunity are considered sensitive for any type of surgery as it can result in various complications. Similarly in case of placing dental implants in immunocompromised patients' supreme care and attention is needed in order to avoid risk and hazardous consequences. Oral and maxillofacial surgeons see an increasing number of patients with immunocompromised conditions in their daily practice due to better long-term health care and new indications for immunosuppressive therapy. The aim of this research is to review the available information about the dental implants in immunocompromised patients. Despite the fact that certain diseases are still considered risk factors in the effectiveness of dental implants in immunocompromised patients, there are few definite contradictions in this treatment option. As a result, disease control of risk factors, as well as personal risk assessment prior to dental implant treatment, may be considered more important than the disease or risk factor itself. Presence of various diseases can raise the risk of treatment failure or side effects in case of dental implant. Majority of the studies support dental implants as reliable and safe option under utmost care in immunocompromised patients however, the literature is quite divided and scarce in this regard and future research can be beneficial to yield better outcome and treatment strategies.

Keywords: Dental, Implant, Patient, Immunity, Compromised

INTRODUCTION

Implant-based dental rehabilitation is becoming increasingly popular in our constantly growing and aging society. Apart from the comfort of the patient and aesthetic

recovery, the restoration of physiological function with dental implants may be linked to improved general health and quality of life. Nonetheless, it is undeniable that the patient's medical condition has a significant impact on the rate of success of dental implants.¹ Dental implants were

first used to replace lost teeth more than 40 years ago, although research and development of implant techniques are currently underway. Various studies in literature have shown the long-term success of dental implants, which promise a high survival rate of more than 90% after ten years. Through the application of bone regeneration treatments or the use of implants with a reduced diameter or length, implant procedures have become feasible in compromised clinical conditions with a paucity of surrounding bone in recent decades. Implant therapy has also been used in individuals with reduced health conditions such as diabetes and autoimmune disorders, owing to ongoing advancements in implant procedures and materials. Immunosuppression can affect both early and late complications by encouraging peri-implantitis or causing early infection and osseointegration problems.²

Any non-compulsory surgery requires that the immune system function properly. The immune system's inflammatory response is critical for both identifying infections and coordinating healing processes. Aside from wound healing, osseointegration of the implant is one of the most important steps toward effective rehabilitation. Osseointegration is thought to be triggered by the same processes as bone fracture healing and is thus linked to a healthy immune system. Oral and maxillofacial surgeons are seeing an increasing number of patients who are immunocompromised or have immunosuppression in their medical records as a result of constantly better health care with longer life expectancy and novel indications for immunosuppressive therapy.³

In patients with systemic illnesses, dental implant therapy should be structured to account for long-term consequences that may occur; these complications are more common and severe than in healthy people. They have the potential to entirely derail the surgery. Like in the case of an osteoporotic patient, bone resorption, which is quite common in the condition, might lengthen the time required for osseointegration; additionally, a special kind of prosthetic loading that stimulates bone healing is required.⁴ Organ transplantation is an extreme therapeutic treatment for an irreversible systemic disease that requires a lifelong immunosuppressive medication regimen. Because immunosuppressants have a strong interplay with oral and systemic health, the impact of this medication on oral hygiene indices and radiographic findings of the implant may require special attention. The link between implants and immunosuppressive medication has been discussed in literature but the results are controversial.⁵ The purpose of this research is to review the available information about the dental implants in immunocompromised patients.

METHODOLOGY

This study is based on a comprehensive literature search conducted on 17 May 2022, in the Medline and Cochrane databases, utilizing the medical topic headings (MeSH) and a combination of all available related terms, according

to the database. To prevent missing any possible research, a manual search for publications was conducted through Google Scholar, using the reference lists of the previously listed papers as a starting point. We looked for valuable information in papers that discussed the information about the dental implants in immunocompromised patients. There were no restrictions on date, language, participant age, or type of publication.

DISCUSSION

Dental implants have been linked to good survival rates in both pristine and regenerated bone, making them a stable and well-established treatment option for total and partial edentulism. Proper patient selection is one of the most important decisions in the case of implant therapy, which means that, as with all surgical procedures, a detailed medical history should be carefully recorded and evaluated for the complexity of the surgical site. With varying degrees of evidence, a variety of systemic diseases have been claimed to affect or even contraindicate implant surgery. Understanding the impact of any systemic disease and concomitant medications on the surgical technique and the final treatment outcome in connection to implants is critical, especially as the number of medically impaired patients needing implant surgery is expected to rise.⁶

Evidence from literature

Findings of case report and 5-year clinical evaluation in 2011 revealed that since dental implants in organ transplant patients have long been questioned due to its association with an elevated risk of infection, especially when the restorative treatment is difficult. A 45-year-old liver transplant recipient on long-term immunosuppressive medication was followed for five years. 11 branemark implants were implanted in the maxilla and mandible one year following liver transplantation utilizing minimally invasive surgery. Peri-implant bone absorption, probing depth, and implant movement were all oral clinical characteristics. The fifth-year values were all within normal limits, showing sustained osseointegration with only minor vertical bone loss. The author further suggests that immunocompromised patients can be effectively rehabilitated with dental implants by doing a thorough evaluation, administering the appropriate antibiotics, and performing a minimally invasive dental implant treatment.⁷

Findings of a prospective controlled study in 2017 showed that both control group and liver transplant group had similar early postsurgical problems. The liver transplant group had a 100% implant survival rate, while the control group had a 98.15% implant survival rate. Peri-implantitis mucositis was found in 35.42% of implants and 64.29% of patients in the liver transplant group, and 43.40% of implants and 56.25% of patients in the control group. In the liver transplant group, peri-implantitis was found in 4.17% of implants and 7.10% of patients, while in the control group, it was found in 9.43% of implants and

18.80% of patients. Immunosuppression was not found to be a risk factor for implant failure or the emergence of peri-implant disorders in liver transplant patients. Hence, dental implant procedure is not contraindicated in individuals who have had a liver transplant; however, these patients should be closely monitored during follow-up care.⁸ Findings of another prospective controlled study in 2012 demonstrated the bone response around submerged dental implants in immunocompromised organ transplant patients is comparable to that seen in control patients, and that this patient group can be successfully rehabilitated with dental implants.⁹

Results of another retrospective clinical study depicted that the prosthetic failure occurred in 45 individuals, resulting in a survival rate of 94.3%. Failure of 173 implants occurred in 98 patients, resulting in a cumulative survival rate of 83.5% at the patient level and 94.6% at the implant level. At 1-, 5-, and 10-years follow-up, the mean marginal bone levels were 1.18 mm, 1.56 mm, and 1.47 mm, respectively. Biological issues arose in 11.9% of patients. Successful implant rehabilitation in patients with systemic illnesses or smoking habits is conceivable. However, depending on the type of systemic illness, varied effects on implant rehabilitation were observed.¹⁰ Dental implants can cause congestive heart failure or, on the other hand, can cause respiratory depression in patients with thyroid disease. Surgery may put patients at risk for chronic adrenal insufficiency. Hypofunction of the adrenal glands affects a patient's health of hypertension and the healing process, which can lead to secondary infection. The dental implant is affected by long-term corticosteroid medication. Corticosteroids have immediate postoperative benefits by lowering inflammation and discomfort, but they also delay healing, lower blood leukocyte counts, and reduce the patient's capability to fight infection.¹¹

In oral implantology, blood disorders are among the most serious diseases. Short- and long-term effects of anaemia include prolonged healing and reduced bone density. Immunocompromised individuals have a significant rate of intraoperative bleeding, which can lead to postoperative edema and pain. Increased risk of subsequent infection is associated with it. Due to numerous chronic infections, implant survival is reduced over time. Multiple issues caused by leukocyte abnormalities can jeopardize the implant's success. Infection is the most common of these as can occur at any stage of treatment. Internal bleeding is common in patients with anaemia, and the risk of edema after surgery and subsequent infection is high.¹²

Immunocompromised patients have a higher risk of postoperative sequelae due to the inability to establish a controlled, appropriate, and continuous immune response, according to a well-accepted surgical concept. Despite the lack of research on the subject, all published studies show that implantation in stable HIV-positive people does not pose a risk for postoperative complications such as infection or paralysis of the wound. Although some studies have reported a higher rate of postoperative complications

where tooth extraction in which strong immunity and neutropenia were present, many authors did not find a link between HIV infection and the incidence of postoperative anxiety and other minor oral surgery procedures.¹³ Vissink states that although dental implants are commonly used in patients who are at risk of medical treatment, it is often unclear whether these treatments are effective in these patients, whether the risk of implantation and development of peri-implantitis increases, and what specific preventive measures, if any, should be taken. According to research, implant survival may be lower in a few cases, and the risk of peri-implant health and its related complications may be higher, but the level of planned disease control is higher than the nature of the disease and the associated risk. Dental implant treatment is a possible treatment for any patient with a medical condition as long as appropriate preventive measures and follow-up care are provided.¹⁴

The use of dental implants in patients with autoimmune illnesses that appear in the mouth is still being researched. The severity of the illness is clearly the most important element that the dentist will examine when deciding on an implant option. Patients with significant symptoms are less likely to seek dental implant rehabilitation from their dentist because it is not a top priority for them. The success rates of the implant are similar to those of healthy people in moderate situations where pharmacological therapy is limited to the local area or for a short time and at a low dose. Patients with average illness severity, on the other hand, should be treated individually. After flare-ups of the disease have been treated, implantation should always be attempted. The mucosa where the implant will be placed should be free of lesions. The treatment duration and dose are critical for implant longevity, as increasing the drug dosage degrades the integrity of the bone and soft tissue.¹⁵

Esimekara suggests that dental implants are a safe and dependable option for immunocompromised patients, with a success rate comparable to that of the general population. These findings appear to contradict the general practice that emerged from previous studies in the literature, which suggested that implantation of patients with systemic diseases should be approached with caution. In fact, several experts warn that systemic variables may play a significant role in the increased risk of implant placement failure. As a result, dental implant placement in such patients was frequently regarded contraindicated. However, the specific nature of systemic variables that threaten implant osseointegration and its long-term preservation is yet unknown.¹⁶ Even in mid- and long-term observations, following follow-up durations of up to or beyond 10 years, survival and effectiveness percentages of implant-prosthetic rehabilitations in patients without compromised general health have been observed to be astonishingly high. Despite the fact that certain illnesses are still regarded risk factors for dental implant success in immunocompromised individuals, there are only a few definite contraindications to this treatment option. As a result, disease control of diseases that increase the risk, as well as a personalized risk-benefit analysis before dental

implant therapy, may be deemed more significant than the disease or risky condition itself. Dental implant therapy, on the other hand, is a potential treatment option for these individuals, with satisfactory rates of success of implant-borne prosthodontic treatment, indicating that these patients may benefit from this treatment option. Furthermore, these findings support the use of an interdisciplinary strategy to overcome the constraints of criteria for dental implant therapy.¹⁷

Although there are few direct contradictions in dental implants, various diseases can raise the risk of treatment failure or side effects. However, the impact of health risks on implant outcome is unknown due to a lack of prospective studies, and well-designed observational studies are necessary. The degree of disease control may be far more important than the type of systemic disorder itself, and concomitant medical treatment should be obtained prior to implant treatment because the quality of life and benefits of dental implants may outweigh any concerns for many of these people. The spectrum of treatment options, as well as the benefits of comparisons and negatives, should be fully reviewed in relation to the needs and wishes of the patient. In patients with systemic diseases, it is important to carefully evaluate cost-benefit analysis against the patient's quality of life, longevity and to perform surgical procedures for implantation with great care.¹⁸

Despite the importance of dental implants in immunocompromised patients the literature in this aspect is quite divided and scarce. More clinical and comprehensive research in future can aid in generation of better evidence-based guidelines and treatment strategies.

CONCLUSION

Dental care in immunocompromised patients should be handled with utmost attention and care. In order to avoid dental implant failures in immunocompromised patients, it is critical to understand the consequences of systemic disorders or those caused by current drugs in the oral cavity. Keeping in view the patient's altered physiological conditions, the health care team should be able to resolve any issues that arise and prepare them for additional treatment options. Further research in the future is needed to develop guidelines and recommendations regarding implantation of dental implants in people with compromised immune systems.

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