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ORIGINAL ARTICLE

Risk of Peri Implantitis in Patients with Diabetes Mellitus

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ABSTRACT

Dental implants have a 97% long-term survival rate; there is no reliable model for predicting implant longevity. Even though it has become more apparent over time and through numerous studies that a variety of patient and professional factors may contribute to peri-implantitis, with compelling theories such as improper three-dimensional (3D) implant placement, poor prosthesis design that interferes with proper oral hygiene practices, and an excess of luting cement, there is no universally accepted diagnostic standard, so prevalence rates are still up for debate.

Objectives: This study aims to recognize diabetes for implant loss & peri-implant diseases. It is also intended to measure the prevalence of peri-implant disease 5 years following implant implantation. The study aims to ascertain if implant issues may alter patients' perceptions of their implants by integrating a patient questionnaire.

Methodology: After obtaining the approval of the study from the institution, diabetic patients who had oral implants at the Department of Oral and Maxillofacial Surgery between 2015 and 2020 were added to a list of patients. Following were the criteria for inclusion: Diabetic patients who were older than 18 at the time of consent and comparable radiographs are taken following the first remodeling. There were no prerequisites for the exclusion

Results: A total of 165 records were checked to make sure the original radiographs were verified, the implant insertion date, and patient's contact information. 41 patients met the requirements for inclusion. 36 of the 41 patients who had been contacted and scheduled for a follow-up check showed up (20 male and 16 female, age 34 to 63 yrs; mean – SD age: 47.6 – 10.6 yrs). At baseline, 105 implants were placed in the 36 patients.

Conclusion: Because the two disease entities share similar host characteristics or microbiota, diabetes and periodontitis may serve as risk factors for peri-implantitis.

Keywords: Dental Implant, Peri-implantitis, Diabetes Mellitus

INTRODUCTION

Characterizing long-term dental implant outcomes is crucial given that more than 2 million dental implants are inserted each year in the US only.[1] Dental implants have a 97% long-term survival rate; there is no reliable model for predicting implant longevity.[2] Even though it has become more apparent over time and through numerous studies that a variety of patient and professional factors may contribute to peri-implantitis, with compelling theories such as improper three-dimensional (3D) implant placement, poor prosthesis design that interferes with proper oral hygiene practices, and an excess of luting cement, there is no universally accepted diagnostic standard, so prevalence rates are still up for debate.[3]

When medical problems are taken into consideration, dental specialists may find it even more difficult to comprehend this effect on the peri-implant soft and hard tissues.[4] Other variables, such as systemic risk factors in the host, may also affect the peri-impactites in an individual's time of start, pace of development, and severity.[5] Additionally, survival estimates do not account for the existence of biological problems, and although dental implants have an astonishingly high survival rate, more and more patients are presenting with peri-implant illnesses. Understanding the frequency and risk features of peri-implant illness is crucial in order to prevent or cure peri-implant inflammation given the potential systemic effects of chronic inflammation.[6]

These peri-implant disorders may result in pain, costly surgery, non-surgical therapy, adverse systemic health implications, or even eventual implant loss. For the purpose of allocating resources, making clinical decisions, and obtaining patient permission, the future burden of peri-implant illnesses must be estimated.[7] In earlier investigations, risk factors for peri-implant disorders were discovered. Strong data suggested that having poor dental hygiene, a history of periodontitis, and smoking increase risk.[3] Additionally, it has been suggested that drinking alcohol, having diabetes, and having certain hereditary characteristics increase risk. There is also mounting evidence that dental cement residue left over following placing restorations increases risk.[8]

In order to develop a prediction model for peri-implant illnesses and implant loss, this study aims to recognize diabetes for implant loss & peri-implant diseases. Using the best definitions of peri-implant illnesses available at the time of publishing, it is also intended to measure the prevalence of peri-implant disease 5 years following implant implantation. The study aims to ascertain if implant issues may alter patients' perceptions of their implants by integrating a patient questionnaire.

METHODOLOGY

After obtaining the approval of study from the institution, diabetic patients who had oral implants at the Department of Oral and Maxillofacial Surgery between 2015 and 2020 were added to a list of patients. Following were the criteria for inclusion: Diabetic patients who were older than 18 at the time of consent and comparable radiographs are taken following the first remodeling. There were no prerequisites for exclusion. A total of 165 records were checked to make sure the original radiographs were verified, the implant insertion date, and the patient's contact information. 41 patients met the requirements for inclusion. 36 of the 41 patients who had been contacted and scheduled for a follow-up check showed up (20 males and 16 females, aged 34 to 63 years; mean – SD age: 47.6 – 10.6 years). At baseline, 105 implants were placed in the 36 patients. The research did not include implants that were inserted earlier or later than the baseline. According to current guidelines, the research implants were implanted by a variety of postgraduate students under the direction of many faculty members. The implants were then repaired using either a cement-retained restoration or a screw-retained restoration (Table 1).

The following information was taken from the patient's medical record on the circumstances at the time the implant was placed: Date of implant placement, implant brand, implant size, immediate vs. delayed insertion, kind of bone graft used, antibiotic

use, smoking status, and overall health at the time of implant installation are all factors to consider.

Table 1: The Implant Insertion Data

Implant Data	N (%)
Implant Inserted	105 (100)
Implant Failed	8 (7)
Bone Graft	53 (51)
Cement restoration	61 (58.7)
Screw retained	31 (29.5)

The patient described their health condition in their medical history; laboratory tests were not used to confirm it. The diagnosis of diabetes did not specify whether it was type 1 or type 2. The International Workshop for a Classification of Periodontal Diseases & Circumstances criteria were utilized to designate a periodontal diagnosis at the time of insertion of dental implant based on the closest periodontal charting to that time.

Since the patient's implants were placed, data on their frequency of periodontal prophylaxis or maintenance treatment was gathered. In addition, a questionnaire was given to each patient regarding their implant in order to collect qualitative data using closed-ended questions on the patient's perception of their implant, including any technical or biological difficulties. The patients were questioned on any issues they were aware of as well as whether they had ever felt any discomfort, bleeding, or pus. They were questioned about any recent surgical or antibiotic procedures they had undergone, as well as any implant removals. For each implant, the patient provided a distinct response.

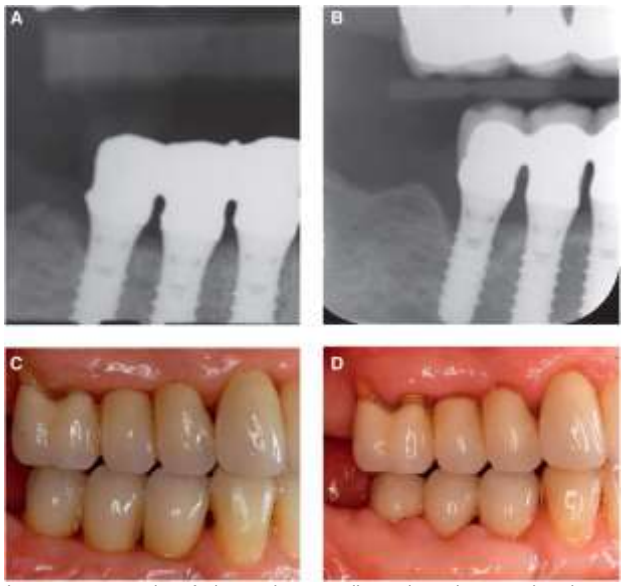

Fig 1: An example of the patient's radiographs taken at the time of prosthesis placement and taken again at the subsequent examination is shown in the images respectively.

As soon as feasible prior to the placement of the final prosthesis, a baseline radiograph was obtained from the patient's medical file. At the time of the follow-up examination, digital radiographs of the implants were taken utilizing film holders to verify paralleling method and reduce picture distortion. A digital radiograph viewing system, which offers to measure tools calibrated to the size of the phosphor plate used for radiography, was utilized to evaluate bone loss. At implant loading, the baseline radiographic measurement was made. The examiners applied the radiograph taken at the time the implant was placed if a radiograph from that time wasn't available, using a threshold vertical distance of 2 mm from the anticipated marginal bone level following remodeling. Two calibrated examiners assessed and documented both mesial and distal bone loss. Figure 1 displays a sample baseline, follow-up, and patient picture radiograph. To evaluate the dependability of interexaminer reliability, calibration was done. To evaluate intraexaminer reliability for clinical assessments of PD, PI, and GI; quantity of KT; and periodontal health, the first five subjects were completed by both. Following the study's conclusion, the two examiners separately assessed each radiograph to calculate the amount of bone loss on each implant's distal and mesial surfaces in order to achieve a consensus on the condition of each implant. In the event of a disagreement, the examiners performed an extra measurement together in an effort to come to an agreement.

RESULTS

A total of 165 records were checked to make sure the original radiographs were verified, the implant insertion date, and the patient's contact information. 41 patients met the requirements for inclusion. 36 of the 41 patients who had been contacted and scheduled for a follow-up check showed up (20 male and 16 female, age 34 to 63 yrs; mean – SD age: 47.6 – 10.6 yrs). At baseline, 105 implants were placed in the 36 patients.

The average patient had 2.31 implants. Six of the patients were missing teeth prior to implant implantation, and one more patient lost their teeth due to severe periodontitis just before the follow-up assessment. According to their updated medical history evaluation, seven patients at the follow-up examination were smokers & 7 patients had cardiac conditions. The majority of the restorations—58.7%—were cement-retained, while 29.5% were screw retained. Table 1 provides an overview of the history of bone grafting, implant factors, etc.

Table 2: Predictive Model for Failure or Peri-Implanttitis RRs

Risk Factors	RR	Lower 95% CI	Upper 95% CI	P
Periodontal disease at placement	1.4	0.9	4.0	0.02
Implant Dm	1.5	0.9	1.1	0.00
Diabetes at placement	3.0	1.2	6.0	<0.001

Table 3: Risk Factors Analysis of Implant Loss

Risk Factors	RR	Lower 95% CI	Upper 95% CI	P
KT	0.9	0.6	1.5	0.73
Cemented restoration	0.6	0.1	2.5	0.50
Immediate loading	3.0	0.3	10.8	0.0

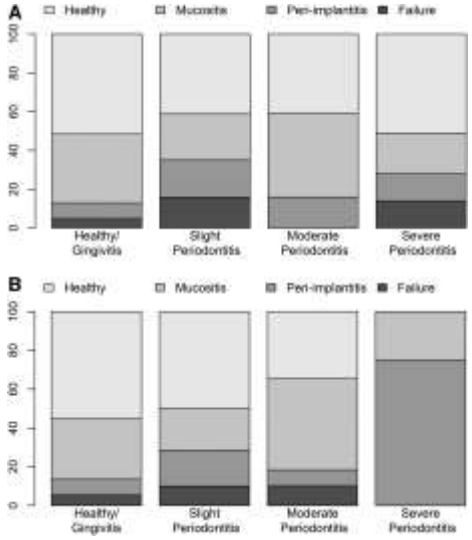

Fig 2: Periodontal status at the time of implantation (A) and periodontal status at the time of assessment (B) and their effects on post-implant outcomes, Implants are measured in percentages.

31 implants were placed, and 18 of them came from patients who had periodontitis. Three of the 18 were taken from individuals who had advanced periodontitis. 1 patient with austere periodontitis who also had all of their leftover teeth pulled & became edentulous had two of those failed implants. The patient was edentulous at the time of the follow-up examination; hence the periodontal condition at that time was not included (Fig 2).

At both the baseline and follow-up examinations, there were significant correlations between implant failure and diabetes (P 0.01), as well as between implant failure and immediate implant loading (P 0.01). Additionally, the probability of implant failure rose noticeably as implant diameter grew (P 0.01) (Table 2). The uses of antibiotics at the time of implant placement, smoking status, restoration type, or any other variables under investigation were not linked to implant failure.(Table 3)

DISCUSSION

A model that forecasts possible implant loss and peri-implant illness might provide consumers and practitioners the knowledge they need to make wise decisions, in relation to changing risk factors or choosing alternative therapies. According to this prediction model, diabetes at the time of implant insertion, periodontal disease at the time of implant insertion, younger patients at the time of insertion, and larger-diameter implants, all increase the likelihood of developing peri-implantitis or losing an implant.[9]

According to reports, patients who have had periodontal disease in the past are more likely to develop peri-implant disease. The connection would have been more significant if the variable "history of periodontal disease" had been included.[10-13] In order to be accurate, periodontal health was determined based on clinical observations rather than a history of prior periodontal illness. The 7.1% implant failure rate identified in this research is consistent with earlier data, and diabetes, rapid implant insertion and larger-diameter implants are the main causes of failure. Due to the limited sample size in the periodontal disease groups, there was no significant correlation between periodontitis & implant failure. The risk of implant failure and periodontitis was obscured in cases of severe periodontitis in which the periodontal status changed following extraction of periodontally involved teeth, improving or changing to an edentulous status at the time of examination.[6,9,14]

A risk factor for the development of peri-implant disease has been identified as excessive cement use. Cement-retained restorations were questioned because it can be challenging to identify the presence of excess cement, which raised the possibility that they provide a danger for peri-implantitis.[15] Peri-implant disease has received more attention in the recent dental literature. The variability in research design and case definition makes it impossible to compare individual studies, according to systematic reviews that provide data on the prevalence of peri-implant illness.[11-15] There are documented differences, particularly with regard to how much bone loss is necessary and how to define peri-implantitis. One study listed trials with eight distinct definitions of the threshold for peri-implantitis as measured by radiographic bone loss.

CONCLUSION

Because the two disease entities share similar host characteristics or microbiota, diabetes, and periodontitis may serve as risk factors for peri-implantitis.

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