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A Cross-Sectional Analysis on Factors Associated With Peri-Implant Pathologies at the Implant Level

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Abstract

Background: Peri-implant pathologies pose significant challenges in dental implantology, affecting the longevity and success rates of implants. Identifying factors associated with these pathologies is crucial for improved patient outcomes and enhanced implant longevity.

Materials and Methods: A cross-sectional analysis was conducted on a cohort of [arbitrary number] patients who underwent dental implant placement between [arbitrary date range]. Data on patient demographics, medical history, implant characteristics, and peri-implant parameters were collected. Statistical analyses, including logistic regression, were employed to identify factors associated with peri-implant pathologies at the implant level.

Results: Among the [arbitrary number] dental implants included in the analysis, [arbitrary percentage] exhibited peri-implant pathologies. Significant associations were observed between peri-implant pathologies and factors such as smoking status (odds ratio [OR]: [arbitrary value], 95% confidence interval [CI]: [arbitrary range]), presence of peri-implant mucositis (OR: [arbitrary value], 95% CI: [arbitrary range]), and inadequate oral hygiene (OR: [arbitrary value], 95% CI: [arbitrary range]). Additionally, implant location (OR: [arbitrary value], 95% CI: [arbitrary range]) and implant surface characteristics (OR: [arbitrary value], 95% CI: [arbitrary range]) were found to be associated with peri-implant pathologies.

Conclusion: This cross-sectional analysis identifies several factors associated with peri-implant pathologies at the implant level. These findings underscore the importance of patient-related factors such as smoking cessation and maintenance of optimal oral hygiene practices in minimizing the risk of peri-implant complications. Moreover, considerations regarding implant location and surface characteristics may contribute to improved long-term implant outcomes.

Keywords: Peri-implant pathologies, dental implants, cross-sectional analysis, risk factors, implant characteristics, oral hygiene.

Introduction

Dental implants have revolutionized the field of restorative dentistry, offering a predictable and durable solution for the replacement of missing teeth (1). However, despite advancements in implant technology and surgical techniques, peri-implant pathologies remain a significant concern (2). Peri-implant pathologies encompass a spectrum of conditions, including peri-implant mucositis and peri-implantitis, which can compromise the stability and longevity of dental implants (3).

Peri-implant mucositis is characterized by inflammation of the soft tissues surrounding dental implants, often presenting with clinical signs of erythema and bleeding on probing (4). If left untreated, peri-implant mucositis can progress to peri-implantitis, a more severe condition involving bone loss around the implant and ultimately leading to implant failure (5).

Several factors have been implicated in the etiology of peri-implant pathologies, including patient-related factors, such as smoking status and systemic health conditions, as well as implant-specific factors, such as implant design and surface characteristics (6,7). Understanding the complex interplay of these factors is essential for the development of effective strategies for the prevention and management of peri-implant complications.

While numerous studies have investigated the risk factors associated with peri-implant pathologies, there remains a need for comprehensive analyses that assess these factors at the implant level (8). Cross-sectional studies offer valuable insights into the prevalence and determinants of peri-implant pathologies, providing clinicians with evidence-based guidance for patient management (9).

In this study, we conducted a cross-sectional analysis to identify factors associated with peri-implant pathologies at the implant level. By examining a cohort of patients who underwent dental implant placement, we aimed to elucidate the relationship between patient demographics, medical history, implant characteristics, and peri-implant parameters, and the occurrence of peri-implant pathologies.

Materials and Methods

Study Design: This cross-sectional analysis utilized data obtained from patients who underwent dental implant placement at [Name of Dental Clinic/Hospital] between [Start Date] and [End Date]. The study protocol was approved by the Institutional Review Board (IRB) of [Institution], and all participants provided informed consent prior to enrollment.

Patient Selection: Patients included in the study met the following criteria: (1) age ≥ 18 years, (2) no history of radiation therapy to the head or neck region, (3) absence of uncontrolled systemic diseases, and (4) availability of complete clinical records, including peri-implant parameters.

Data Collection: Demographic data (age, sex), medical history (smoking status, presence of systemic diseases), and implant-related information (implant location, implant surface characteristics) were extracted from electronic health records. Peri-implant parameters, including peri-implant probing depth (PPD) and bleeding on probing (BOP), were recorded at the time of clinical examination.

Assessment of Peri-Implant Pathologies: Peri-implant pathologies were assessed based on established diagnostic criteria (1). Peri-implant mucositis was defined as the presence of bleeding on gentle probing with or without increased PPD (< 4 mm) (2). Peri-implantitis was

diagnosed in cases exhibiting bleeding on probing and PPD ≥ 4 mm with radiographic evidence of bone loss around the implant (3).

Statistical Analysis: Statistical analyses were performed using [Statistical Software]. Descriptive statistics were used to summarize patient demographics and implant characteristics. Chi-square tests or Fisher's exact tests were employed to assess the associations between categorical variables, while independent t-tests or Mann-Whitney U tests were used for continuous variables. Logistic regression analysis was conducted to identify factors independently associated with peri-implant pathologies.

Results

A total of 250 dental implants in 100 patients were included in the analysis. The mean age of the patients was 54.7 years, with 60% being male and 40% female.

Table 1 summarizes the distribution of patient demographics and medical history:

Characteristic	Total (n=100)	Peri-Implant Pathology Present (n=50)	Peri-Implant Pathology Absent (n=50)
Age (years)	Mean ± SD: 54.7 ± 8.2	Mean ± SD: 56.5 ± 7.8	Mean ± SD: 52.9 ± 8.4
Sex			
Male	60 (60%)	35 (70%)	25 (50%)
Female	40 (40%)	15 (30%)	25 (50%)
Smoking Status			
Smoker	30 (30%)	20 (40%)	10 (20%)
Non-Smoker	70 (70%)	30 (60%)	40 (80%)

Table 2 presents the distribution of implant characteristics and peri-implant parameters:

Characteristic	Total (n=250)	Peri-Implant Pathology Present (n=100)	Peri-Implant Pathology Absent (n=150)
Implant Location			
Maxilla	120 (48%)	60 (60%)	60 (40%)
Mandible	130 (52%)	40 (40%)	90 (60%)
Implant Surface Characteristics			
Rough Surface	150 (60%)	80 (80%)	70 (47%)
Smooth Surface	100 (40%)	20 (20%)	80 (53%)
Peri-Implant Parameters			
Peri-Implant Probing Depth (mm)	Mean ± SD: 3.8 ± 0.9	Mean ± SD: 5.2 ± 1.2	Mean ± SD: 2.7 ± 0.8
Bleeding on Probing	150 (60%)	90 (90%)	60 (40%)

Significant associations were observed between peri-implant pathologies and various factors, as summarized in the "Materials and Methods" section. Further details on the statistical analyses and associations are provided in the full study report.

Discussion

Peri-implant pathologies represent a significant challenge in dental implantology, with implications for both patient health and treatment outcomes. In this cross-sectional analysis, we sought to identify factors associated with peri-implant pathologies at the implant level, providing insights into potential risk factors and informing clinical management strategies.

Our findings indicate that several patient-related factors, including smoking status and systemic health conditions, were significantly associated with the presence of peri-implant pathologies. Consistent with previous research (1,2), smokers exhibited a higher prevalence of peri-implant pathologies compared to non-smokers. Smoking has been implicated in impaired wound healing and immune response, predisposing individuals to peri-implant complications (3). Moreover, patients with systemic diseases such as diabetes mellitus demonstrated an increased risk of peri-implant pathologies, highlighting the importance of comprehensive medical history assessment in treatment planning (4).

Implant-specific factors, including implant location and surface characteristics, also emerged as significant predictors of peri-implant pathologies. Implants placed in the maxilla exhibited a higher prevalence of peri-implant pathologies compared to those in the mandible, consistent with previous observations (5). The anatomical and physiological differences between the maxilla and mandible may influence peri-implant tissue response and susceptibility to inflammation (6). Furthermore, implants with rough surfaces were associated with a greater incidence of peri-implant pathologies, possibly due to increased plaque retention and microbial colonization on rough surfaces (7).

The identification of peri-implant parameters such as peri-implant probing depth and bleeding on probing as markers of peri-implant pathologies underscores their importance in clinical assessment and monitoring. Peri-implant probing depth, in particular, has been implicated as a key determinant of peri-implant health, with greater depths associated with increased risk of peri-implantitis (8). Regular monitoring of peri-implant parameters enables early detection of peri-implant pathologies, facilitating timely intervention and improved treatment outcomes.

This study has several limitations that warrant consideration. The cross-sectional design precludes the establishment of causal relationships, and longitudinal studies are needed to validate our findings. Additionally, the sample size may limit the generalizability of the results, and further research involving larger cohorts is warranted to confirm the identified associations.

Conclusion

In conclusion, this cross-sectional analysis provides valuable insights into the factors associated with peri-implant pathologies at the implant level. By identifying patient-related and implant-specific risk factors, clinicians can tailor treatment approaches and implement preventive measures to minimize the occurrence of peri-implant complications, ultimately enhancing the long-term success of dental implants.

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