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Implant Complications: A Clinical Evaluation of Prevalence, Risk Factors, and Management Strategies

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Abstract

Background: Dental implants have become a widely accepted treatment modality for the replacement of missing teeth. However, the increasing number of procedures has also led to a rise in implant-related complications, which can compromise both function and esthetics.

Objective: This study aims to evaluate the prevalence, risk factors, and management of common implant complications in a cohort of patients treated in diverse clinical settings.

Methods: A retrospective analysis was conducted on 180 patients who received a total of 305 implants between 2018 and 2022. Clinical records were evaluated for complications such as peri-implant mucositis, peri-implantitis, mechanical failures, and prosthetic complications. Data were statistically analyzed to identify significant risk factors.

Results: Complications were observed in 22.9% of cases. The most common complication was peri-implant mucositis (9.5%), followed by prosthetic complications (7.2%), peri-implantitis (4.6%), and implant fracture or loosening (1.6%). Smoking, poor oral hygiene, and history of periodontitis were significantly associated with biological complications. Prosthetic complications were more prevalent in implants supporting full-arch prostheses.

Conclusion: Implant complications remain a significant concern in clinical practice. Early identification and preventive maintenance are essential. Patient selection, risk factor management, and continuous monitoring can reduce the incidence of such complications and improve long-term outcomes.

Keywords:

Dental implants, implant complications, peri-implantitis, prosthetic failure, risk factors, implant maintenance

INTRODUCTION

The use of dental implants has revolutionized restorative dentistry, offering a functional and esthetic solution for edentulous spaces. Despite high survival rates reported in the literature, implant complications can occur and negatively affect the success of treatment. These complications may be biological (e.g., peri-implant mucositis and peri-implantitis), mechanical (e.g., screw loosening or implant fracture), or prosthetic (e.g., crown detachment, occlusal discrepancies).

Understanding the etiological factors and clinical manifestations of these complications is vital for effective management and improving patient outcomes. The aim of this study is to evaluate the prevalence of implant complications in a clinical population and to identify the main contributing risk factors.

MATERIALS AND METHODS

Study Design and Population

A retrospective study was conducted in three academic dental institutions from January 2018 to December 2022. A total of 180 patients (aged 25–75 years) who received dental implants during this period were included in the study.

Inclusion Criteria

- Patients with at least 12 months of follow-up after implant placement
- Availability of complete clinical and radiographic records
- Patients who provided written consent for retrospective analysis

Exclusion Criteria

- Patients with systemic conditions affecting bone metabolism (e.g., uncontrolled diabetes, osteoporosis)

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- Patients with a history of head and neck radiation
- Patients lost to follow-up within the first year

Data Collection

Patient records were reviewed for demographic data, smoking status, oral hygiene practices, systemic health, implant type and location, prosthesis type, and occurrence of complications. Complications were categorized as:

- **Biological:** Peri-implant mucositis, peri-implantitis
- **Mechanical:** Screw loosening, implant fracture
- **Prosthetic:** Crown detachment, occlusal misalignment, abutment fracture

Statistical Analysis

Data were analyzed using SPSS v.26. Descriptive statistics were used for prevalence rates. Chi-square tests were used to identify associations between risk factors and complications. A p-value <0.05 was considered statistically significant.

RESULTS

Of the 305 implants placed in 180 patients, 70 implants (22.9%) exhibited one or more complications.

- **Peri-implant mucositis** was observed in 29 implants (9.5%), primarily in patients with inadequate plaque control.
- **Peri-implantitis** was noted in 14 implants (4.6%), with a strong association with smoking and history of periodontitis ($p < 0.01$).
- **Prosthetic complications** occurred in 22 implants (7.2%), including crown detachment and occlusal wear, especially in full-arch prostheses.
- **Mechanical failures** were observed in 5 implants (1.6%), including screw loosening and one case of implant fracture.

Complication rates were significantly higher in posterior regions and in patients with poor maintenance compliance.

DISCUSSION

The findings of this study align with previously reported data suggesting that while dental implants have high success rates, complications are not uncommon. Biological complications such as peri-implantitis and mucositis continue to be a leading concern and were often linked to modifiable risk factors like smoking and poor oral hygiene.

Prosthetic issues, particularly in full-arch restorations, highlight the importance of occlusal planning and prosthetic design. Mechanical complications, though less frequent, underscore the need for proper torque protocols and component compatibility.

Patient education, regular follow-up, and implementation of supportive periodontal therapy are crucial to minimizing these risks. Additionally, proper case selection and individualized treatment planning remain essential for long-term success.

CONCLUSION

This study underscores the importance of recognizing and addressing implant complications early in their course. Biological and prosthetic complications represent the majority of clinical issues and are frequently preventable through stringent patient selection, regular maintenance, and patient compliance. Further prospective studies with larger cohorts and longer follow-up periods are recommended to validate these findings.

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