



Prosthetic Complications of Dental Implants and Mini Screw Implants Used in Orthodontics

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KEYWORDS

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ABSTRACT:

Background: The aim of this study was to assess the prosthetic challenges linked with dental implants.

Material and methods: This study encompassed a group of 100 individuals who underwent implant treatment and mini screw implant orthodontic treatment. An examination of prosthetic complications associated with the implants and mini screw implants was conducted among the patients.

Results: In this investigation, the loosening of the retentive mechanism for overdentures was documented in 12 instances. Additionally, there were 4 occurrences of implant loss in irradiated maxillae. Complications related to hemorrhage were noted in 3 cases. Fractures of resin veneers in fixed partial dentures (FPDs) were reported in 5 instances. Furthermore, there was 1 case of implant loss associated with maxillary overdentures. Two overdentures required relining. The study also identified implant bending in 8 cases, loosening of mini-screws in 5 cases, root damage in 2 instances, and mini-screw drift in 1 patient.

Conclusion: The findings of the study indicated that the predominant problem associated with prosthetic implants was the loosening of the overdenture retentive mechanism, which represented approximately 12% of the documented cases and the most common complication of the mini screw implants was implant bending seen in 8% cases.

Introduction

Examining the patterns of tooth loss within a population is essential for evaluating the efficacy of dental health

care services, which can vary considerably across different geographical and cultural settings. Studies have shown that dental caries and periodontal diseases are significant contributors to tooth extraction. In Pakistan,



advanced dental caries is responsible for 63.1% of tooth loss, while periodontitis accounts for 26.2%.¹⁻³

After losing a tooth, individuals frequently seek replacement options to regain both function and appearance. In the last ten years, the domain of clinical prosthodontics has experienced considerable progress, adapting to scientific advancements and the changing requirements of patients. Conventional prosthodontic methods for replacing a single missing tooth encompass removable partial dentures, partial and full coverage bridges, as well as resin-bonded bridges.⁴

The introduction of dental implants has emerged as a significant alternative to conventional dentures and bridges. In situations involving edentulism, the choice between fixed and removable implant prostheses presents a complex dilemma. A crucial aspect of this decision-making process is the consideration of facial aesthetics, especially the need for support of facial tissues. When both fixed and removable options are feasible, the complexity of the surgical procedures required becomes the next major factor affecting the decision. In cases of considerable horizontal and/or vertical bone loss, extensive regeneration of both hard and soft tissues may be required to enable the successful placement of fixed implant prostheses.^{7,8}

Orthodontic anchorage is essential for the effective implementation of orthodontic treatment. A range of anchorage options exists, including onplants, palatal plates, miniplates, and miniscrews. Among these, miniscrews have gained popularity for reinforcing orthodontic anchorage due to their superior stability, versatility in insertion locations, ease of placement and removal, minimal tissue disruption, capacity for immediate or early loading, reduced need for patient compliance, and affordability.⁹⁻¹¹

The aim of the current research was to evaluate the prosthetic challenges related to dental implants.

Material and methods

This study involved a cohort of 100 participants who underwent implant treatment and mini screw implant orthodontic treatment. Prior to the procedure, the subjects were adequately informed and asked to provide their consent. Only those who agreed to participate were included in the research. An examination of prosthetic

complications associated with the implants was performed on the aforementioned patients. The results were systematically organized in tabular form. Statistical analysis was performed utilizing SPSS software.

Results

Table 1: prosthetic complications of dental implants among the subjects.

Complications	Number of subjects (%)
Loosening of overdenture retentive mechanism	12(12%)
Implant loss in irradiated maxillae	04(04%)
Haemorrhage related complications	03(03%)
Resin veneer fracture in FPDs	05(05%)
Implant loss with maxillary overdentures	01(01%)
Overdentures needing to be relined	02(02%)

In this study, it was observed that loosening of overdenture retentive mechanism was seen in 12 cases. Implant loss in irradiated maxillae was observed in 4 cases. Haemorrhage related complications were seen in 3 cases. Resin veneer fracture in FPDs was seen in 5 cases. Implant loss with maxillary overdentures was seen in 1 case. In 2 cases, the overdentures needed to be relined.

Table 2: Complications of mini-screws

Complications	Number of cases
Implant bending	08
Loosening of mini-screws	05
Root damage	02
Mini-screw drift	01

Implant bending was seen in 8 cases, loosening of mini-screws was seen in 5 cases, root damage was seen in 2 cases and mini-screw drift was seen in 1 patient.

Discussion

Miniscrews have been proved to provide reliable anchorage and placed in numerous clinical applications



such as deep bite correction, space closer, midline correction, extrusion, intrusion, distalization, mesialization, and en-masse retraction with high success rate; in addition, the uses of miniscrew have widened the scope of nonsurgical orthodontic therapy.⁹ Moreover, it was shown that miniscrews could facilitate more favorable outcomes compared with conventional methods.¹⁰ Nonetheless, complications could occur not only during and after insertion but also under loading, during, and after removal. It is necessary for clinicians to comprehensively understand its complications and related factors to minimize the failure rate.^{12,13}

The field of dentistry has introduced implants as a compelling alternative to traditional dentures and bridges. Currently, there are two main types available: single crown implants and implant-supported fixed partial dentures (FPDs). The success of dental implants relies on osseointegration, a biological mechanism in which osteoblasts adhere to and fuse with the titanium surface of the implants that are surgically inserted into the alveolar bone. The increasing preference for dental implants can be attributed to their ability to nearly restore normal function in both partially and fully edentulous dental arches.^{14,15}

Screw-connected implant systems often exhibit microgaps that range from about 40 to 100 μm at the interface between the implant and the abutment. The presence of these microgaps can promote the accumulation of plaque, which in turn heightens the risk of developing peri-implantitis. Conversely, locking-taper implant systems have shown a marked decrease in the formation of microgaps, measuring between 1 and 3 μm , in comparison to previous systems. This reduction in microgaps may play a role in diminishing the prevalence of peri-implantitis.¹⁶

The aim of the current research was to evaluate the prosthetic challenges related to dental implants.

In this investigation, the loosening of the retentive mechanism for overdentures was documented in 12 instances. Additionally, there were 4 occurrences of implant loss in irradiated maxillae. Complications related to hemorrhage were noted in 3 cases. Fractures of resin veneers in fixed partial dentures (FPDs) were reported in 5 instances. Furthermore, there was 1 case of implant loss associated with maxillary overdentures. Two

overdentures required relining. The study also identified implant bending in 8 cases, loosening of mini-screws in 5 cases, root damage in 2 instances, and mini-screw drift in 1 patient.

Giudice AL et al¹⁷ The aim of this systematic review was to evaluate the complications and side effects associated with the clinical use of orthodontic miniscrews by systematically reviewing the best available evidence. A survey of articles published up to March 2020 investigating the complications associated with miniscrew insertion, in both the maxilla and mandible, was performed using 7 electronic databases. Clinical studies, case reports, and case series reporting complications associated with the use of orthodontic miniscrew implants were included. Two authors independently performed study selection, data extraction, and risk-of-bias assessment. The database survey yielded 24 articles. The risk-of-bias assessment revealed low methodological quality for the included studies. The most frequent adverse event reported was root injury with an associated periradicular lesion, vitality loss, pink discoloration of the tooth, and transitory loss of pulp sensitivity. Chronic inflammation of the soft tissue surrounding the miniscrew with mucosal overgrowth was also reported. The other adverse events reported were lesion of the buccal mucosa at the insertion site, soft-tissue necrosis, and perforation of the floor of the nasal cavity and maxillary sinus. Adverse events were also reported after miniscrew removal and included secondary bleeding, miniscrew fracture, scars, and exostosis. These findings highlight the need for clinicians to preliminarily assess generic and specific insertion site complications and side effects.

Atieh MA et al.¹⁸ A retrospective analysis of patients aged ≥ 18 years and having dental implants placed at Dubai Health Authority in 2010. Relevant information related to systemic, patient-, implant-, site-, surgical- and prosthesis-related factors were collected. The strength of association between the prevalence of peri-implant mucositis and peri-implantitis and each variable was measured by chi-square analysis. A binary logistic regression analysis was performed to identify possible risk factors. A total of 162 patients with 301 implant-supported restorations were included in the study. The age of the patients ranged between 19 and 72 with a mean age of 46.4 ± 11.7 years. The prevalence of peri-implant



mucositis at the patient and implant levels were 44.4% and 38.2%, respectively. For peri-implantitis, the prevalence at the patient level was 5.6%, while the prevalence at the implant level was 4.0%. The binary logistic regression identified three risk factors (smoking habits, histories of treated periodontitis and lack of peri-implant maintenance) for peri-implantitis. Within the limitations of this study, smoking habits, history of treated periodontitis and lack of peri-implant maintenance were significant risk factors for peri-implantitis. Early detection of these factors would ensure appropriate planning and care of patients at high risk of developing peri-implant diseases.

Conclusion

The findings of the study indicated that the predominant problem associated with prosthetic implants was the loosening of the overdenture retentive mechanism, which represented approximately 12% of the documented cases and the most common complication of the mini screw implants was implant bending seen in 8% cases.

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