

## MORPHOLOGICAL RESULT OF DENTAL IMPLANTATION IN PATIENTS WITH DIABETES MELLITUS

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**Abstract** Dental implantation is increasingly performed in older populations, who frequently present with systemic comorbidities such as diabetes mellitus. The present study aimed to identify morphological predictors associated with postoperative complications and implant success in this high-risk cohort. A total of 30 patients aged 40–65 years were examined, including individuals with varying severity of periodontal disease. Histological and immunohistochemical analyses of gingival tissues were conducted to assess local immune responses. The findings demonstrate that alterations in mucosal immune homeostasis—particularly increased mast cell density, macrophage infiltration, and antigen-presenting cell activity—are strongly associated with postoperative complications. Patients with diabetes exhibited significantly higher rates of inflammatory responses and delayed healing. Morphological changes in trabecular bone structure correlated with disease severity and implant prognosis. These results suggest that immunocompetent cells within the oral mucosa may serve as reliable biomarkers for predicting implant outcomes. Preoperative immunomodulatory strategies and careful patient selection are critical to improving clinical success rates.

**Keywords:** dental implantation, immune homeostasis, systemic disease, oral mucosa, periodontal inflammation, immunocompetent cells

**Introduction** Dental implant success is strongly influenced by both local and systemic factors. Numerous studies indicate that systemic conditions, particularly Diabetes Mellitus, impair wound healing and bone regeneration, thereby increasing the risk of implant failure. Hyperglycemia disrupts angiogenesis and immune responses, negatively affecting osseointegration. Chronic periodontal inflammation is another critical determinant of peri-implant health. Patients with periodontitis demonstrate higher susceptibility to peri-implant complications due to persistent microbial contamination and altered host immune responses. Increased inflammatory cell infiltration and cytokine activity have been reported in peri-implant tissues compared to healthy mucosa. Recent studies emphasize the role of immune cells in peri-implant tissue remodeling. Mast cells are key regulators of inflammation and tissue repair, capable of releasing mediators that either promote healing or induce tissue destruction

depending on their activation status . Experimental and clinical studies have demonstrated that mast cell density correlates with the severity of periodontal disease and inflammatory response .Macrophages, particularly CD68-positive macrophages, play a crucial role in immune defense and bone remodeling. Increased expression of CD68+ cells has been associated with disease progression and severity of peri-implantitis, highlighting their importance in pathological bone resorption .Additionally, bone quality and microarchitecture significantly influence implant stability. Morphological studies show that trabecular thinning, increased rarefaction, and disruption of bone architecture are associated with impaired osseointegration and reduced implant success rates.Despite extensive research, most studies focus on isolated factors without integrating immune and morphological parameters. Therefore, a combined approach considering both cellular and structural characteristics may provide a more accurate prediction of implant outcomes.

**Materials and Methods** The study included 30 patients divided into three groups based on the severity of periodontal disease according to the American Academy of Periodontology (AAP) classification. A control group (n=8) consisted of individuals without periodontal pathology. The experimental group included 22 patients (13 females, 9 males) aged 40–65 years who underwent dental implantation, with or without bone grafting procedures. Patients were further categorized into: Group 1: Moderate periodontal destruction (Type III) Group 2: Severe periodontal destruction (Type IV) Clinical parameters assessed included postoperative pain, wound healing dynamics, early complications, and degree of osseointegration (evaluated radiographically). Histological samples were obtained from gingival tissues during tooth extraction procedures. Analyses included: Histopathological examination Immunohistochemical evaluation of immune cell populations

**Results** Early postoperative complications were observed in 25% of patients, with the majority (75%) occurring in individuals with diabetes mellitus. These complications included edema and hyperemia of soft tissues. Morphological analysis revealed: Increased vascular permeability and tissue edema Elevated mast cell counts in diabetic patients Enhanced macrophage migration and inflammatory infiltration Increased presence of CD68-positive immunocompetent cells A strong correlation was identified between: Severity of bone destruction Degree of immune cell infiltration Structural changes in trabecular bone Trabecular bone remodeling showed: Thinning and fragmentation of bone structures Increased zones of rarefaction Disruption of normal bone architecture Additionally, the spacing between cement lines indicated altered bone remodeling dynamics. Discussion The results highlight the critical role of immune regulation in the success of dental implantation. Mast cells appear to play a central role in modulating inflammatory and reparative processes through cytokine release and macrophage recruitment. Patients with systemic diseases, particularly

diabetes, exhibit dysregulated immune responses, leading to increased susceptibility to complications. Morphological indicators such as mast cell density, trabecular bone integrity, and immune cell activity can therefore serve as predictive markers. Preoperative assessment of these parameters allows clinicians to: Stratify patient risk Optimize treatment planning Implement immunomodulatory interventions

**Conclusions** Increased mast cell activity in diabetic patients contributes to edema and inflammatory infiltration in gingival tissues. Regardless of systemic status, microbial contamination following implantation necessitates restoration of local immune balance. Immunocompetent cells in oral mucosa serve as reliable indicators of implant success and can be used for prognostic evaluation. Comprehensive immunomodulatory therapy is essential both before and after implantation in high-risk patients.

1. Antonio Zizzi, Simone Domenico Aspriello, Corrado Rubini, Gaia Goteri. Peri-implant diseases and host inflammatory response involving mast cells: a review. *Int J Immunopathol Pharmacol*. 2011;24(3):557–566.
2. Raina Agrawal, Jagriti Gupta, Krishna Kumar Gupta, Vinod Kumar. Correlation of mast cells in different stages of human periodontal diseases: pilot study. *J Oral Maxillofac Pathol*. 2016;20(1):91–95.
3. Maria Elisa Galarraga-Vinueza, Karina Obreja, Ausra Ramanauskaite, Frank Schwarz. Macrophage polarization in peri-implantitis lesions. *Clin Oral Investig*. 2021;25:2335–2344.
4. Ricardo Rezzani, Luigi Rodella, Gianluca Tartaglia, Carlo Paganelli. Mast cells and the inflammatory response to implanted biomaterials. *Arch Histol Cytol*. 2004;67(3):211–217.
5. Edda Gemmell, C.L. Carter, G.J. Seymour. Mast cells in human periodontal disease. *J Dent Res*. 2004;83(5):384–387.
6. Rodrigo Bruno, João Silva, Tatiana Silva, Antonio Batista. Characterization of inflammatory cell infiltrate in human dental pulpitis. *Int Endod J*. 2010;43(11):1013–1021.
7. Evaluation of peri-implant mucosa: clinical, histopathological and immunological aspects. *Arch Oral Biol*. 2014;59(5):470–478.