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ENHANCING MANAGEMENT OF ORAL PATHOLOGIES INDUCED BY DIVERSE DENTAL PROSTHETIC DESIGNS

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Abstract: Dental prostheses—whether fixed, removable, or implant-supported—frequently precipitate complications in the oral cavity, particularly when improperly fitted or maintained. This article synthesizes current evidence on common prosthesis-related pathologies, including inflammatory papillary hyperplasia, epulis fissuratum, and peri-implant mucositis, and proposes a structured, evidence-based treatment paradigm. Emphasis is placed on interdisciplinary strategies involving precision prosthesis fabrication, optimized hygiene, biomaterial selection, and patient education to improve outcomes and prevent recurrence.

Key words: Dental prostheses ,Oral pathologies, Inflammatory papillary hyperplasia , Epulis fissuratum,Peri-implant mucositis , Prosthesis-induced lesions , Oral rehabilitation , Prosthodontic complications

Introduction. Dental prosthetic rehabilitation, while fundamentally aimed at restoring oral function, aesthetics, and masticatory efficiency, is not without its biological and biomechanical complications. Despite advances in prosthodontic materials and techniques, prosthesis-induced pathologies remain a significant clinical concern. Lesions such as inflammatory papillary hyperplasia, epulis fissuratum, and peri-implant mucositis represent common adverse outcomes that can compromise the integrity of the oral mucosa, diminish prosthesis longevity, and substantially impair patient quality of life. These conditions typically arise from a complex interplay of chronic mechanical irritation, microbial biofilm accumulation, and individual host response factors, including systemic comorbidities and immune function. As such, their incidence highlights the critical need for refined diagnostic algorithms, preventive prosthodontic protocols, and multimodal treatment strategies that address not only the symptomatic manifestations but also the underlying etiological mechanisms. A paradigm shift toward personalized, evidence-based prosthetic care is essential to mitigate these risks and enhance long-term clinical outcomes.

Purpose of the study. The purpose of this study is to explore and enhance the clinical strategies used in the diagnosis, prevention, and treatment of oral pathologies resulting from various types of dental prostheses, including fixed, removable, and implant-supported restorations. Despite significant advancements in prosthodontic materials and design, prosthesis-induced conditions—such as inflammatory papillary hyperplasia, epulis fissuratum, and peri-implant mucositis—remain prevalent and can negatively affect oral health, prosthesis longevity, and patient quality of life.

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Materials and methods. This investigation was designed as a prospective, longitudinal clinical study, incorporating both quantitative and qualitative methodologies to evaluate the prevalence, etiopathogenesis, and clinical outcomes of prosthesis-induced oral mucosal pathologies. The study was supplemented by a narrative synthesis of contemporary literature to contextualize clinical findings within current prosthodontic paradigms. Ethical clearance was obtained from the Institutional Review Board (IRB) and all procedures conformed to the ethical standards of the 2013 revision of the Declaration of Helsinki. A total of 60 participants (n = 60; age range: 35–75 years; mean age: 54.2 ± 9.6 years; 63.3% female, 36.7% male) were recruited from the Department of Prosthodontics and Oral Medicine, meeting strict inclusion criteria based on clinical and prosthodontic parameters. Clinically diagnosed soft tissue alterations associated with the use of fixed, removable, or implant-supported dental prostheses

Minimum of 6 months of prosthesis usage

Absence of systemic mucocutaneous disease (e.g., lupus erythematosus, oral lichen planus)

Patient willingness to comply with follow-up and hygiene protocol

History of recent maxillofacial surgery or radiotherapy to the craniofacial region

Use of systemic immunosuppressants, corticosteroids, or chemotherapy within the past 12 months

Presence of uncontrolled systemic conditions (e.g., uncontrolled diabetes mellitus, Sjögren's syndrome) Each patient underwent a standardized comprehensive **intraoral and extraoral examination**, performed by two calibrated examiners to ensure inter-rater reliability ($\kappa > 0.85$). Clinical parameters recorded included:

Lesion location, dimension, morphology, and surface characteristics

Degree of erythema, induration, pain (measured via 10-point **Visual Analogue Scale**)

Type, age, material, and fit of the prosthesis

Prosthesis adaptation was verified using pressure indicator paste and intraoral scanners (Trios 3Shape), and occlusal contacts were examined using shimstock and articulating foil.

Panoramic radiography was utilized for all subjects; CBCT imaging was reserved for implant-associated complications (n = 21) to assess crestal bone resorption and prosthetic-implant alignment. In cases with suspected Candida-associated lesions (e.g., inflammatory papillary hyperplasia), oral swabs were collected and cultured on Sabouraud dextrose agar; identification

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of Candida albicans was confirmed via chromogenic media and PCR-based fungal genotyping. Histopathological examination was conducted on 12 biopsy specimens to rule out dysplastic changes; tissues were fixed in 10% neutral buffered formalin and stained with Hematoxylin & Eosin (H&E) and Periodic Acid–Schiff (PAS) stains. Treatment was stratified according to the lesion type and severity Adjustment or rebasing of dentures using pressure-relief techniques and tissue conditioners Use of topical antifungals (nystatin oral suspension 100,000 IU/mL, qid × 14 days) in Candida-associated cases . Daily chlorhexidine 0.12% rinses and instruction in prosthesis and oral hygiene

Temporary discontinuation of prosthesis wear during night hours to promote mucosal healing.Refractory lesions (e.g., advanced epulis fissuratum or persistent IPH) were surgically excised using scalpel or diode laser ablation (980 nm wavelength). Post-surgical impressions were taken using polyvinyl siloxane materials, and new prostheses were fabricated using CAD/CAM protocols to ensure optimal adaptation and load distribution . Data were entered into a structured digital database and analyzed using SPSS version 27.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (mean, SD, frequency, and proportion) were calculated. Intragroup and intergroup comparisons of treatment outcomes (e.g., VAS scores, lesion size reduction) were conducted using:

Paired t-tests for pre- and post-treatment evaluation , One-way ANOVA with Bonferroni post hoc correction for multiple group comparisons ,Chi-square tests for categorical data analysis , Statistical significance was set at $p < 0.05$, and Cohen's d effect sizes were calculated to evaluate treatment magnitude.

Results and Discussion. A total of 60 patients completed the study protocol, and all were included in the final analysis. The most frequently diagnosed prosthesis-induced pathology was inflammatory papillary hyperplasia (IPH), observed in 38.3% (n = 23) of participants, followed by epulis fissuratum in 28.3% (n = 17), and peri-implant mucositis in 25% (n = 15). Mixed presentations were noted in 8.4% (n = 5) of patients. Across the cohort, significant clinical improvement was observed post-intervention. Patients undergoing non-surgical therapy showed a mean reduction in lesion size of 43.7% ± 9.8, while the surgical group (n = 18) demonstrated a more substantial reduction (74.2% ± 7.4, $p < 0.001$). Pain intensity, as measured by the Visual Analogue Scale (VAS), decreased from a pre-treatment mean of 6.8 ± 1.2 to 2.3 ± 0.8 post-treatment ($p < 0.001$). Candida albicans was isolated in 61% of cases involving IPH, supporting the role of fungal superinfection in its pathogenesis. Patients who received concurrent antifungal therapy showed accelerated mucosal recovery and a statistically significant reduction in lesion recurrence at 3-month follow-up ($p = 0.032$). CBCT imaging in peri-implant mucositis cases revealed early peri-implant crestal bone loss (<2 mm) in 40% of affected implants. Histopathological analyses confirmed benign reactive hyperplasia in all biopsied tissues, with no evidence of dysplasia or malignancy, although dense inflammatory infiltrates were present in 75% of samples.

The findings of this study affirm the clinical significance of prosthesis-induced oral mucosal pathologies and highlight the complex interplay between mechanical trauma, microbial

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colonization, and host immunoinflammatory responses in their development. The high prevalence of IPH and epulis fissuratum underscores the need for periodic prosthetic evaluations and timely prosthesis adjustment or replacement to prevent chronic tissue irritation. In alignment with previous studies (e.g., García-Cuesta et al., 2020; Klasser & Greene, 2019), our results confirm that poorly fitting dentures and rough prosthetic surfaces are primary etiological factors in mucosal lesion formation. Surface topography directly influences microbial adhesion, particularly in porous acrylic bases, necessitating consideration of low-porosity, biocompatible materials in prosthesis design. Furthermore, CAD/CAM-fabricated prostheses were associated with superior fit accuracy and reduced lesion incidence, consistent with findings by Turkyilmaz et al. (2021). Patients managed with an integrated approach, combining prosthetic adjustment, antifungal therapy, and hygiene optimization, exhibited significantly better outcomes than those treated with monotherapy. Surgical excision proved highly effective in resolving persistent fibrous lesions, but its success was contingent upon subsequent prosthesis redesign, supporting the theory that recurrence is closely linked to prosthesis quality and continued trauma.

The detection of Candida spp. in a majority of IPH cases reinforces the fungal etiology in prosthesis-related stomatitis. These findings echo those of Coco et al. (2016), who demonstrated the synergistic role of mechanical trauma and fungal colonization in prosthetic mucosal disease. Hence, antimicrobial adjuncts should be considered a standard component of treatment in cases where microbiological involvement is suspected. Advanced imaging, particularly CBCT, proved valuable in early detection of peri-implant bone changes, which may otherwise be clinically silent. Although dysplastic transformation was not observed in our sample, the presence of chronic inflammatory changes warrants routine biopsy of atypical or non-resolving lesions, particularly in elderly patients and long-term denture wearers. While the findings are promising, the study is limited by its moderate sample size and relatively short follow-up period (3 months). Longitudinal studies with larger cohorts are necessary to evaluate recurrence rates and long-term prosthesis tolerance. Future research should also explore the potential of antimicrobial nanocoatings, smart prosthetic sensors, and 3D-printed bioadaptive materials in preventing lesion formation.

Summary of Key Findings

Variable	**Pre-Treatment**	**Post-Treatment**	***p*-value**
Mean VAS Score	6.8 ± 1.2	2.3 ± 0.8	<0.001
Mean Lesion Size (mm²)	87.4 ± 11.3	38.6 ± 8.2	<0.001
Candida Detection (IPH cases)	61%	8% (post-antifungal)	0.032

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Variable	Pre-Treatment	Post-Treatment	*p*-value
Recurrence (at 3 months)	—	6.7%	—

Conclusion. This study underscores the clinical importance of early detection and comprehensive management of prosthesis-induced oral pathologies, which remain a prevalent and often underestimated complication in dental rehabilitation. Lesions such as inflammatory papillary hyperplasia, epulis fissuratum, and peri-implant mucositis result from a multifactorial interplay of mechanical irritation, microbial colonization, and host-related factors. Left untreated, these conditions can compromise both oral function and patient quality of life, potentially leading to chronic inflammation, soft tissue hypertrophy, or early prosthetic failure.

The findings demonstrate that a multimodal therapeutic approach, incorporating prosthetic adjustment or replacement, antimicrobial therapy, patient-specific oral hygiene protocols, and, where necessary, surgical intervention, significantly improves clinical outcomes and reduces recurrence rates. Moreover, the integration of advanced diagnostic modalities, including CBCT imaging, microbiological analysis, and histopathological evaluation, plays a critical role in guiding precise, evidence-based treatment. Future strategies should emphasize preventive prosthodontics, including the use of biocompatible materials, digital fabrication technologies, and personalized prosthesis design to mitigate mechanical and microbial risks. In addition, long-term patient education and routine post-prosthetic follow-up are essential components of sustained oral health.

In conclusion, the optimization of treatment protocols for prosthesis-related oral lesions requires a shift toward interdisciplinary, patient-centered care, supported by continuous clinical monitoring and technological integration. Such an approach ensures not only the resolution of existing pathologies but also the long-term success and comfort of dental prosthetic rehabilitation.

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