

LOCAL IMMUNITY AND THE MICROBIAL "LANDSCAPE" OF THE DENTURE-BEARING AREA MUCOSA BOTH BEFORE AND AFTER THE PLACEMENT OF COMPLETE REMOVABLE DENTURES

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Changes in Oral Microbiome and Local Immunity in Edentulous Patients Before and After Complete Denture Prosthodontics

Background

The presence of teeth, whether complete or partial, is a major etiological factor influencing the oral ecology [1]. Specific habitats for microbial growth and activity are found in dental fissures, carious cavities, root canals, gingival sulci, and dental plaque. The environmental conditions for the oral microbiota undergo significant alterations following partial or total tooth loss and the subsequent introduction of dental prostheses [2].

Aim: To investigate the oral microbiome in edentulous patients before and six months after the placement of complete removable dentures.

Materials and Methods

The study evaluated the qualitative and quantitative composition of the oral microbiota in 12 edentulous patients prior to prosthodontic treatment and in 14 patients six months post-insertion of complete dentures. The mean age of the patients was 71.6 pm 5.2 years. Thirteen age-matched volunteers served as the control group.

Prior to sampling, the pH of mixed saliva was measured. The Ambjørnsen index was utilized to assess plaque accumulation on various denture surfaces to determine hygiene levels. Microorganisms were examined via light microscopy following mucosal swabbing. Microbiota density was categorized as sparse, significant, or abundant based on visual fields [3].

Quantitative analysis was performed using Polymerase Chain Reaction (PCR), where <102 CFU/mL was considered sparse, 102–103 CFU/mL significant, and >105 CFU/mL abundant. Local immunity was assessed via NETosis (the formation of Neutrophil Extracellular Traps—NETs). Biomaterial was stained using the Feulgen reaction with Schiff reagent for DNA detection and fixed with a 95% ethanol solution to confirm the presence of NETs.

Statistical analysis was conducted using IBM SPSS Statistics v.27.0 and the Mann-Whitney U-test. The significance threshold was set at $p < 0.05$ (indicated by).

Results

The oral pH remained stable after total tooth loss (7.2 pm 0.6) compared to the control group (7.3 pm 0.4). High levels of mixed, coccal, and fungal flora were observed in both control subjects and edentulous patients. However, in the edentulous state, rod-shaped flora (Enterobacteriaceae and Eubacterium spp.) increased to significant levels, while fungal flora decreased to sparse levels.

Six months after denture placement, fungal colonies significantly increased; Eubacterium spp. decreased to sparse levels, while Leptotrichia spp. and Fusobacterium spp. reached significant concentrations. A trend toward increased Peptostreptococcus spp. was also noted.

Regarding local immunity, the mucosal surface of edentulous patients showed scattered neutrophils undergoing NETosis and expressing NETs. However, neutrophils were absent on the mucosal surface six months after denture use. This suggests that the prosthesis acts as a mechanical barrier preventing neutrophil migration to the mucosal surface, thereby inhibiting NETosis and compromising this specific local immune function. Consequently, damaged mucosal cells and bacterial triggers may not be cleared efficiently.

Conclusions

Total edentulism does not disrupt the oral acid-base balance but shifts the microbial profile toward increased rod-shaped flora and decreased fungal presence.

Six months of complete denture wear leads to a resurgence of fungal colonies and a decrease in rod-shaped flora alongside an increase in mixed microbiota.

Edentulism initially activates local immune responses (NETosis). However, the presence of a complete removable denture appears to suppress these local immune mechanisms on the supporting tissues.

Reference :

1. Stafeev, A.A. Kolichestvennyi i kachestvennyi analiz mikrobioty polosti rta pri ortopedicheskoi reabilitatsii patsientov polnymi i chastichnymi s"emnymi plastinochnymi protezami / A.A. Stafeev, M.G. Chesnokova, V.A. Chesnokov // Stomatologiya. – 2015. – №5. – S. 48 – 51. DOI: 10.17116/stomat201594548-51
2. Rol' narushenii proteoliticheskoi sistemy v patogeneze proteznogo stomatita / O.M. Lavrovskaya, Ya.A. Lavrovskaya, S.K. Severinova [i dr.] // Tavricheskii mediko biologicheskii vestnik. – 2019. – №1. – S. 164-169.
3. Pisarevskii, Yu.L. Stomatologicheskii sindrom u patsientov s akrilovymi s"emnymi zubnymi protezami na fone nedostatochnosti nizhnego pishchevodnogo sfinktera / Yu.L. Pisarevskii, I.V. Kibalina, A.I. Zhilina [i dr.] // Zabaikal'skii meditsinskii zhurnal. – 2024. – №3. – S. 9-14.
4. Fousert, E. Neutrophil extracellular traps (NETs) take the central stage in driving autoimmune responses / E. Fousert, R. Toes, J. Desai // Cells. – 2020. – №9. – 915 p. DOI: <https://doi.org/10.3390/cells9040915>.