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Morphological changes in the oral mucosa during orthopedic treatment with removable plastic constructions

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РЕЗЮМЕ

Background. Removable plastic dentures (RPDs) remain essential for edentulous patients, yet their interaction with oral tissues can precipitate inflammatory and degenerative changes that compromise both comfort and treatment longevity.

Objective. To quantify and characterise morphological alterations of the oral mucosa in long-term RPD wearers and to determine the influence of prosthesis quality, hygiene practices and duration of use on the severity of these changes.

Methods. A cross-sectional clinical study was performed on 65 patients aged ≥ 50 years who had worn complete or partial RPDs for at least 12 months. Standardised intra-oral examinations assessed colour, texture, exudation and lesion type; tongue coating and salivary moisture were also recorded. Prosthesis fit and surface roughness were determined by visual and tactile inspection. Oral hygiene habits were documented with a validated questionnaire. Eleven patients consented to punch biopsy for histopathological confirmation. Participants were stratified into groups with and without mucosal lesions. Associations were analysed using χ^2 and Student's t-tests ($\alpha = 0.05$).

Results. Forty-five patients (69%) showed clinically obvious mucosal damage: catarrhal inflammation (34/65, 52%), hyperplastic growths (11/65, 17%) and acrylic intolerance (2/65, 3%). Lesions correlated strongly with inadequate hygiene ($p < 0.01$) and low-quality dentures ($p = 0.02$). Wear time exceeding five years doubled the risk of pathology (OR = 2.1; 95% CI 1.1–3.9). Histology corroborated chronic inflammatory infiltration and epithelial degenerative changes.

Conclusion. Poorly fabricated or poorly maintained RPDs markedly increase the prevalence of pathological mucosal reactions. Regular professional follow-up, patient-centred hygiene education and timely remanufacture are pivotal for preserving oral tissue health.

Keywords: oral mucosa, dentures, inflammation, biofilms, mouth diseases.

1. Introduction

Removable plastic dentures are a practical solution for restoring masticatory function and facial aesthetics in patients with partial or complete tooth loss. However, despite their benefits, long-term use often leads to complications in the oral cavity. According to clinical observations, up to 70 % of denture wearers experience various forms of mucosal pathology, including catarrhal inflammation, trauma-induced lesions, hyperplasia and acrylic intolerance.

The expanding elderly population and growing prevalence of edentulism make prevention and timely management of these complications particularly relevant. The present study aims to fill gaps in local epidemiological data by examining the prevalence and determinants of mucosal changes among denture wearers in Kazakhstan.

2. Materials and Methods

Study design: Cross-sectional observational study.

Participants: Sixty-five patients (34 females, 31 males; mean age 63 ± 8 years) attending dental clinics in Astana who had worn complete or partial removable plastic dentures for ≥ 12 months. Inclusion criteria: signed informed consent, adequate general health, and willingness to undergo biopsy if indicated. Exclusion criteria: recent chemotherapy, immunosuppression, uncontrolled diabetes, and systemic diseases affecting the oral mucosa.

Clinical protocol: Standardised examination recorded mucosal colour, swelling, surface characteristics, and lesions. Tongue coating and salivary moisture were also assessed. Prosthesis quality was

judged by fit, stability, occlusal scheme and base roughness. Hygiene was evaluated via questionnaire and direct observation of denture cleanliness.

Histopathology: Punch biopsies (3 mm) were obtained from 11 symptomatic sites under local anaesthesia and examined with H&E staining.

Statistics: Data were analysed using SPSS 28.0. Continuous variables were compared using Student's t-test; categorical variables with χ^2 -test. Significance was set at $p < 0.05$.

Ethics: The study complied with the Declaration of Helsinki and was approved by the Local Ethics Committee (protocol № 2024-04).

3. Results

Lesion prevalence: Mucosal changes were observed in 45 of 65 participants (69 %). The distribution of lesions was: catarrhal inflammation – 52 % ($n=34$),

hyperplastic processes – 17 % ($n=11$), acrylic intolerance – 3 % ($n=2$).

Risk factors: Poor hygiene practices were present in 45 patients (69 %) and were strongly associated with inflammatory lesions ($\chi^2 = 10.5$, $p < 0.01$). Low-quality prostheses were identified in 37 cases (57 %) and correlated with lesion presence ($\chi^2 = 5.6$, $p = 0.02$). Denture

wear exceeding five years increased lesion risk two-fold (OR = 2.1, 95 % CI 1.1–3.9).

Histological findings: Specimens showed chronic inflammatory infiltrates, epithelial atrophy or hyperplasia, and micro-ulceration corresponding to clinical diagnoses.

4. Discussion

Our findings align with previous international studies that report mucosal complication rates between 60 % and 75 % among long-term denture wearers. The high prevalence of catarrhal inflammation highlights the mechanical trauma caused by poorly fitting prostheses and the irritative effect of plaque biofilms. Hyperplastic lesions, particularly lobular fibromas and papillary hyperplasia, likely develop from chronic low-grade trauma combined with *Candida* colonisation.

The strong association between inadequate hygiene and lesion severity underscores the need for

structured patient education. Digital fabrication techniques and high-impact acrylics have been shown to improve fit and reduce surface roughness; their wider adoption could mitigate trauma-related pathology.

Limitations of our study include its cross-sectional nature, reliance on clinical assessment for most participants, and relatively small biopsy sample. Future longitudinal studies incorporating microbiological profiling and patient-reported outcome measures are warranted.

5. Conclusions

1. Pathological changes of the oral mucosa were detected in 69 % of removable denture wearers examined.

2. Inadequate denture hygiene and low-quality prostheses are significant, independent risk factors for mucosal lesions.

3. Wearing dentures for more than five years doubles the risk of pathological tissue changes.

4. Regular professional follow-up, timely remanufacture of prostheses and comprehensive hygiene education are essential preventive strategies.

Conflict of Interest

The authors declare no conflict of interest.

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Author Contributions

Conceptualization - M.K.Z.; Investigation - R.N.Z.; Formal analysis - R.N.Z., E.B.K., S.A.A.; Writing - original draft - M.K.Z.; Writing - review and editing - R.N.Z.; Supervision - M.K.Z. All authors have read and approved the final manuscript.

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Алынбалы пластикалық конструкциялармен ортопедиялық емдеу кезінде ауыз қуысының шырышты қабығындағы морфологиялық өзгерістер

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Түйіндеме

Өзектілігі. Алынбалы пластикалық протездер тіссіз науқастардың функциясы мен эстетикасын қалпына келтірудің кең таралған әдісі, алайда ұзақ қолданылуы ауыз шырышты қабығында қабыну өзгерістерін туындатады.

Зерттеудің мақсаты. Протез сапасы, гигиеналық дағдылар және пайдалану ұзақтығының шырышты қабық морфологиясына әсерін бағалау.

Әдістері. Астана қаласындағы 65 пациентке (≥50 ж.) клиникалық тексеру, гигиена сауалнамасы, биопсия (11 пациент) жүргізілді; деректер χ^2 және t-тесттерімен талданды.

Нәтижесі. Пациенттердің 69 %-ында шырышты қабық зақымдары анықталды; зақымданулардың жиілігі нашар гигиена ($p<0,01$) және сапасыз протездермен ($p=0,02$) сенімді байланыс көрсетті.

Қорытынды. Сапасыз немесе дұрыс күтім жасалмаған протездер шырышты қабық патологиясының қаупін арттырады; тұрақты бақылау және пациенттерді оқыту қажет.

Түйін сөздер: ауыз шырышты қабығы, протездер, қабыну, биофильм, ауыз аурулары.

Морфологические изменения слизистой оболочки полости рта при ортопедическом лечении съёмными пластиковыми конструкциями

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Резюме

Актуальность. Съёмные пластмассовые протезы широко применяются для восстановления функции и эстетики полости рта, однако длительное ношение может вызывать воспалительные и дистрофические изменения слизистой оболочки.

Цель исследования. Оценить морфологические изменения слизистой у пациентов, пользующихся протезами, и установить влияние качества протеза, гигиены и длительности ношения.

Методы. Обследовано 65 пациентов (≥50 лет) с полными и частичными протезами; проведены клинический осмотр, опрос гигиены, гистологическое исследование (11 случаев); статистический анализ χ^2 и t-тесты.

Результаты. У 69 % пациентов выявлены поражения слизистой; их частота достоверно связана с неудовлетворительной гигиеной ($p<0,01$) и низким качеством протезов ($p=0,02$).

Выводы. Некачественные или плохо обслуживаемые протезы повышают риск патологических реакций; необходимы регулярный контроль и обучение гигиене.

Ключевые слова: слизистая полости рта, протезы, воспаление, биоплёнка, заболевания полости рта.