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THE INFLUENCE OF ACRYLIC DENTURES ON ALVEOLAR BONE ATROPHY

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Abstract. Alveolar bone atrophy is an inevitable process following tooth loss and remains one of the key challenges in prosthetic dentistry. Acrylic removable dentures are widely used due to their affordability and ease of fabrication; however, their impact on bone resorption remains controversial. The aim of this study is to evaluate the effect of acrylic dentures on the rate and pattern of alveolar bone atrophy. Clinical observations and literature data were analyzed. It was found that acrylic dentures do not prevent bone resorption and, under certain conditions, may even accelerate it due to uneven distribution of masticatory load. The findings highlight the importance of an individualized approach to prosthetic treatment and regular monitoring of the prosthetic bed.

Keywords: acrylic denture, alveolar bone, atrophy, removable prosthetics, bone resorption

Introduction. Tooth loss triggers a cascade of morphological and functional changes in the maxillofacial system, the most significant of which is alveolar ridge atrophy. This process is primarily caused by the absence of physiological loading transmitted through the periodontal ligament, leading to gradual bone resorption.

Removable acrylic dentures remain the most commonly used method for restoring dentition defects, particularly among patients with limited financial resources. Despite restoring masticatory function and aesthetics, these prostheses transfer load primarily to the mucosa and underlying bone, which may influence the rate of bone atrophy.

Current literature presents conflicting views regarding the impact of acrylic dentures on bone resorption. Some studies suggest a protective role through load distribution, while others indicate acceleration of atrophic processes.

Aim of the study: to assess the influence of acrylic removable dentures on alveolar bone atrophy and to identify factors that exacerbate this process.

Materials and Methods

The study was designed as an analytical and clinical review.

Materials:

- Clinical observations of patients with partial and complete edentulism
- Orthopantomographic and CBCT imaging data
- Scientific publications from the past 10–15 years

Inclusion criteria:

- Patients using acrylic removable dentures
- Duration of denture use longer than 1 year
- Absence of systemic diseases affecting bone metabolism

Methods:

- Radiographic assessment of alveolar ridge height
- Comparative analysis before and after prosthetic treatment
- Evaluation of masticatory load distribution
- Analysis of patient complaints (pain, denture instability)

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Data analysis:

Descriptive and comparative statistical methods were applied.

Results

The study results demonstrated that:

1. **Alveolar bone atrophy progresses in all patients**, regardless of denture use.
2. Patients with acrylic dentures exhibited:
    - more pronounced resorption in the ridge area
    - a decrease in alveolar ridge height averaging 0.5–1.5 mm per year
3. The most significant atrophy was observed:
    - during the first 1–2 years after tooth extraction
    - in cases of poor denture retention
    - with occlusal imbalance
4. Long-term denture wear (over 5 years) was associated with:
    - flattening of the prosthetic bed
    - reduction of retention zones
5. Regular denture adjustment was associated with a slower rate of atrophy.

Discussion

The findings confirm that acrylic removable dentures do not prevent alveolar bone atrophy. The primary reason is the lack of physiological load transmission through the periodontal ligament, as occurs with natural teeth or dental implants.

Masticatory forces transmitted through acrylic dentures are directed onto the mucosa, leading to:

- tissue ischemia
- impaired microcirculation
- increased osteoclastic activity

Additionally, uneven load distribution results in localized overloading of certain bone areas, accelerating resorption.

Comparative analysis with alternative treatment methods indicates that:

- dental implants help preserve bone due to functional loading
- removable partial (framework) dentures are less traumatic due to tooth support

An important factor is the quality of denture fabrication. Improper occlusion, poor base adaptation, and lack of regular adjustments significantly accelerate atrophic changes.

Conclusions

1. Acrylic removable dentures do not prevent alveolar bone atrophy.
2. In some cases, they may accelerate bone resorption due to uneven load distribution.
3. The rate of atrophy depends on:
    - denture quality
    - duration of use
    - condition of the mucosa
4. Regular denture relining and adjustment reduce the negative impact on bone tissue.
5. Alternative prosthetic options, including implant-supported restorations, should be considered to slow bone loss.

Practical Significance

The results emphasize the need for:

- regular follow-up and monitoring of patients
- timely denture relining and correction
- individualized selection of prosthetic design

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