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Oral Hygiene Status in Patients with Complete Removable and Implant-Supported Overdentures: A Clinical and Preventive Analysis

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Abstract: In modern prosthetic dentistry, rehabilitation of patients with complete edentulism is increasingly carried out using implant-supported prosthetic constructions. The use of implant-retained overdentures significantly improves the functional efficiency of prosthetic treatment, enhances prosthesis stability, and increases patients' quality of life. However, the long-term success of treatment directly depends on the level of individual oral hygiene and proper maintenance of prosthetic components. Removable dentures of various types create additional retentive areas for dental plaque and microbial accumulation, which may contribute to inflammatory changes in the mucosa and peri-implant tissues. Regular monitoring of oral hygiene is particularly important in patients using implant-supported prostheses, since biofilm formation is one of the key risk factors for the development of peri-implantitis. Clinical observations indicate that patients with implant-supported overdentures, when adequately motivated in oral hygiene practices, demonstrate more stable tissue conditions in the prosthetic bed compared to users of conventional complete removable dentures. This underscores the need for individualized preventive programs, including patient education on denture care and regular professional follow-up. Thus, maintaining an optimal level of oral hygiene is a critical prerequisite for preserving the functionality of prosthetic constructions and preventing complications associated with both conventional removable dentures and implant-supported systems.

Keywords: Complete Edentulism, Removable Dentures, Overdentures, Dental Implants, Oral Hygiene, Peri-Implant Tissues.

Introduction

Aim and Objectives of the Study

The present study was aimed at the clinical comparison of oral hygiene status and prosthetic constructions in elderly patients using different types of mandibular prosthetic rehabilitation: conventional complete removable acrylic dentures and implant-supported overdentures with various attachment systems.

To achieve this aim, the following objectives were defined:

1. To analyze the hygiene level in elderly patients using conventional complete removable mandibular dentures.
2. To assess the hygienic condition of implant-supported overdentures with stud (locator) attachment systems.
3. To evaluate oral hygiene characteristics in patients using implant-supported overdentures with bar attachment systems.
4. To perform a comparative analysis of hygiene indicators among different mandibular prosthetic designs.

Materials and Methods

The clinical study included 45 patients aged 55 to 75 years who were under regular dental follow-up. All participants were non-smokers. Exclusion criteria comprised systemic or neurological disorders associated with impaired motor skills or reduced manual dexterity that could affect the quality of

personal oral hygiene.

The patients were divided into three equal groups (n = 15 each):

- **Group I** – patients using conventional complete removable mandibular acrylic dentures;
- **Group II** – patients with implant-supported overdentures retained by a bar attachment system;
- **Group III** – patients with implant-supported overdentures retained by a stud (locator) attachment system.

Clinical examinations were performed during routine preventive visits. The assessment included visual evaluation of prosthetic constructions, the mucosa of the prosthetic bed, and the components of the implant-supported superstructures.

Prior to prosthesis delivery, all patients received detailed oral hygiene instructions. The recommendations included:

- Rinsing the oral cavity and the denture after meals;
- Brushing the denture, superstructures, and remaining teeth twice daily using a toothbrush and toothpaste;
- Storing the denture in water overnight after removal;
- For patients with implant-supported prostheses, additional use of a sonic toothbrush (**Philips Sonicare**) was recommended to improve plaque removal around attachment components.

All participants were under continuous follow-up, ensuring standardization of clinical conditions and compliance with hygiene protocols.

Method for Assessing the Hygienic Status of Dentures

For quantitative evaluation of hygiene levels, a modified denture hygiene index was used, adapted to the objectives of the present study.

The method involved detection of dental plaque by vital staining of the internal surface of the denture with methylene blue solution. After application of the dye, the prosthesis was rinsed under running water for 5 seconds and dried with an air stream for 10 seconds.

Each denture was then conventionally divided into three diagnostic segments:

- Anterior segment;
- Right posterior segment;
- Left posterior segment.

The boundaries were defined by an imaginary line passing through the midpoints of the canines of the artificial dentition.

Each segment was evaluated using a four-point scoring system:

- **0 points** — no staining;
- **1 point** — slight focal staining;
- **2 points** — staining of less than 50% of the segment surface;
- **3 points** — staining of more than 50% of the segment surface;
- **4 points** — uniform staining of the entire segment surface.

The final hygiene index was calculated as the arithmetic mean of the scores obtained for all segments.

Interpretation of the Index:

- **0–1.5** — good hygiene level;
- **1.6–2.5** — satisfactory hygiene level;
- **2.6–4.0** — poor hygiene level.

Results

The analysis of the obtained data revealed the following mean index values:

- **Group I (complete removable acrylic dentures)** — 1.55 ± …
- **Group II (implant-supported overdentures with stud attachment)** — 1.58 ± …
- **Group III (implant-supported overdentures with bar attachment)** — 1.01 ± …

Thus, Groups I and II demonstrated hygiene levels corresponding to a satisfactory category. In contrast, Group III exhibited a good hygienic status of prosthetic constructions.

Comparative analysis showed no statistically significant differences between patients using conventional complete removable dentures and those with stud-retained overdentures. However, patients with bar-retained overdentures demonstrated more favorable hygiene indicators.

Discussion

The findings suggest that hygiene levels are influenced not only by the structural complexity of the prosthesis but also by multiple contributing factors, including patient motivation, level of awareness, and specific design characteristics.

Although bar-retained systems present a more complex relief configuration, the reduced area of the acrylic denture base may limit microbial adhesion. Acrylic materials, due to their inherent porosity, are more susceptible to bacterial colonization compared with metallic components of bar attachment systems, which may explain the observed differences.

Additionally, behavioral aspects should be considered. Patients opting for implant-supported prostheses are often more motivated to comply with hygiene instructions and maintenance protocols, recognizing the financial investment and clinical importance of implant therapy.

Conclusion

1. The hygienic status of patients using conventional complete removable dentures and implant-supported overdentures with stud attachments is statistically comparable.
2. The use of bar attachment systems is associated with more favorable hygiene outcomes.
3. Reduction in acrylic base volume and the presence of metallic components may contribute to decreased microbial plaque accumulation.
4. Patient motivation and adherence to individualized preventive recommendations play a crucial role in maintaining optimal hygiene levels.

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