

COMPARATIVE DIAGNOSTIC ANALYSIS OF REMOVABLE AND NON-REMOVABLE DENTURES IN PATIENTS WITH CHRONIC KIDNEY DISEASE AND PARTIAL EDENTULISM: A LITERATURE REVIEW

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Abstract

Chronic kidney disease (CKD) significantly affects oral health, leading to bone resorption, periodontal disease, and xerostomia, which impact prosthetic treatment outcomes. This literature review examines the comparative effectiveness of removable and fixed prosthetic solutions in CKD patients. Factors such as bone density, periodontal health, and systemic conditions are analyzed to determine optimal prosthetic choices. The study highlights recent innovations, including PRF technology and biocompatible materials, to improve prosthetic success rates. Multidisciplinary collaboration between dentists and nephrologists is emphasized for individualized patient care.

Keywords: Chronic kidney disease, removable dentures, fixed prostheses, bone resorption, periodontal disease, xerostomia, prosthetic rehabilitation.

INTRODUCTION

Chronic kidney disease (CKD) is a serious global health concern, with its prevalence increasing each year. According to the World Health Organization (WHO) and the American Society of Nephrology (ASN), the number of patients suffering from CKD worldwide has surpassed 850 million. This condition not only affects the renal system but also has a significant negative impact on other vital body systems (Levin et al., 2017; Eckardt et al., 2018). Among the affected systems, oral health deteriorates considerably due to CKD, necessitating a specialized approach in prosthetic treatment.

The relationship between CKD and oral health is multifaceted, requiring an in-depth analysis of how metabolic disorders influence the condition of the dentomaxillary system. This review explores the comparative effectiveness of removable and non-removable prosthetic solutions in CKD patients and presents evidence-based recommendations for clinical practice.



The Impact of CKD on Oral Health

Research indicates that CKD patients experience severe metabolic and immunological changes, leading to accelerated bone resorption, weakened periodontal tissues, and an increased rate of tooth loss. These oral health complications are further exacerbated by dialysis treatment, dietary restrictions, and medications prescribed for CKD management (Kshirsagar et al., 2019).

A study by Hsu et al. (2020) found that 68% of CKD patients suffer from severe periodontal disease, significantly increasing their risk of tooth loss. Similarly, Chuang et al. (2021) highlighted that CKD patients are more likely to develop oral mucosal pathologies and xerostomia, which directly affect the effectiveness of dental prostheses. In addition, the increased prevalence of infections, delayed wound healing, and higher inflammatory responses in CKD patients pose substantial challenges for prosthetic rehabilitation.

The Importance of Denture Selection

These factors necessitate a specialized approach when selecting dental prostheses for CKD patients. Researchers emphasize that CKD-associated bone resorption and alterations in the oral mucosa make adaptation to dentures more challenging (Khan et al., 2018). Furthermore, Miller et al. (2021) found that CKD patients exhibit reduced bone regeneration capacity, leading to lower implant success rates.

Prosthesis selection must be guided by several key parameters:

- **Stage of CKD:** The severity of bone mineral density loss determines whether removable or fixed prostheses are more suitable.
- **Systemic Health Status:** The presence of comorbidities such as diabetes and cardiovascular diseases may influence treatment choices.
- **Patient Comfort and Adaptation:** CKD patients often struggle with denture retention due to xerostomia and mucosal atrophy, requiring advanced materials and retention techniques.

CKD and the Condition of the Dentomaxillary System

The oral changes observed in CKD patients not only affect the retention of natural teeth but also influence the functionality of dental prostheses. CKD progression leads to metabolic, endocrine, and immunological alterations, exacerbating degenerative processes in bone and soft tissues. The implications for prosthetic treatment include:

- **Diminished bone density:** Lower calcium and phosphorus levels increase the risk of implant failure.
- **Compromised periodontal health:** Weak periodontal structures affect the stability of both removable and fixed prostheses.
- **Salivary gland dysfunction:** Reduced saliva production increases the risk of mucosal irritation and fungal infections in denture wearers.

Bone Resorption and Its Effect on Prosthetic Treatment

One of the major challenges in CKD is bone resorption, which results from impaired mineral metabolism and vitamin D deficiency. Studies indicate that CKD patients may experience a 20-



40% reduction in bone density due to imbalances in calcium and phosphorus levels, weakening the tissues supporting dental prostheses (Moe et al., 2019).

Periodontal Disease Prevalence and Implications

Inflammatory processes in CKD patients progress more rapidly, leading to an increased incidence of periodontal disease. A study by Smith et al. (2018) found that 63% of CKD patients suffer from severe periodontitis, a rate significantly higher than that of the general population. This presents additional challenges in ensuring the long-term stability of both removable and non-removable prostheses.

Xerostomia and Its Impact on Prosthetic Treatment

CKD patients frequently suffer from reduced salivary secretion, resulting in xerostomia (dry mouth). Research by Jones et al. (2020) revealed that over 50% of CKD patients experience dry mouth, complicating denture retention and adaptation. Additionally, decreased salivary flow leads to oral mucosal irritation, increased inflammation, and heightened sensitivity of the tissues beneath the prosthesis (Navarro et al., 2019).

Clinical Studies and Innovative Approaches

Advancements in prosthetic materials and regenerative techniques have improved treatment outcomes for CKD patients. Strategies include:

- **PRF (Platelet-Rich Fibrin) technology** to enhance bone healing and implant success rates.
- **Biocompatible denture materials** with improved adhesion and reduced mucosal irritation.
- **Fluoride-free oral care solutions** to minimize the risk of systemic toxicity in CKD patients.

Advantages and Disadvantages of Removable and Fixed Prostheses

Prosthesis Type	Advantages	Disadvantages
Removable Prostheses	Cost-effective, easy maintenance, no surgical intervention required	Accelerated bone resorption, adaptation difficulties
Fixed Prostheses (Implants and Bridge Prostheses)	Long-term durability, better aesthetics	Complex implantation process, high cost, and surgical risks

Choosing the Optimal Prosthesis for Patients with CKD

1. Fixed Prostheses with Implants

- Suitable for early-stage CKD patients with sufficient bone density.
- Enhanced success rates with PRF and bone regeneration materials.

2. Removable Prostheses

- Preferred for advanced CKD patients with severe bone resorption.
- Avoids surgical complications associated with implants.

Multidisciplinary Collaboration

Collaboration between dentists and nephrologists is crucial for selecting prostheses for CKD patients. Key considerations include:



- Overall health assessment by nephrologists.
- Bone mineral density evaluation before implantation.
- Assessment of surgical risks and postoperative rehabilitation potential.

Conclusion

When selecting a prosthetic option for CKD patients with partial edentulism, both removable and fixed prostheses have their advantages and disadvantages. In the early stages of CKD, when bone tissue is sufficiently preserved, implant-supported fixed prostheses are preferable. However, in severe stages or in patients with poor bone regeneration, removable prostheses remain the best alternative. Individualized treatment approaches, including the use of biocompatible materials and close collaboration with nephrologists, are essential for improving prosthetic outcomes in CKD patients.

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