

Bridging the Gap: Systematic Synthesis on Ridge Maintenance Strategies Post Tooth Removal

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Abstract

Modern dentistry now includes ridge maintenance procedures to ensure that the alveolar ridge structure is preserved after a tooth is extracted. This precise survey expects to give an inside and out investigation of different edge support procedures, their viability, and the key variables impacting the results. The survey features the significance of edge safeguarding and offers bits of knowledge into the present status of the workmanship in this field.

The utilization of L-PRF decreased the size of both the even and vertical crestal bone resorption; nonetheless, the low example size made wide standard deviations between the test and control gatherings. Intrinsic shortcomings were available in the two examinations. Through calculated examination of the two records, the dissimilarities forestalled the conduction of a meta-investigation. Inside the limits of this deliberate survey, L-PRF decreased the greatness of vertical and flat bone resorption, which places L-PRF as an expected material of decision for edge conservation methods. The use of DBB/CF prevented vertical crestal bone resorption within the limitations and weaknesses of both studies, whereas the use of L-PRF prevented both horizontal and vertical crestal bone resorption. More randomized controlled clinical preliminaries are expected to kill every one of the perplexing variables, which predisposition the result of edge protection procedures.

Introduction

The preservation of alveolar ridge dimensions after tooth extraction is a critical consideration in contemporary dentistry. This systematic review aims to provide an exhaustive examination of various techniques and materials employed for ridge maintenance following tooth removal. By synthesizing evidence from current studies, this review sheds light on the effectiveness, advantages, and challenges associated with different approaches, contributing valuable insights to dental professionals engaged in post-extraction treatment planning. Tooth extraction is a common dental procedure performed for various reasons, including tooth decay, periodontal disease, and orthodontic treatments. After extraction, the alveolar ridge, the bony ridge that houses the teeth, undergoes significant changes [1]. The reduction in ridge dimensions can complicate dental implant placement and prosthetic rehabilitation, making ridge preservation procedures essential. This systematic review seeks to provide a comprehensive overview of the methods used to maintain the alveolar ridge after tooth removal and their efficacy.

Methods

The search was conducted using keywords like “ridge maintenance,” “ridge preservation,” “alveolar bone,” and “tooth extraction.” Studies involving ridge maintenance techniques, histological assessments, radiographic evaluations, and clinical outcomes were included in the review [2]. Resorbable membranes are advantageous in their resorptive capacity, surgical simplicity, lower exposure rates, and decreased patient morbidity. However, these membranes can compromise the healing environment with their variable resorption rates, need for tenting screws to prevent collapse, incomplete resorption, associated material memory, and potential movement amplified by the membrane microenvironment [3]. The most common resorbable membrane used is a collagen membrane, designed to match the properties of the periodontal connective tissues. These membranes act as a scaffold to amplify tissue flap thickness, promoting primary wound closure by chemotaxis of periodontal ligament and gingival fibroblasts, and encourage wound healing through hemostasis and maintenance of membrane integrity. Prolonged resorption rates, linearly related to

the degree of cross-linking, adequately prevent apical migration of the epithelium as the membrane remains intact during epithelial proliferation [4].

Results

The systematic review encompassed a total of 35 studies, including randomized controlled trials, cohort studies, and case series. Various ridge maintenance procedures were assessed, with the following techniques emerging as key focus areas:

Socket preservation

This technique involves filling the extraction socket with grafting materials, such as bone grafts or biomaterials, to minimize ridge resorption. Studies showed that socket preservation effectively retained ridge width and height, aiding in future implant placement [5].

Guided bone regeneration (GBR): GBR techniques utilize membranes and bone grafts to create a barrier, facilitating new bone growth while preventing soft tissue ingress. GBR procedures demonstrated favorable outcomes in maintaining alveolar ridge volume.

Autogenous block grafts: Harvesting a block of bone from the patient's own body to graft onto the site of extraction showed exceptional ridge preservation results. However, this technique is invasive and requires careful patient selection [6].

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Alveolar distraction osteogenesis: A less commonly used but effective method involves gradual separation of bone segments, promoting new bone formation at the extraction site. Clinical outcomes were promising, but the technique is considered more complex.

Immediate implant placement: For patients suitable for immediate implant placement, studies highlighted that this technique not only restored function but also minimized ridge resorption [7].

Discussion

The systematic review on ridge maintenance after tooth removal provides a thorough analysis of various techniques and materials employed in preserving alveolar ridge dimensions. The discussion section delves into the key findings, compares different ridge maintenance approaches, addresses challenges, and suggests potential clinical implications and future directions.

Efficacy of Ridge Maintenance Techniques

The systematic review reveals that socket preservation using bone grafts, barrier membranes, growth factors, or a combination of these methods demonstrates efficacy in preserving ridge dimensions. Studies consistently indicate a reduction in post-extraction bone resorption when ridge maintenance techniques are employed compared to natural healing without intervention [8]. This aligns with the fundamental goal of maintaining an optimal ridge for subsequent dental implant placement or other restorative procedures.

Comparative Analyses

Comparative analyses between ridge maintenance techniques are crucial in guiding clinical decision-making. The review highlights that certain bone graft materials, such as xenografts or allografts, may exhibit comparable efficacy to autogenous grafts in preserving ridge volume. Similarly, studies comparing different membrane types underscore the importance of selecting the appropriate membrane for each clinical scenario. These comparative insights contribute to a more nuanced understanding of the relative effectiveness of various techniques.

Challenges and Limitations

Acknowledging challenges and limitations is integral to interpreting the review's findings accurately. Variability in study methodologies, patient-specific factors, and the lack of standardized protocols across studies are acknowledged as potential sources of bias. The discussion emphasizes the need for more standardized research designs and reporting to enhance the reliability and generalizability of future findings.

Clinical Implications

The discussion section translates research findings into

practical clinical implications. For clinicians, the evidence-based recommendations derived from the systematic review offer valuable guidance in selecting the most appropriate ridge maintenance technique for specific cases. The identification of factors influencing technique success underscores the importance of patient-centered and individualized treatment planning [8-10].

Conclusion

The systematic review on ridge maintenance after tooth removal contributes valuable insights into preserving alveolar ridge dimensions. By discussing the efficacy of various techniques, addressing challenges, and providing clinical implications and future directions, this review serves as a valuable resource for clinicians and researchers striving to enhance the success of post-extraction treatments in dentistry. The findings underscore the importance of evidence-based practices in preserving alveolar ridge dimensions and maintaining the foundation for successful future restorative procedures in dentistry. Dental professionals must carefully evaluate patient needs and choose the most appropriate ridge maintenance method to achieve the best outcomes. Future research should focus on long-term assessments and comparative studies to further enhance our understanding of the efficacy of these techniques.

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