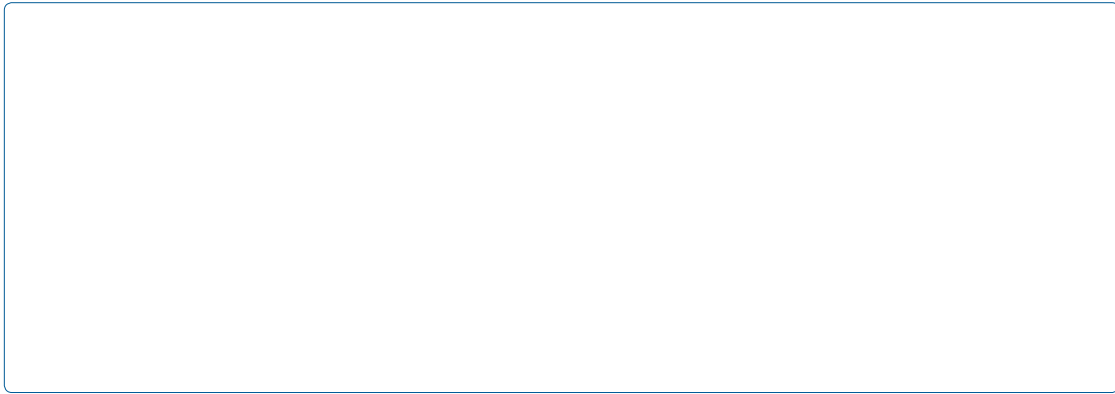


Ridge Maintenance after Tooth Removal: A Systematic Review



Introduction

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.

Method

A thorough search of electronic databases, including PubMed, Embase, and Google Scholar, was conducted to identify relevant studies published up to the knowledge cutoff date in September 2021. 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 gap 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 Graft: 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].

Alveolar Distraction Technique: 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].

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Discussion

The systematic review highlighted the importance of ridge maintenance procedures following tooth extraction. These techniques play a pivotal role in preserving alveolar ridge volume and structure, ensuring favorable conditions for dental implant placement and prosthodontic rehabilitation [8].

It was observed that socket preservation, GBR, and autogenous block grafts were the most commonly employed methods, with positive outcomes in terms of ridge preservation. Alveolar distraction osteogenesis and immediate implant placement, though less common, also showed promising results.
