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PRESERVATION OF MANDIBULAR ALVEOLAR BONE RIDGE BY USING BIOACTIVE GLASS FOLLOWING TEETH EXTRACTION (CLINICAL STUDY)

By

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THESIS

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INTRODUCTION

Introduction

Alveolar bone resorption is a common finding after teeth extraction, It creates an aesthetic problem for the fabrication of the conventional prosthesis, or it can make the placement of endosseous implant difficult or even impossible. [1]

Following the extraction of teeth, the residual alveolar ridge undergoes bone remodeling which involves both external and internal bone changes.[2] It occurs due to localized periosteal osteoclastic resorption which is accompanied by endosteal bone formation. [2] This reduction of residual ridge (RRR) occurs most rapidly in 6 months to 2 years following extraction, but in many individuals continues until death, resulting in the removal of massive amounts of bone. The practical significance of this continuing loss of bone lies in the fact that removable dentures, which are used to substitute the extracted teeth, depend on the bony support of the residual ridge for stability, retention, comfort and aesthetic. [2]

A study of the morphologic changes in the facial skeleton during seven years of complete denture wear,[3] revealed that the decrease in facial height was mainly due to pronounced reduction of the mandibular ridge and a consequent forward upward rotation of the mandible.[3,4]

Radiographic measurements of alveolar ridge dimensions had shown that there was a loss of height and width when comparisons were made between the bone levels at the time of tooth extraction compared to that seen 12 months later. These reductions in width were generally greater than the reduction in height when patients were treated with an immediate denture. [5]

The upward rotation of the mandible and the forward slide of the lower denture led to reduction in horizontal overlap and in some patients led to a horizontal overlap of the lower teeth over the upper ones. [3]

The reduction of the residual alveolar ridges was most rapid during the first year of denture wear. [6]

REVIEW OF LITERATURE

Review of Literature

Residual ridge reduction is a chronic, cumulative, localized disease of bone remodeling, [2] it is irreversible and disabling disease, probably of multifactorial origin. The relative importance of various co-factors is unknown. [7] These co-factors were suggested to be: *anatomic* factors, such as the order of the anterior residual ridge, the height of the anterior part of the residual ridge, and the density of the anterior part of the residual ridge, *biological* factors, such as sex, age, and relation to menopause, *mechanical* factors, such as average number of hours per day the dentures were worn, the interocllusal distance, retention, stability, and coincidence of centric occlusion, no single factor was found to have a high correlation with the rate of residual ridge reduction[7].

Remodeling of bone depends on a variety of factors including the availability of viable bone cells, The biochemical factors (local and systemic) which influence bone cells and the cell control brought about by physical loads applied to bone.[8-11]

Availability of viable bone cells

It is known that specialized bone cells such as osteoblasts and osteoclasts have shorter span than human life, Their continued availability depend on genetic and environmental capacity of progenitor cells.[2] Since residual ridge reduction is a longitudinal and a cumulative process persisting for the rest of the patients life, senescence may become an important factor in the rate of RRR at certain stages due to aging changes in the number and viability of bone cells[2]

Aging may slow down cells; diminish the work they perform per day.[12] In patient who had simple extractions compared with patients who had alveolectomies which remove significant amounts of labial cortical plate have tended to show that the rate of RRR was greater in those who had potentially osteogenic tissue removed by alveolectomy.[12-15]

Carlsson *et al*,[16] (1967) have shown that in patients with simple extraction the labial plate of lamellar bone is largely removed by osteoclastic activity by about 40 days after extraction. Parallel to this resorption bone formation take place so that by 3months both the labial plate and socket have been replaced with new bone in other word old labial plate of bone serve as nedius for new bone formation.[16]

Biochemical factors which influence bone cells

Local biochemical factors: as endotoxins from dental plaque (plaque can occur in edentulous mouth).[17]

Prostaglandins, human gingival bone resorption stimulating factor, these are all factors important role of RRR.[18-19]

Systemic biochemical factors: osteoporosis may be a contributing factor whether it may be idiopathic or in the form of a deficiency of estrogen, calcium, growth hormone or an excess of thyroid hormone or cortisone.[20,11,21]

Cell control brought about by physical loads on bone

Studies had shown that the mean rate of residual ridge reduction was three to four times greater in mandible than in maxilla.[22, 3, 7]

This due to the patient occlusion, the mean load per unit area applied to the mandible is 1.8 more than that applied in the maxilla[2]