The Value of Platelet Rich Fibrin in One-Stage Sinus Augmentation

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Dedication

I would like to thank my dear family and husband for their patience, support and encouragement.

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Item	Abbreviation
PRF	Platelet rich fibrin
PRP	Platelet rich plasma
CBCT	Cone beam computed tomography
mm	Millimeter
SD	Standard deviation
RBH	Residual bone height
ILPIS	Implant length protruding into sinus
DIASF	Distance from implant apex to sinus floor

Introduction

Introduction

Prosthetic rehabilitation of a severely atrophic maxilla represents a challenging therapeutic problem. Bone augmentation is usually required to enable placement and ensure stability of a sufficient number and length of implants.[1]

Tooth loss in the posterior maxilla results in a rapid resorption of both horizontal and vertical alveolar bone due to lack of intraosseous stimulation by periodontal ligament fibers. In addition, the absence of upper molars leads to increased osteoclastic activity in Schneiderian membrane, causing pneumatization of the sinus by resorbing bone within a few months. Moreover, the area of the postero-lateral maxilla is considered a low quality bone tissue typically classified as type IV (poor quality) according to the Lekholm and Zarb [2] classification scale. Patients with severe maxillary atrophy are subjected to changes in masticatory, swallowing and speech, and these changes can often result in physical or psychological problems. [3]

Maxillary sinus augmentation, originally developed and described by Tatum [4] in 1975 , is a well-established procedure for functional rehabilitation of partially or completely edentulous patients. The survival rate for implants placed in grafted sinuses showed comparable results to those reported for implants placed in pristine bone (original bone) in the non-grafted posterior maxilla. Augmentation may be indicated when the distance from the sinus floor to the top of the alveolar ridge is less than 8–10 mm. [4,5,6]

Introduction

To date, two main techniques of sinus floor elevation for dental implant placement are in use: a two-stage technique with a lateral window approach, followed by implant placement after a healing period, and a single stage technique using either a lateral or transalveolar approach. The decision to apply the one or the two-stage techniques is based on the residual bone volume available and the possibility of accomplishing primary stability for the inserted implants. **(7)**

Autogenous bone graft has been proposed as the gold standard for sinus procedure with good long-term results. Its greatest advantage is the osteogenic, osteoinductive, and osteoconductive properties without the risk of graft rejection. However, there are disadvantages, such as limited availability, limited bone volume, unpredictable resorption, need for a second surgical site, and donor site morbidity. Therefore, alternative materials with different features have been developed to try to find acceptable alternative to autogenous grafts. **(8)**

. Recently, the possibility of sinus-lift without any grafted material is hotly debated, following the concepts of guided bone regeneration.**(9)** Lundgren et al**(10)** suggested that the use of bone substitutes during sinus floor augmentation is not necessary because the natural blood clot inside the sub-sinus space is capable of promoting bone healing. It has been shown that sinus-lift can be performed using the lateral approach with whole blood as sole filling material.**(11,12)** However; it is often difficult to fill the sinus cavity with a stabilized blood clot. **(13,14)**

Introduction

The use of PRF in sinus-lift procedures has been promoted for lateral sinus-lift. [15,16,17] The precise effects of PRF membranes on Schneiderian membranes have not been investigated. However, a PRF membrane may improve the healing of a Schneiderian membrane and stimulate its osteogenic periosteum-like behavior and perhaps increase or stabilize the bone volume around the implant end. [18,19]

Review of literature

Rehabilitation of partially or totally edentulous patients using dental implants has become a routine treatment modality in the last decades, with reliable long-term results. [20]

The posterior maxilla has been acknowledged as the most difficult and problematic intraoral area for implant dentistry, requiring a maximum attention for the achievement of successful surgery. Some reports indicate a lower rate of implant survival in the posterior maxilla, which was attributed to the reduced density often being found in this region. [21] The resorptive pattern of the edentulous maxilla is superiorly and medially directed, resulting in limitations in both height and width of the bony foundation for implants. Implant placement in the edentulous posterior maxilla present difficulties due to horizontal or vertical alveolar ridge deficiency, unfavorable bone quality, or increased pneumatization of the maxillary sinus. [22]

Ulm et al [23] clearly showed that the common limiting factor for endosseous implant placement in the posterior maxilla is not the width, but the height of the alveolar ridge. Furthermore, It was reported that the failure of implants placed in posterior maxilla without sinus lifting is attributed to the use of implants that are too short to resist the strong occlusal forces exerted in this area rather than the 'quality' of type IV bone. [24]

Rehabilitation of posterior maxilla

A sufficient and long-term stable bone site is the basis of successful implant therapy. However, due to atrophy or periodontal disease, edentulous ridges may be unfavorable for