Clinical and Radiological Evaluation of Ridge Preservation After Tooth Extraction By Using Concentrated Growth Factor

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ABSTRACT

Introduction: The breadth of the leftover bone quickly diminishes after having teeth extracted. Socket grafting improves the prognosis by helping to preserve the remaining bone's breadth and height. Among the various options for ridge preservation operations is the use of autologous platelet concentrates, such as concentrated growth factor, which has been shown to speed up the recovery of both hard and soft tissues after surgery. It improves quality of life by retaining the alveolar socket in two dimensions, horizontally and vertically, for potential rehabilitative prostheses. The researchers wanted to see whether ridge preservation with focused growth factor could be achieved following tooth extraction using radiological and clinical measures.

Method: Forty samples were gathered from various locations. With approval from the appropriate institutional ethics committee, atraumatic extraction was done using a periotome, and concentrated growth factor was afterwards inserted; clinical and radiological examinations were performed pre- and post-operatively for a total of 6 months.

Result: When comparing pre- and post-op measurements of soft tissue ridge width, there was a statistically significant change. When comparing pre- and post-operative measures, there was a statistically significant difference in the mean width of the hard tissues. After surgery, socket height was much higher than pre-operation measures.

Conclusion: This current investigation shows that the use of an autologous, non-immunogenic, and cost-effective CONCENTRATED GROWTH FACTOR resulted in little modifications to the shape of the alveolar bone.

Keywords: Ridge Preservation, Tooth Extraction, Concentrated Growth Factor

INTRODUCTION

Natural loading repairs need soft and hard tissue reconstruction. In particular, alveolar bone's horizontal dimensions shrink on the face. Buccal alveolar bone loss is more pronounced in the vertical dimension [1].

Alveolar bone loss is most noticeable in the first six months after surgery [1,2]. Socket preservation procedures were developed and researched to avoid this collapse after atraumatic extraction by periotome was recommended. Prosthetic rehabilitation, including as implant therapy, may benefit from socket preservation techniques since it helps preserve the surrounding teeth.

Depending on the characteristics of the material used to fill the socket, ridge preservation might be either permanent or temporary. Different materials have different osteo conduction, osteo induction, and osteo genic characteristics. Periodontal applications, such as periodontal regeneration therapies, have only recently benefited from the development of growth factors. Platelets are the first kind of cells to arrive to a wound site from the nearby capillaries following an injury [6]. “Platelets are triggered when they come into contact with the blemished walls of a blood vessel. Platelets, when activated, release growth factors from their alpha granules. These growth factors include platelet-derived growth factor (PDGF), vascular

endothelial growth factor (VEGF), and transforming growth factor (TGF).” Wound healing and tissue restoration are both aided by growth factors. [7,8].
The purpose of this research is to determine whether or not concentrated growth factor is helpful in preserving the alveolar ridge following tooth extraction.

METHOD

Forty participants were recruited from the Department of Periodontology's outpatient clinic. Age between 20 and 40 is one of the requirements for participation. A patient's overall health status, Patients who, during the previous year before to the first assessment, had not received any regenerative periodontal treatment. Patients who have not been given any antibiotics in the last six months. Patients who are able to maintain good dental hygiene on their own. Participant who understood the clinical trial's goals and offered informed permission.
Conditions of Ineligibility Patients during the previous year who have had periodontal flap / regenerative treatment, Patients who are pregnant or breastfeeding, as well as smokers and alcoholics Patients that consistently neglect their dental hygiene. Radiation treatment recipient patient. “Systemic diseases like diabetes mellitus, cardiovascular disease, immuno-compromised (e.g., HIV individuals, under radiotherapy), and so on, as well as medications like corticosteroids, calcium channel blockers, or bisphosphonates, which are known to interfere with the outcome of periodontal therapy.” Those who have life-threatening conditions or are allergic to certain medications.
The Institutional Ethical Committee gave its approval, and the research was conducted in accordance with their guidelines. The study's subjects were chosen at random. Getting a patient's medical background and permission to proceed. Evaluation of the gums and teeth within the mouth. Isotopic optical probing analysis (IOPA) of a targeted area of missing teeth. The Labio-palatal breadth of the edentulous region, as determined by cone beam computed tomography (CBCT) scanning of the chosen area. Dentition height, presence of disease, and other factors.
Phase 1 treatment, including clinical photography and research models, was completed. The process of preparing a stent prior to a surgical procedure. Extraction without trauma, injection of growth factor concentrate, and surgical closure of extraction socket. Treatment after surgery.

SURGICAL PROCEDURE

The patient was instructed to begin taking preoperative antibiotics 1 day before to surgery (Cap.Amoxycillin 500 mg three times a day) and Tab. Ibuprufen 400 mg 1 hour prior to surgery. Before having surgery, patients were urged to rinse with a Chlorhexidine solution that contained 2%. An intra crevicular incision is made around the affected tooth after enough local anesthesia has been administered (2% lignocaine with epinephrine, 1:200,000). The damaged tooth is removed without causing any stress to the surrounding alveolar bone. The periodontal ligament may be cut using a periotome. After the tooth has been extracted, the socket is cleaned thoroughly with a curette and saline.

CONCENTRATED GROWTH FACTOR PREPARATION

Blood was obtained from an IV after the area around the patient's anterior cubital fossa was disinfected with povidone iodine. Most surgeons choose the anterior cubital vein.Ten milliliters of blood were taken and put into the CGF machine to be processed into a concentrated growth factor solution. The parameters include an initial 30 second acceleration,“2 minutes of centrifugation at 2,700 rpm, 4 minutes at 2,400 rpm, 4 minutes at 2,700 rpm, 3 minutes at 3,000 rpm, and a force of 692 gm, 547 gm, 592 gm, and 855 gm, respectively, before the device decelerates for 36 seconds and stops. Following this

procedure, four distinct blood fractions are isolated: (1) the upper phase, which corresponds to the liquid phase of plasma and is known as platelet poor plasma (PPP); (2) the intermediate phase, also known as the fibrin buffy coat phase; (3)" the lower red phase; and (4) the liquid phase. Primary closure, in which a fibrin layer rich in growth factor is preserved within the socket and the wound is stitched closed, is used. a dressing for periodontal pockets.

After 14 days, patients were instructed to return to have their periodontal sutures and dressings removed. At the 6-month mark, patients underwent a second round of clinical examination with the use of Boley's gauge and a prefabricated, custom-made acrylic stent.

Six-month follow-up of cone beam computed tomography: The CBCT scan was performed with the patient in an upright posture using a Care Stream 9300 system configured to 120 kV, 70 mA, and a tube focal point of 0.7 mm; CS 3D Imaging Software 3.3.9.0 was used for sectioning the area of interest. The post-operative values are determined 6 months after surgery; the labio-palatal breadth of the treated area was measured then.

SPSS 16 (IBM CORP, CHICAGO, IL, USA) was used to do the statistical analyses. Data are given as mean SD and range for descriptive purposes. To evaluate the changes in all of the variables from pre- to post-surgery, paired T tests were conducted. In this case, a significant P Value was defined as less than 0.05.

RESULTS

All research participants were contacted again one, three, and six months after their first appointment for follow-up care. Thirty people were chosen for this research, all of whom had been given the all-clear for extraction. All data from 30 locations have been compiled and analyzed statistically.

Thirty sites were identified, and atraumatic extraction was performed on each of them before a fibrin layer of concentrated growth factor was inserted into the extraction socket using a MEDIFUGE machine. There were no infections throughout the healing process, so that was good. Clinical and imaging tests were performed after 6 months. The following table displays the statistical findings as mean SD values.

Clinical evaluation of ridge width in this research showed a decrease from 7.34±0.55mm at baseline to 5.16±0.14mm after 6 months. There was a 1.090.4mm reduction in the ridge's horizontal dimensions. This led to measurements of the average ridge width being taken at the crest, 5 mm from the crest, and 10 mm from the crest.

"There was a statistically significant change in the mean breadth of the hard tissues between the pre- and post-op measurements. There was a statistically significant increase in socket height after surgery compared to before measurements."(Table 1)

Table 1: Comparison between baseline and after 6 months values between the variables.

Groups	Mean	SD	T value	P value
Labiopalatal width – baseline vs Labiopalatal width - after 6 months	4.56	1.1	14.06	0.001
Buccolingual width at crest – baseline vs Buccolingual width at crest - after 6 months	3.10	1.3	8.15	0.001
Buccolingual width at 5 – baseline vs Buccolingual width at 5 - after 6 months	4.18	1.3	12.32	0.001
Buccolingual width at 10 – baseline vs Buccolingual width at 10 - after 6 months	3.67	1.1	12.98	0.001
Apico coronal height – baseline vs Apicocoronal height - after 6 months"	5.89	1.4	19.76	0.001

DISCUSSION

Clinical evaluation was performed using Boley's gauze at baseline and again after 6 months postoperatively in the current investigation. On the day of extraction, just after I inserted the CGF in the socket, I had a CBCT scan. CBCT was used to acquire a vertical and horizontal measurement of the 3-dimensional image. After 6 months, CBCT imaging was analyzed.

"Results were similar to those obtained by Mardas et al. [9] in that the buccolingual dimension of the alveolar ridge shrank by 1.11mm in the synthetic bone replacement group and by 2.11mm in the bovine derived xenograft group. The present study showed that concentrated growth factor was just as effective as secondary soft tissue in maintaining the alveolar socket's horizontal and vertical dimensions."

Human extraction sockets healed either spontaneously or with ridge preservation and additional soft tissue healing, as studied by Barone et al. [10]. The results indicated that the control group shrank in both the vertical and horizontal directions, with the vertical shrinking by 1.020.7mm and the horizontal shrinking by 3.60.72mm. The vertical dimension in the test group has decreased by 1.60.55mm, while the horizontal dimension has decreased by 1.80.5mm.

The results of the current investigation demonstrated that concentrated growth factor is as efficient as secondary soft tissue in preserving the horizontal and vertical dimensions of the alveolar socket. Gholam Ali et al. [11], who examined xenograft and synthetic bone, found correlations with the current study's findings.

In his systematic review of the effects of Autologous Platelet Concentrates on alveolar socket preservation, Morachini et al. [12] discovered that changes in the horizontal dimension are larger than those in the vertical dimension, which is in line with the current study's findings. The vertical bone loss in the control group was greater than that in the experiment group.

This research's findings were consistent with those of a clinico-radiographic investigation "by Swati Das et al. [13], which compared the success rates of socket preservation using beta-tri-calcium phosphate and collagen (group 2) to using PRF-Platelet Rich Fibrin (group 1)."Researchers found that group 2 saw a statistically significant increase in socket depth decrease compared to group 1. When comparing the two groups radiographically, group 1 had a greater mean difference in socket height and breadth. Group 1 also has a greater mean density than Group 2.

The findings of these investigations reveal that the alveolar ridge dimensions of the removed socket may be predicted with high accuracy after treatment with concentrated growth factor. By preventing the need for a subsequent incision, autologous platelet concentration improves patient compliance. Due to its antigenicity, graft rejection will be reduced since hypersensitive responses will not be triggered. Cost-effectiveness is also a major factor.

CONCLUSION

Based on the results of this evaluation of autologous, non-immunogenic, and cost-effective CONCENTRATED GROWTH FACTOR in alveolar ridge preservation following atraumatic extraction, it is clear that using CONCENTRATED GROWTH FACTOR resulted in minimal changes to the alveolar bone's natural contour.

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