CLINICAL AND RADIOLOGICAL EVALUATION OF RIDGE PRESERVATION AFTER TOOTH EXTRACTION BY USING CONCENTRATED GROWTH FACTOR

A Dissertation submitted in
partial fulfillment of the requirements
for the degree of

MASTER OF DENTAL SURGERY

BRANCH – II

PERIODONTOLOGY

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY
CHENNAI – 600 032

2017 – 2020

CERTIFICATE BY THE GUIDE

This is to certify that **Dr. THANMANAM. R**, Post Graduate student (2017- 2020) in the Department of Periodontology, Tamil Nadu Government Dental College and Hospital, Chennai – 600 003 has done this dissertation titled **"CLINICAL AND RADIOLOGICAL EVALUATION OF RIDGE PRESERVATION AFTER TOOTH EXTRACTION BY USING CONCENTRATED GROWTH FACTOR"** under my direct guidance and supervision in partial fulfillment of the regulations laid down by **Tamil Nadu Dr. M.G.R. Medical University**, Chennai – 600 032 for **M.D.S.,** (Branch – II) **Periodontology** degree examination.

Dr. K. MALATHI, M.D.S.,

HOD, Professor and Guide

Department of Periodontology

TAMIL NADU GOVERNMENT DENTAL COLLEGE AND HOSPITAL

CHENNAI – 600 003

CERTIFICATE BY HEAD OF THE DEPARTMENT / HEAD OF THE INSTITUTION

This is to certify that the Dissertation entitled **"CLINICAL AND RADIOLOGICAL EVALUATION OF RIDGE PRESERVATION AFTER TOOTH EXTRACTION BY USING CONCENTRATED GROWTH FACTOR"** is a bonafide work done by **Dr. THANMANAM.R**, Post Graduate student (2017–2020) in the Department of Periodontology under the guidance of **Dr. K. MALATHI, M.D.S**, HOD and Professor (Guide), Department of Periodontology, Tamil Nadu Government Dental College and Hospital, Chennai - 600 003.

Dr. K. MALATHI, M.D.S.,
H.O.D. & Guide,
Department of Periodontology

Dr. G. VIMALA, M.D.S.,
Principal,
TNGDC & H

TAMIL NADU GOVERNMENT DENTAL COLLEGE AND HOSPITAL
CHENNAI – 600 003

DECLARATION BY THE CANDIDATE

TITLE OF STUDY	**CLINICAL AND RADIOLOGICAL EVALUATION OF RIDGE PRESERVATION AFTER TOOTH EXTRACTION BY USING CONCENTRATED GROWTH FACTOR**
PLACE OF STUDY	**TAMIL NADU GOVERNMENT DENTAL COLLEGE AND HOSPITAL, CHENNAI – 600 003.**
DURATION OF THE COURSE	**3 YEARS**
NAME OF THE GUIDE	**Dr. K. MALATHI, M.D.S.**
HEAD OF THE DEPARTMENT	**Dr. K. MALATHI, M.D.S.**

I hereby declare that this dissertation titled **"CLINICAL AND RADIOLOGICAL EVALUATION OF RIDGE PRESERVATION AFTER TOOTH EXTRACTION BY USING CONCENTRATED GROWTH FACTOR"** is a bonafide and genuine research work carried out by me under the guidance of **Dr. K. MALATHI, M.D.S., HOD and Guide,** Department of Periodontology, Tamil Nadu Government Dental College and Hospital, Chennai - 600003.

Dr. K. MALATHI, M.D.S., **HOD & Guide**	**Dr. G. VIMALA, M.D.S.,** **Principal**	**Dr. THANMANAM.R** **Candidate**

TAMIL NADU GOVERNMENT DENTAL COLLEGE AND HOSPITAL

CHENNAI - 600 003

TRIPARTITE AGREEMENT

This agreement herein after the "Agreement" is entered into on this day 24/1/2020 between the Tamil Nadu Government Dental College and Hospital represented by its **Principal** having address at Tamil Nadu Government Dental College and Hospital, Chennai – 600 003, (hereafter referred to as the college")

And

Dr. THANMANAM.R, aged 36 years currently studying as **Post Graduate Student** in Department of Periodontology, Tamil Nadu Government Dental College and Hospital, Chennai – 600 003 (herein after referred to as the PG student and Principal Investigator"),

And

Mrs. Dr. K.MALATHI, M.D.S., aged 53 years working as **Professor** in Department of Periodontology at the Tamil Nadu Government Dental College and Hospital, Chennai – 600 003 (hereafter referred to as Co-investigator"),

Whereas the PG student as part of her curriculum undertakes this research on **"CLINICAL AND RADIOLOGICAL EVALUATION OF RIDGE PRESERVATION AFTER TOOTH EXTRACTION BY USING CONCENTRATED GROWTH FACTOR"** for which purpose the Co – investigator and the college shall provide the requisite infrastructure based on availability and also provide facility to the PG student as to the extent possible as a Principal Investigator

Whereas the parties, by this agreement have mutually agreed to the various issues including in particular the copyright and confidentiality issues that arise in this regard.

Now this agreement witnessed as follows

1. The parties agree that all the Research material and ownership therein shall become the vested right of the college, including in particular all the copyright in the literature including the study, research and all other related papers.
2. To the extent that the college has the legal right to do go, shall grant to licence or assign the copyright so vested with it for medical and/or commercial usage of interested persons/ entities subject to a reasonable terms/ conditions including royalty as deemed by the college.
3. The royalty so received by the college shall be shared equally by all the three parties.
4. The PG student and Co-investigator shall under no circumstances deal with the copyright, Confidential information and know – how – generated during the course of research/study in any manner whatsoever, while shall sole rest with the college.

5. The PG student and Co-investigator undertake not to divulge (or) cause to be divulged any of the Confidential information or, know – how to anyone in any manner whatsoever and for any purpose without the express written consent of the college.
6. All expenses pertaining to the research shall be decided upon by the Principal investigator/ Co-investigator or borne sole by the PG student (Principal-investigator)
7. The college shall provide all infrastructure and access facilities within and in other institutes to the extent possible. This includes patient interactions, introductory letters, recommendation letters and such other acts required in this regard.
8. The Co-Investigator shall suitably guide the Student Right from selection of the Research Topic and Area till its completion. However the selection and conduct of research, topic and area of research by the student researcher under guidance from the Co-Investigator shall be subject to the prior approval, recommendations and comments of the Ethical Committee of the College constituted for the purpose.
9. It is agreed that as regards other aspects not covered under this agreement, but which pertain to the research undertaken by the PG student, under the guidance from the Co-Investigator, the decision of the college may be binding and final.
10. If any dispute arises as to the matters related or connected to this agreement herein, it shall be referred to arbitration in accordance with the provisions of the Arbitration and Conciliation Act, 1996.

In witness whereof the parties hereinabove mentioned have on this day month and year herein above mentioned set their hands to this agreement in the presence of the following two witnesses.

College represented by its **Principal**

Dr. G. VIMALA. MDS.,
PRINCIPAL
TAMIL NADU GOVERNMENT DENTAL COLLEGE & HOSPITALS
CHENNAI- 600 003.

PG Student

Student Guide

Witness

1. P. R. Ganesh .
2.

CERTIFICATE II

This is to certify that this dissertation work titled **"CLINICAL AND RADIOLOGICAL EVALUATION OF RIDGE PRESERVATION AFTER TOOTH EXTRACTION BY USING CONCENTRATED GROWTH FACTOR"** of the candidate **Dr. THANMANAM. R** with Registration Number **241713004** for the award of **MASTER OF DENTAL SURGERY** in the **Branch II - PERIODONTOLOGY**. I personally verified the urkund.com website for the purpose of plagiarism check. I found that the uploaded thesis file contains from introduction to conclusion pages and result shows 4 percentage of plagiarism in the dissertation.

Guide & Supervisor sign with Seal

Dr. K. MALATHI, MDS.,PGDHA.,
PROFESSOR & HEAD
DEPT OF PERIODONTICS
TAMILNADU GOVERNMENT DENTAL
COLLEGE & HOSPITAL
CHENNAI-600 003

TRIPARTITE AGREEMENT

This agreement herein after the "Agreement" is entered into on this day _____ between the Tamil Nadu Government Dental College and Hospital represented by its **Principal** having address at Tamil Nadu Government Dental College and Hospital, Chennai – 600 003, (hereafter referred to as the college")

And

Dr. THANMANAM.R, aged 36 years currently studying as **Post Graduate Student** in Department of Periodontology, Tamil Nadu Government Dental College and Hospital, Chennai – 600 003 (herein after referred to as the PG student and Principal Investigator"),

And

Mrs. Dr. K.MALATHI, M.D.S., aged 53 years working as **Professor** in Department of Periodontology at the Tamil Nadu Government Dental College and Hospital, Chennai – 600 003 (hereafter referred to as Co-investigator"),

Whereas the PG student as part of her curriculum undertakes this research on **"CLINICAL AND RADIOLOGICAL EVALUATION OF RIDGE PRESERVATION AFTER TOOTH EXTRACTION BY USING CONCENTRATED GROWTH FACTOR"** for which purpose the Co – investigator and the college shall provide the requisite infrastructure based on availability and also provide facility to the PG student as to the extent possible as a Principal Investigator

Whereas the parties, by this agreement have mutually agreed to the various issues including in particular the copyright and confidentiality issues that arise in this regard.

Now this agreement witnessed as follows

1. The parties agree that all the Research material and ownership therein shall become the vested right of the college, including in particular all the copyright in the literature including the study, research and all other related papers.
2. To the extent that the college has the legal right to do go, shall grant to licence or assign the copyright so vested with it for medical and/or commercial usage of interested persons/ entities subject to a reasonable terms/ conditions including royalty as deemed by the college.
3. The royalty so received by the college shall be shared equally by all the three parties.
4. The PG student and Co-investigator shall under no circumstances deal with the copyright, Confidential information and know – how – generated during the course of research/study in any manner whatsoever, while shall sole rest with the college.

5. The PG student and Co-investigator undertake not to divulge (or) cause to be divulged any of the Confidential information or, know – how to anyone in any manner whatsoever and for any purpose without the express written consent of the college.
6. All expenses pertaining to the research shall be decided upon by the Principal investigator/ Co-investigator or borne sole by the PG student (Principal-investigator)
7. The college shall provide all infrastructure and access facilities within and in other institutes to the extent possible. This includes patient interactions, introductory letters, recommendation letters and such other acts required in this regard.
8. The Co-Investigator shall suitably guide the Student Right from selection of the Research Topic and Area till its completion. However the selection and conduct of research, topic and area of research by the student researcher under guidance from the Co-Investigator shall be subject to the prior approval, recommendations and comments of the Ethical Committee of the College constituted for the purpose.
9. It is agreed that as regards other aspects not covered under this agreement, but which pertain to the research undertaken by the PG student, under the guidance from the Co-Investigator, the decision of the college may be binding and final.
10. If any dispute arises as to the matters related or connected to this agreement herein, it shall be referred to arbitration in accordance with the provisions of the Arbitration and Conciliation Act, 1996.

In witness whereof the parties hereinabove mentioned have on this day month and year herein above mentioned set their hands to this agreement in the presence of the following two witnesses.

College represented by its **Principal** **PG Student**

Student Guide

Witness

1.

2.

Introduction

INTRODUCTION

In routine dental practice extraction of grossly decayed root stumps, vertically fractured roots, and hopeless teeth are inevitable. such extraction leads to dimensional reduction in the hard tissue. Loss of ridge height results in prosthetic instability. Reconstruction of the soft and hard tissue is imperative for natural loading restorations. Horizontal dimensional loss occurs especially on the facial aspect of alveolar bone. Vertical loss of alveolar bone that occurs in the buccal aspect is noticeably more.

Contour of the alveolar bone loss occur especially in first six months of postoperative period [1]. To prevent this collapse atraumatic extraction by periotome was advocated, and various socket preservation techniques invented and studied [2].

Socket preservation methodologies will help in prosthetic rehabilitation like implant treatment which conserves adjacent tooth structure also [3] .

Ridge preservation may be long term or transitional depending on the properties of the material placed into the socket. There are many materials like autogenous, allogenous, xenogeneic and alloplastic materials are available to make participation of cellular compartments of periodontium to participate in the regenerative process of the alveolar bone. Osteo conduction, osteo induction and osteo genic properties varies among these materials.

Growth factors are the recent invention for various periodontal applications like periodontal regenerative procedures. Platelet are the cells which arrive at wound site immediately after injury from the adjacent capillaries [4].

While contact with injured capillary walls, platelets gets activated. These activated platelets release their alpha granular contents, which contain platelet derived growth

factor-PDGF, vascular endothelial growth factor-VEGF, Transforming growth factor -β. these growth factors enhance wound healing and enhance regeneration of lost tissue.

Among platelet derived growth factor platelet rich plasma-PRP is the first generation PDGF introduced by Marx and colleagues in 1998. Platelet rich fibrin-PRF is the second generation PDGF introduced by Choukran and co-workers in 2001. concentrated growth factor-CGF is the third generation PDGF. Concentrated growth factor was first developed by Sacco in 2006. It has the highest potential for periodontal regeneration.

This study aims to evaluate the effectiveness of concentrated growth factor in alveolar ridge preservation after tooth extraction.

Aim and objectives

AIM AND OBJECTIVES

AIM

To evaluate the clinical and radiological evaluation of ridge preservation after tooth extraction using concentrated growth factor.

OBJECTIVES

To assess the effectiveness of concentrated growth factor in preserving alveolar ridge.

1. Clinical Parameters

- Bucco lingual width of soft tissue evaluation by Boleys gauze with stent.

2. Radiological evaluation

- CBCT evaluation of socket width at baseline and after 6 months.
- CBCT evaluation of socket height at baseline and after 6 months.

Review of Literature

REVIEW OF LITERATURE

Changes in the alveolar bone dimensions invariably occurs after tooth extraction. During socket healing period, new bone grows into the extraction site while the alveolar ridge is being resorbed. Several studies have demonstrated that the height and width of the alveolar bone has been reduced significantly and immediately after tooth extraction.[5,6,7]

Amler et al (1960)[5] in his study, explained the events following extraction When a tooth is removed, there is haemorrhage followed by formation of a blood clot that fills the entire socket. This is an inflammatory reaction that stimulates recruitment of cells to form granulation tissue. Within 48 to 72 hours after extraction the clot starts to breakdown as granulation tissue begins to infiltrate the clot especially at the base of the socket. By four days the epithelium proliferates along the socket periphery and immature connective tissue is apparent.

After seven days the granulation tissue has completely infiltrated and replaced the clot. At this stage, osteoid is evident at the base of the socket as uncalcified bone spicules. Over the next 2–3 weeks this begins to mineralize from the base of the socket coronally. This is accompanied by continued re- epithelialization which completely covers the socket by six weeks post-extraction. Further infill of bone takes place with maximum radiographic density at around 100 days.

Studies by ***Pietrovksy et al (1967)***[6] showed that maximum changes in alveolar dimension takes place within 12 months immediately after extraction.

Dimensional loss of socket bone hinders dental implant placement and conventional prosthesis. Therefore, in order to maintain the alveolar ridge dimensions, it is essential to perform socket preservation procedures after tooth extraction, which can

be done by placing grafting materials in the extraction socket as a framework for bone deposition**.**

Schropp et al (2003)[7] in his study, showed Healing of an extraction socket is characterized by internal changes that leads to formation of bone within the socket, and external changes that leads to loss of alveolar ridge width and height.

Schropp et al (2003)[8] studied the effect of a single tooth extraction of premolar or molar teeth on bone healing and soft tissue changes using clinical and radiographic measurements as well as digital subtraction radiography. They showed that the major changes take place in the 12 months following an extraction with an average of 50 per cent reduction in the width of the alveolar ridge. Two-thirds of this reduction occurred within the first three months. This loss averaged between 5 and 7 mm and was similar at all sites in the mouth.

Lam et al (1960)[9] studied about the dimensional changes in multiple adjacent extraction sockets .It showed that the greater apico coronal reduction was seen in adjacent multiple extraction sockets than single extraction sockets.

Study by ***Araujo MG Lindhe (2005)***[10], showed that in the first eight weeks following extraction in a dog model there is marked osteoclastic activity resulting in the resorption of the buccal and lingual crestal walls. They noted that the reduction of height was more pronounced at the buccal wall and was accompanied by a horizontal loss on both buccal and lingual walls.

More studies by ***Lekovic et al (1997)***[11] have shown that there is greater loss of alveolar ridge width than the height and that some degree of loss was observed at all extraction sites. It has been suggested that this variability is due to anatomic, prosthetic, metabolic, functional, genetic and iatrogenic factors.

Lekovic et al (1998)[12] stated that the most rapid changes were found in the early post-extraction period, from six months to two years.

Darby et al (2008)[13] explained that the ridge preservation is any procedure undertaken at the time of extraction or following an extraction that is designed to minimize external resorption of the ridge and maximize bone formation within the socket. However, there are clinical situations where it is not advisable to undertake ridge preservation at the time of extraction (eg.) in the presence of acute infection. In these situations, preservation of the ridge may be delayed by six to eight weeks.

Atwood et al (1971)[14] showed that there were differences in resorption rate between maxilla and mandible. This study performed on edentulous arches showed four times greater resorption in mandible than maxilla.

In a systemic review by ***Tan et al (2012)***[15], said horizontal bone resorption is greater (3.79mm) than vertical resorption. (1.24mm) in 6 months.

Artzi et al (2016)[16] published a systematic review in which he stated that the changes of alveolar bone dimension of extraction sockets in humans exhibited a range of 2.6-4.6 mm in width reduction, and a range in height reduction between 0.4-3.9 mm. The rate of alveolar ridge resorption after tooth extraction was faster in the first nine months. It was found that two-thirds of the resorption happened in the first three months, and half of the ridge width decreased in the first 12 months (average 6.1 mm; 2.7-12.2 mm).

Several components may impact the changes of bone dimensions after tooth extraction, for example the tooth position in the dental arch, the number and proximity of teeth to be extracted, the condition of the socket before and after extraction, and the tissue biotype. Thin biotype with highly scalloped hard and soft tissues is more prone to display hard tissue resorption and soft tissue recession than the thick biotype.

The severity of the healing pattern may establish a problem for the clinician such as an aesthetic problem in the implant-supported restoration, an orthodontic tooth movement into extraction site, etc. In order to eliminate or minimize extensive hard and soft tissue regenerative surgical procedures, socket preservation can be carried out at the time of tooth extraction.

Socket preservation is a procedure at the time of tooth extraction to control bone resorption. It aims to preserve the bone volume and soft tissue position of the alveolar ridge, to reduce post-extraction dimensional changes and to eliminate future bone regeneration that required for ideal implant placement.[17]

Various bone graft materials for socket Preservation

Mish et al (1993)[18] described that socket preservation can be achieved by bone regeneration. Bone regeneration can be achieved by three different mechanisms: osteogenesis, osteo-induction, and osteo-conduction.

Osteogenesis

Osteogenesis refers to formation or development of new bone by the cells contained in the bone graft.

Osteo induction

Osteo-induction is the chemical process by which molecules present in the graft convert neighbouring cells into osteoblast which inturn form bone.

Osteo conduction

Osteo-conduction is the physical effect by the matrix of the graft which forms scaffold that favours the cells to penetrate and form new bone.

The primary types of bone graft material are

- autogenous bone,
- allografts,
- xenografts,
- alloplasts.

AUTOGRAFT

Evian et al (1982)[19] described Autogenous Bone graft which is taken and transferred from one location to another location within the same individual. Autogenous bone can be harvested from extraoral sites such as the iliac crest or tibial bone; and intraoral sites such as the mandibular symphysis, maxillary tuberosity, 8- to 12-weeks post-extraction healing sites, ramus, tori or exostoses. Autogenous bone can be trabecular (cancellous), cortical or cortico trabecular.

Rose et al (2004)[20] said that Cancellous bone has more osteogenic potential than cortical bone due to the presence of hematopoietic marrow and a greater amount of plueri potential cells in cancellous bone.

Barboza et al (1999)[21] note that the cortical graft has fewer surviving osteogenic cells but provides the most bone morphogenetic protein (BMP). BMP differentiates host mesenchymal cells into osteoblasts. In addition, BMP provides more resistance to the graft structure resorption, which impedes soft tissue in-growth but also may prolong the time needed for blood vessels to infiltrate the graft. Cortico trabecular block grafts can

be shaped and trimmed to fit the recipient bed, and the trabecular part is placed to face the recipient bed.

ALLOGRAFT

Allografts are bone obtained from a different individual of the same species.

Becker et al (1994)[22] compared demineralized freeze-dried bone allograft against autogenous bone graft in seven paired sites and found that after three months new bone was found at all sites where autogenous bone was placed, whereas new bone was found in only one of the seven sites where demineralized freeze-dried bone allograft was placed.

Clementini et al (2011)[23] found out a success rate of 72-97% in implants placed in onlay graft regenerated ridges in a 6months to 10 years period.

Araujo et al (2011)[24] conducted a study that used autologous bone chips as graft materials and found that it had little effect on bone formation and in promoting alveolar ridge preservation.

Although autogenous bone is the best candidate for repairing osseous defect, its limited volume and requisition of additional surgery indicated a need for an alternative material. Allografts, xenografts, and alloplasts, either in a block or particulate form, can also be used as an alternative bone graft material.

Allografts consist of tissue transferred from one individual to another within the same species. Allografts are widely used because the materials do not require a secondary surgical site and so host morbidity is decreased. The graft materials can be classified as demineralized freeze-dried bone allograft (DFDBA) and freeze-dried bone allograft (FDBA).

Buck be et al (1999)[25] said that it is possible to add an osteo inductive property to the already osteoconductive bone by demineralizing the material causing the releasing of bone morphogenetic proteins (BMPs). One disadvantage of using allograft is its risk of transmitting disease, however, there have been no report of viral contamination or acquired pathology from the use of DFDBA or FDBA. Freezing the bone allograft can further reduce the risk of contamination to one in eight million.

Delloye et al (2007)[26], Transmission of hepatitis C and human immunodeficiency virus (HIV) have been well documented by transplanting allograft. As a result of the risks associated with disease transmission, allografts are required to undergo extensive sterilisation, typically by irradiation. However, these procedures are reported to diminish the mechanical integrity (Cornu et al, 2000) and osteo inductive properties ***Han et al, (2008)***[27].

Shigeyama et al (1995)[28] found out commercially prepared allografts are reported to contain BMP-2, BMP-4 and BMP-7, at lower concentrations than from fresh bone preparations. Quality of allograft is donor-dependent.Variations in clinical outcome depends upon the processing and handling methods of the allograft ***Calori et al (2011)***[29]

Studies conducted by ***Aspenberg (1988)***[30], Becker (1994) and Forum (2011) using DFDBA showed that DFDBA could not speed up bone formation and showed little new bone formed around DFDBA.

XENOGRAFTS

Xenografts are bone from a different species.

Several short-term studies indicated that the placement of xenografts in alveolar sockets could advocate bone formation and ridge preservation, but may also delay healing.

ALLOPLAST

Alloplasts are synthetic bone graft materials. Common examples are hydroxyapatite, tricalcium phosphate, calcium sulphate and bioactive glass. These graft materials are osteoconductive, which act as a scaffold for new bone formation.

In a study on five beagle dogs by ***Lindhe J et al (2013)***[31], an alloplastic graft (Biphasic Alloplastic Graft (BPCAP); α-TCP (Tri Calcium Phosphate) core coated with nanocrystalline biomimetic hydroxyapatite embedded in porcine collagen was used as graft materials for the extraction socket of the premolar sites. The clinicians documented that the biphasic alloplastic graft did not undergo marked resorption, but allowed new bone formation within the post-extraction site.

In another study, ***Shakibaie (2013)***[32] compared the effectiveness of a synthetic material consisting of hydroxyapatite and silicon dioxide (NanoBone) and the Bio-Oss®. The result showed that the alveolar ridge was better preserved with Bio-Oss than with NanoBone.

Nemcovsky and ***Serfaty et al (1996)***[33] studied the use of hydroxyapatite in fresh extraction sockets in a series of 23 cases and reported to have achieved primary closure by rotating split thickness flaps for a period of 24 months follow up. They showed that there was a predictable ridge preservation with minimal postoperative ridge deformation (1.4 mm vertically and 0.6 mm horizontally). They claimed that this would retain sufficient bone volume to allow implants to be inserted. However, over half the patients experienced some exfoliation of hydroxyapatite suggesting that the flap design was not predictable in maintaining soft tissue closure.

Forum et al (2002)[34] did a comparative study between DFDBA, control socket and bio active glass (bio gran) in fresh extracted socket. All sites were covered by flap advancement and re-entered six to eight months later. The placement of Biogran resulted in 60 per cent bone vitality, a measure of new bone formation, with the control and DFDBA sites showing approximately 33 per cent. This study showed the benefit of synthetic bone graft material.

Guarnieri et al (2004)[35] placed calcium sulphate in 10 extraction sockets without a barrier membrane and re-entered the sites at three months. The graft material had readily resorbed with 100 per cent bone infill and implants were able to be placed at all sites.

One study has looked at the use of bioactive glass and calcium sulphate together. No statistical difference was found between experimental and control groups, casting doubt on the use of these materials in combination.

Another product that was used to graft extraction sockets is BioPlant -HTR (hard tissue replacement). It is a biocompatible microporous composite of methacrylate and calcium hydroxide. ***Haris et al (1998)***[36] reported that after a period of 8 to 12 months there was sufficient hard tissue to place implants.

AUTOLOGOUS PLATELET CONCENTRATES

- Platelet rich plasma
- Platelet rich fibrin
- Concentrated growth factor

According to ***Intini.G (2009)***[37] Platelets contain many growth factors like TGF, FGF, and IGF which are responsible for osteoblast proliferation and bone deposition. These growth factors are protein molecules which signals cell for growth, proliferation, differentiation and act as a key mediator of inflammation. The results of experimental

studies have established that growth factors play an important role in bone formation, fracture healing, tooth regeneration and the repair of other oral and maxillofacial tissues.

This platelet concentrates are autologous blood preparations containing supraphysiological concentration of platelets, which by definition are neither toxic nor immunogenic and are capable of accelerating the normal processes of bone regeneration. Generally, for bone and tooth regeneration it requires three components like 1. Scaffolds, 2. stem cells, 3. growth factors. This platelet concentrates contain all these three components hence considered as ideal material for bone and tooth regeneration.

Platelet concentrates are prepared by various technique and where used widely in dentistry. The usage of platelet concentrates begins with the introduction of fibrin sealants or "Fibrin glue" by ***Matras in (1970)***[38]. Fibrin sealants are fibrin clots containing meshwork of fibrin with entrapped platelets. Commonly used as topical haemostatic agent, tissue sealer, and mixed with bone graft for filling bony defect. The risk of viral transmission and inability to resist physical stress are the main drawbacks of fibrin glue. In order to overcome these limitations platelet concentrates are developed.

Marx et al (1998)[39] introduced **PLATELET RICH PLASMA(PRP),** which is considered to be first generation platelet concentrates produced by two stage centrifugation process and use of bovine thrombin.

This was followed by **PLATELET RICH FIBRIN (PRF**) developed in France by Choukran et al (2001)[40]. This second-generation platelet concentrate eliminates the risk associated with the use of bovine thrombin. It is prepared from venous blood without

any anticoagulant and centrifuged. It does not have immunogenic properties because of being used in same individual from whom taken.

Newer additive to the second-generation platelet concentrates is Concentrated Growth Factors. **Sacco introduced CGF (CONCENTRATED GROWTH FACTORS) in (2006)[41]. This is third generation platelet concentrate.** A special centrifugation machine called Medifuge (Italy), is used to prepare CGF, similar to PRF, but with a different centrifugation speed ranging from 2400 to 2700 rpm which allows the separation of a fibrin matrix which is much denser, larger and richer in growth factors. This newer platelet concentrates considered to be better than PRF and contains autologous osteo-inductive platelet growth factors. It acts as osteoconductive fibrin matrix. It is found to be used in various clinical situations.

Morachini et al (2015)[42] in his study about the effect of autologous platelet concentrates for alveolar socket preservation showed an enhanced socket healing with less dimensional change in alveolar bone.

Jing qiao et al (2016)[43] conducted a study, in which CGFs were used in the periodontal intra bony defects which showed that the addition of CGFs improved the clinical effectiveness.

Swati Das et al (2016)[44] compared the effectiveness of PRF with beta tricalcium phosphate. This study results showed that significantly greater decrease in socket depth and buccolingual width in beta tricalcium phosphate treated sockets than PRF treated sockets.

Mandeep et al (2018)[45] showed in his study that PRF accelerated socket wound healing by bone fill and reduced resorption in both horizontal and vertical dimension enhancing the maintenance of the height and width of the alveolar bone.

Materials and Methods

MATERIALS & METHODS

SOURCE OF DATA:

A study population of 30 subjects were selected from the outpatient section of Department of Periodontology, Tamil Nadu Government Dental College & Hospital, Chennai, Tamil Nadu, India.

INCLUSION CRITERIA:

1. Age between 20 and 50 years
2. Systemically healthy patients.
3. Patients who have not undergone any type of regenerative periodontal therapy over a period of 1 year prior to the initial examination.
4. Patients without any antibiotic treatment in last six months.
5. Patients who has the ability to perform adequate oral hygiene.
6. Patient who received instruction on the purpose of the clinical study and gave his /her consent.

EXCLUSION CRITERIA:

1. Subjects who have received periodontal flap / regenerative therapy within the past 1 year
2. Pregnant and lactating patients.
3. smokers and Alcoholics.
4. Patients who demonstrate poor oral hygiene maintenance.
5. Patient who has received radiation therapy.
6. Systemic illness known to affect the outcomes of periodontal therapy; such as diabetes mellitus, cardio vascular diseases, immuno-compromised (e.g. HIV individuals, under radiotherapy), patients taking medications such as corticosteroids, calcium channel blocker or bisphosphonates which are known to interfere with the outcome.
7. Patients with any known allergy to drugs
8. Patient who has acute infections.

STUDY DESIGN

Ethical clearances were obtained from the Institution Ethical Committee and the ethical principles were followed throughout the study. Random selection of the Subjects for the study was done who are fulfilling inclusion criteria, with no discrimination on the basis of sex, caste, religion or socioeconomic status as long as they are ready to follow oral hygiene instruction and other pre-operative and postoperative instructions. The risk and advantage of the surgical procedure explained and written informed consent was obtained from all the subjects selected for the study. Complete dental and medical history was obtained. A total of 30 patients were selected for the study.

STUDY PROTOCOL

1. Institutional ethical committee approval.
2. Obtaining medical history and informed consent.
3. Intra oral examination and periodontal evaluation.
4. Radiographic evaluation (IOPA) of selected edentulous region.
5. Cone beam computed tomography (CBCT) evaluation of the selected edentulous region to determine,
    a. Labio-palatal width of the edentulous area.
    b. Height of edentulous area.
    c. Presence of any pathology
6. Clinical photographs & study models.
7. Phase 1 therapy.
8. Presurgical preparation such as stent preparation.
9. Surgical procedure -atraumatic extraction, placement of concentrated growth factor and suturing the socket.
10. Postoperative care.
11. Clinical re-evaluation at the end of 6 months.
12. CBCT re-evaluation at the end of 6 months.

PARAMETERS

CLINICAL PARAMETERS:

CLINICAL EVALUATION BY BOLEY'S GAUGE WITH STENT:

Boley gauge is a device used for perfectly measuring length, width, and thickness of tooth in millimetre increments. The metric scale on the gauge can be used for determining exact dimensions of tooth and edentulous space.

RADIOGRAPHIC PARAMETERS:

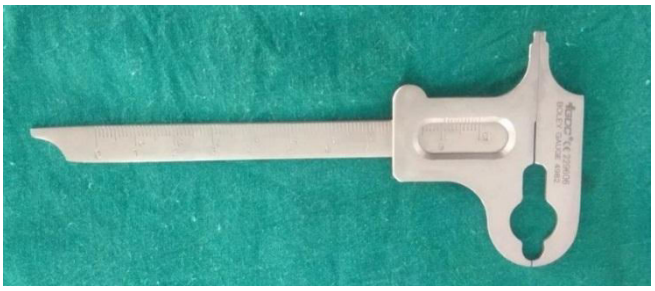
- ❖ CBCT evaluation of socket width at baseline and after 6 months.
- ❖ CBCT evaluation of socket height at baseline and after 6 months.

CLINICAL EVALUATION SOCKET WIDTH

Clinical evaluation of socket width was recorded, immediately after extraction (Day 0) and at the end of 6months, by using Boley's gauge and prefabricated custom-made acrylic stent.

Stent Preparation

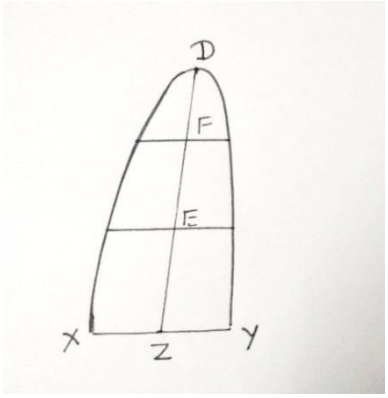
Reference stent was made by selfcure clear acrylic resin from the study model. This stent was extended from alveolar mucosa over of the corresponding edentulous region to the occlusal and palatal surfaces of the teeth adjacent to edentulous space on both mesial and distal sides. Reference holes were made on both labial &palatal side of flange, to guide the placement of the Boley's gauge in the same plane and direction during measurements, to avoid any variation. The measurements of ridge width were made using a Boley's gauge.



CBCT evaluation of labio palatal ridge width:

Care stream 9300 CBCT System was set at 120 kV, 70 mA with tube focal spot of 0.7 mm and the CBCT scan was done with the patient in erect position and the sectioning of the region of interest was done using CS 3D Imaging Software 3.3.9.0

Reference points were marked by the following criteria:



In sagittal section,

POINT X-most cervical point of cemento enamel junction (CEJ) on surface adjacent to edentulous region on the mesial tooth was marked (eg.pt x).

PONT Y -most cervical point of cemento enamel junction (CEJ) on surface adjacent to edentulous region on the distal tooth (eg.pt Y).

In axial view, a reference

POINT Z - line was drawn by joining point X & point Y. Exactly the midpoint was marked on the reference line (eg. point Z) and used as reference point.

POINT D – tangential line drawn from point Z to the height of the socket

POINT E - Point E marked 5 mm from the point Z on the tangential line.

POINT F - Point F marked 10 mm from the point Z on the tangential line.

Pre-operative values:

A sagittal section of the edentulous region was obtained from the CBCT. The sagittal slice/plane was positioned and selected in such a way that it coincides with the

reference point, which marked the axial view. A tangential line was drawn to the ridge from the reference point. On the tangential line certain points were marked (eg. point D, point E & point F) at a particular distance from the reference point- point Z. Distance between points (point Z & D) might vary from patient to patient. Points E & F were marked 5 mm and 10 mm from the point Z. Labio palatal width of the alveolar ridge were measured horizontally in relation to the point Z, point E & point F and considered as crest level, 5 mm from crest level and 10 mm from crest level values respectively.

Measuring postoperative values:

The postoperative values are calculated after a period of 6 months, The post-operative labio-palatal width of the selected region was measured.

For Clinical Examination:

- Mouth mirror
- Williams Periodontal probe
- Kidney tray
- Cotton roll
- Sterilized disposable gloves, head cap, facemask
- IOPA film with radiographic grid

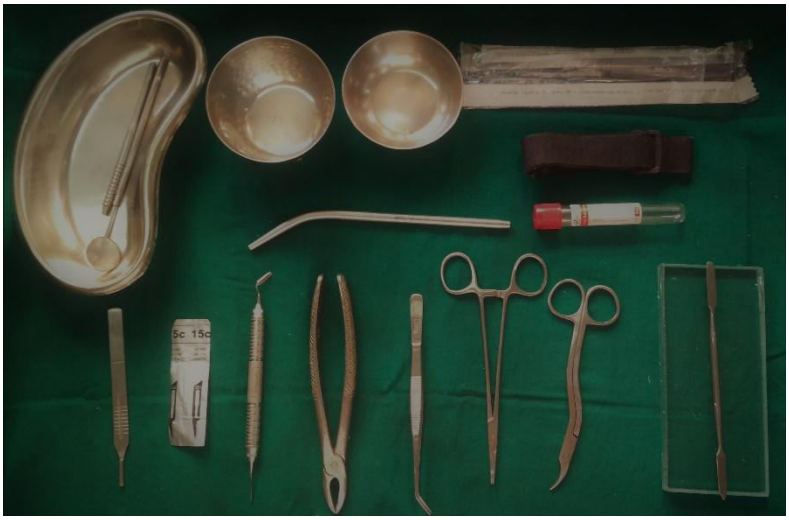
For Phase I therapy:

- Mouth mirror
- Williams Periodontal probe
- Kidney tray
- Ultrasonic scaler
- Cotton rolls
- Sterilized disposable gloves, head cap, face-mask
- Disposable syringes
- Local anaesthetic solution (2% lignocaine hydrochloride with adrenaline 1:80000)

For Phase II Therapy

- Mouth mirror
- Williams Periodontal probe
- Disposable syringes
- Local anaesthetic solution (2% lignocaine hydrochloride with adrenaline 1:80000) Surgical blades
- Curettes and scalers
- Periosteal elevators
- Periotome
- Extraction forceps
- Scissors
- Needle holders
- Suture material 3-0 black silk braided
- Normal saline
- Gauze
- Medifuge machine
- Cement spatula and Glass slab
- Noneugenol periodontal dressing

ARMAMENTARIUM



CGF MACHINE -(MEDIFUGE)

SURGICAL PROCEDURE

Following screening, consent was obtained from the patient for the planned treatment. The patient was advised to start preoperative antibiotics (Cap.Amoxycillin 500 mg three times a day, 1 day before surgery) and Tab. Ibuprufen 400mg 1 hour before surgery.

All patients were instructed to use 2% Chlorhexidine mouth rinse before surgery. After adequate local anaesthesia (2% lignocaine with epinephrine, 1:200,000), an intra crevicular incision made around the involved tooth. Atraumatic extraction of the compromised tooth done carefully to avoid damage to the surrounding alveolar bone. Periotome is used to release the periodontal ligament. Once the tooth removed, the socket is carefully debrided with curette and irrigated with saline.

CONCENTRATED GROWTH FACTOR PREPARATION

Disinfection of the skin in the anterior cubital fossa region using povidone iodine done in the area, from where intra venous blood withdrawn using a vacutainer tube.

Anterior cubital vein is most commonly preferred.10ml blood drawn for concentrated growth factor preparation which was placed in CGF machine. This is pre programmed with the following characteristics: acceleration for 30 seconds, followed by 2 minutes centrifugation at 2,700 rpm, 4 minutes at 2,400 rpm, 4 minutes at 2,700 rpm, 3 minutes at 3,000 rpm at a force of 692 gm, 547 gm, 592 gm and 855 gm respectively and finally 36 seconds deceleration and stopped . At the end of the process, four blood fractions are identified: (1) the superior phase, representing the liquid phase of plasma named platelet poor plasma (PPP), (2) the interim phase or fibrin buffy coat phase, (3) the liquid phase and (4) lower red phase.

PLACING CGF

Fibrin layer of the concentrated growth factor kept inside the socket and suturing done by primary closure. Periodontal dressing applied.

POST-SURGICAL CARE

Post-operative instruction for patient:

- After the end of surgical procedure, patients were instructed to take the prescribed antibiotics and analgesics within 30 minutes.
- Patients were advised to avoid tooth brushing in the surgical site and advised to use the opposite side while chewing.
- Patients were instructed to use 0.2% chlorhexidine mouth wash twice a day for 2 weeks.
- Patients were advised to avoid chewing hard food materials till the removal of the periodontal dressing.
- Patients were advised to report for removal of the periodontal dressing and suture 14 days after the surgery.

Photographs

Figure 1. ARMAMENTARIUM

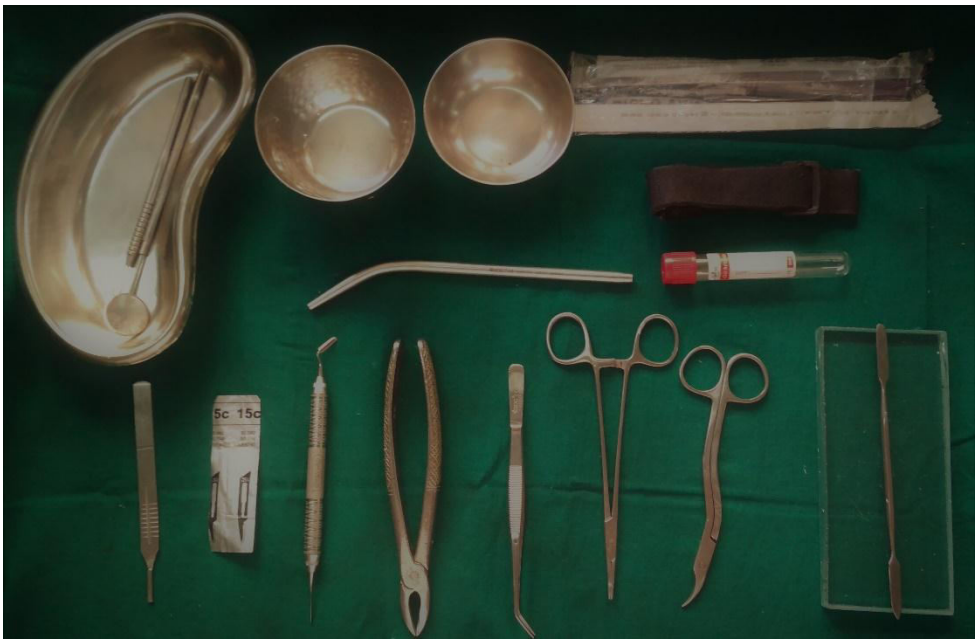


Figure 2. BOLEYS GAUGE

Figure 3. CGF MACHINE (MEDIFUGE)

Figure 2. PREOPERATIVE

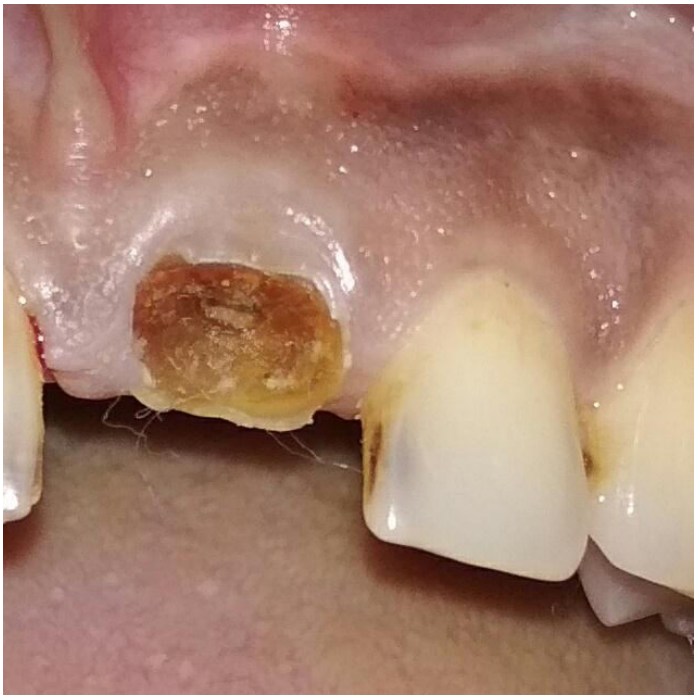


Figure 5. INTRA-OPERATIVE

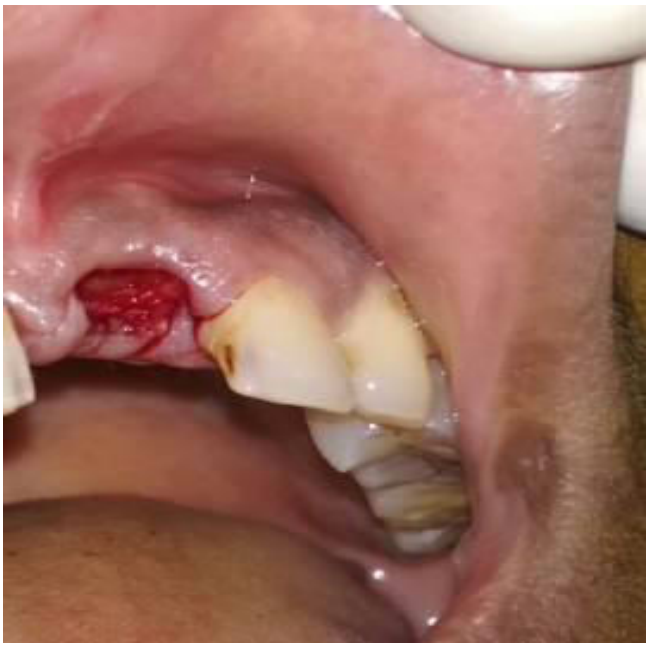


Figure 6. EXTRACTED ROOT STUMP

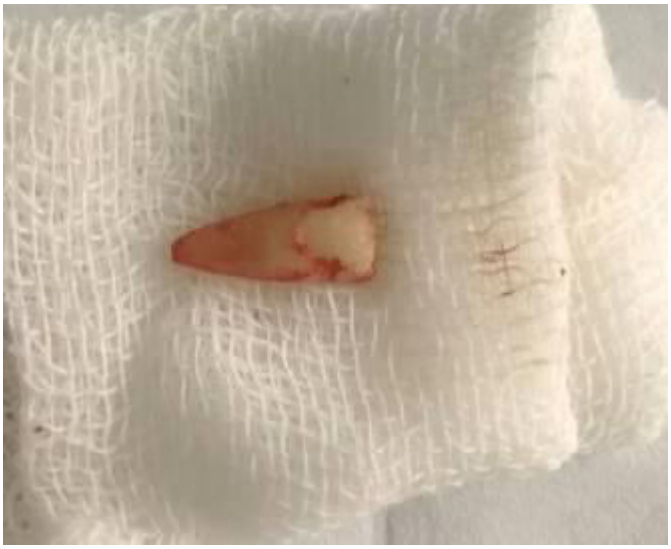


Figure 7. PREPARED CGF

Figure 8. SUTURING

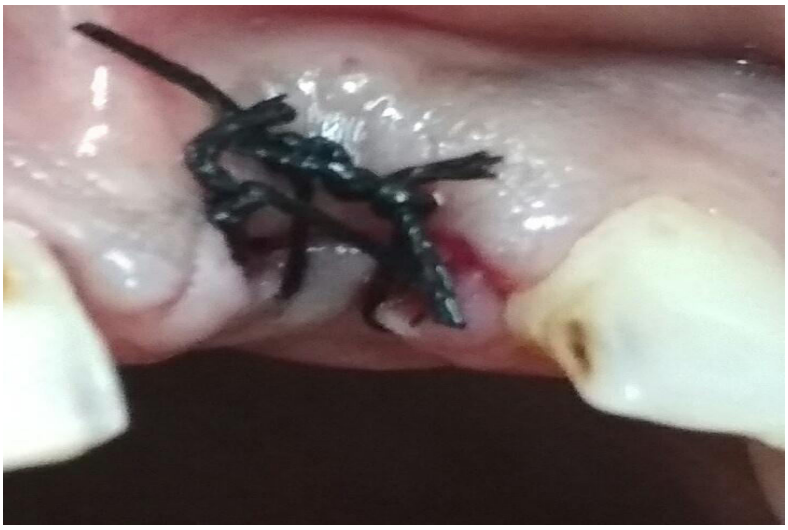


Figure 9. BOLEYS GAUGE MEASUREMENT

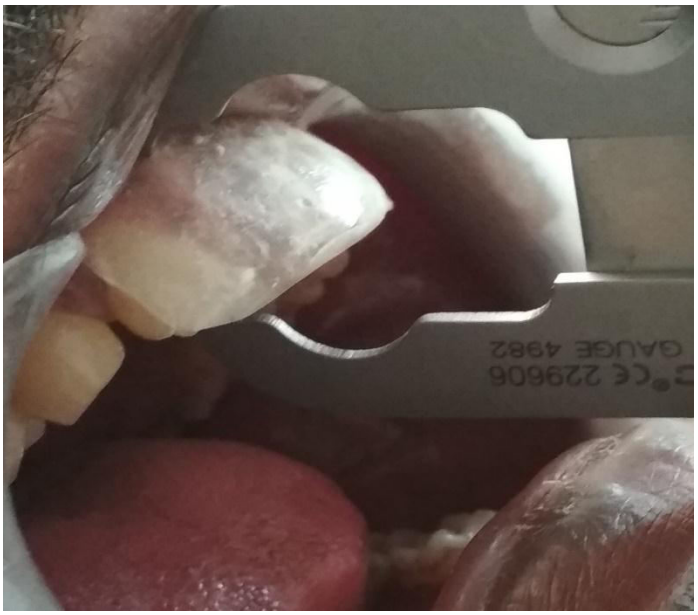


Figure 10. POST -OPERATIVE

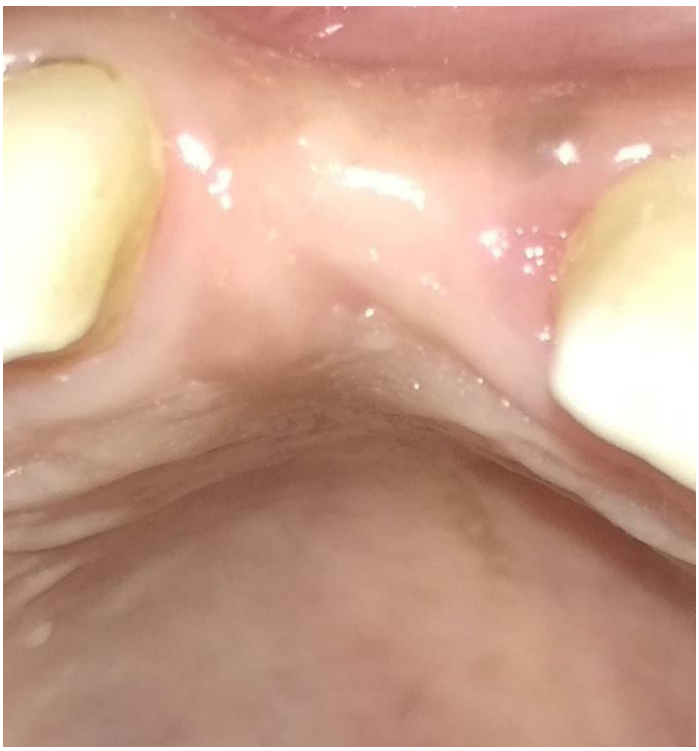


Figure 11. CBCT (PREOPERATIVE)

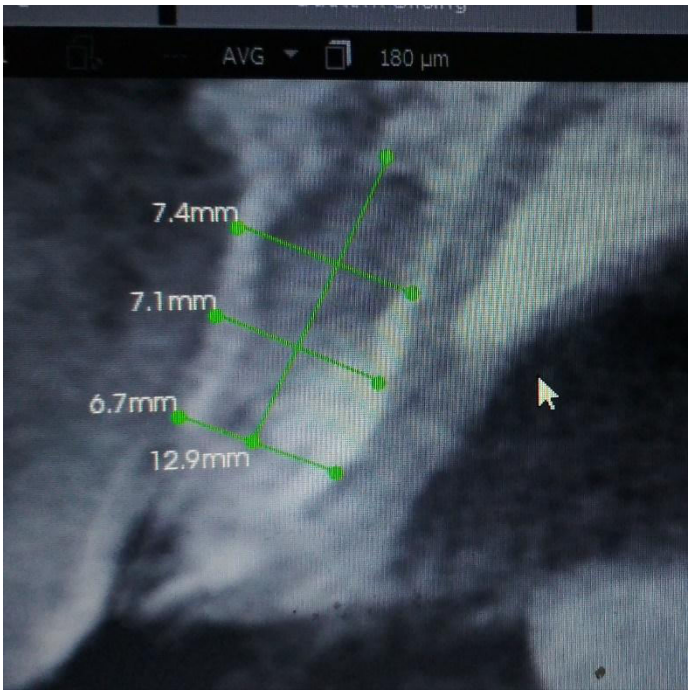
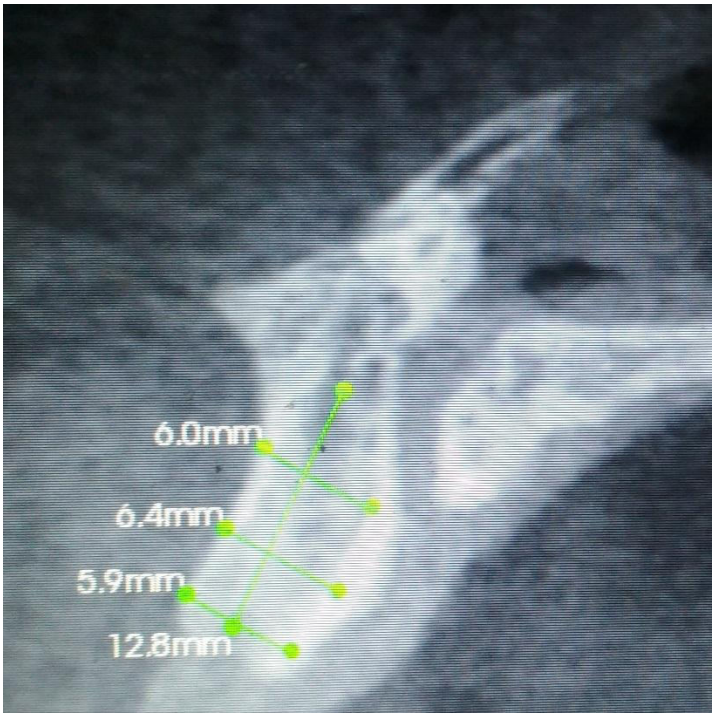


Figure 12. CBCT (POST OPERATIVE)



Statistical Analysis

STATISTICAL ANALYSIS

The statistical analysis has been done using the software computer program SPSS version 16 (IBM CORP, CHICAGO, IL, USA). Data analysis was performed using the patient as the experimental unit. For all parameters, the mean values per subject and per visit were calculated. The changes over time of these variables were examined by means of paired T test. Descriptive data are presented as mean ± SD and range values.

Statistical Tests used:

1. Paired T tests were performed to compare the preoperative and postoperative values of all the variables.
2. P Value of <0.05 was considered as being statistically significant.

Results

RESULTS

The present study was carried out with the aim of clinical and radiological evaluation of ridge preservation after atraumatic extraction using concentrated growth factor. All the patients participated in the study were recalled for maintenance visits in the interval of 1month,3months and 6months. A total of 30 patients indicated for extraction were selected for this study. Final results and statistical analysis was done for a total of 30 sites.

Atraumatic extraction was carried out in the selected 30 sites and concentrated growth factor obtained from patient blood by the MEDIFUGE machine and then fibrin layer of CONCENTRATED GROWTH FACTOR was placed into the socket. Healing period was satisfactory without any infections. After 6 months both clinical and radiological evaluation done. Statistical results given as mean ± SD values by the following tables and bar diagrams.

CLINICAL PARAMETER

The ridge width was assessed using a custom-made acrylic stent and Boley's gauge. Preoperatively, the soft tissue mean ridge width was 9.41± .82mm. The ridge width at the end of 6 months was 7.93±0.19mm.

The mean difference in the soft tissue ridge width between pre-operative and post-operative analysis is 1.48±0.2mm. It was found to be statistically significant with a p value of $p=0.000$ ($p < 0.05$).

RADIOLOGICAL PARAMETER

CHANGES IN RADIOGRAPHIC (CBCT) SOCKET WIDTH

For more accurate assessment of alveolar ridge width, CBCT was used preoperatively and post operatively for evaluation.

In this study, the mean ridge width was assessed at different height from the crest level, as the purpose of this study was to evaluate the amount of the extracted socket preserved (ridge) following minimally traumatic extraction and concentrated growth factor placement.

Hence the mean ridge width was assessed at crest level, 5mm from the crest level and 10mm from the crest level.

Preoperative assessment **at the baseline** was done. It showed that the mean ridge width of

- 6.95± 0.39mm at the crest level,
- 7.88 ±0.91mm at 5mm from the crest level and
- 6.74± 0.38 mm at 10mm from the crest level.

Postoperative assessment was done **at the end of 6 months**, which showed a mean ridge width of

- 5.14± 0.65mm at the crest level,
- 6.60± 0.99 mm at 5mm from the crest level and
- 5.65± 0.31mm at 10mm from the crest level.

The mean difference of preoperative and postoperative width at crest was 1.89±0.29 which found to be statistically significant with a p value of $p=0.000(p<0.05)$.

The mean difference of preoperative and postoperative width at 5mm from crest was 1.28±0.08 which was found to be statistically significant with a p value of $p=0.000(p<0.05)$.

The mean difference of preoperative and postoperative width at 10mm from crest was 1.09±0.07 which was found to be statistically significant with a p value of $p=0.000(p<0.05)$.

The mean difference of alveolar socket width between the preoperative and 6months post operative evaluation at the crest level, 5 mm from the crest level and 10 mm from crest level were statistically significant with a significance value ($p < 0.05$).

CHANGES IN RADIOGRAPHIC (CBCT) SOCKET HEIGHT

Preoperative CBCT assessment was done **at baseline which** showed a mean height of 13.76 ± 1.17mm.

Postoperative assessment was done **at the end of 6 months** which showed a mean height of 12.34± 1.13mm.

The mean difference of preoperative and postoperative height was 1.42± 0.04 found to be statistically significant with a p value of $p=0.003 (p<0.05)$.

MASTER CHART - I

PARAMETERS AT BASELINE

NO	AGE/ SEX	TOOTH NO	BL WIDTH AT CREST {mm}	BL WIDTH AT 5mm	BL WIDTH AT 10mm	APICO CORONAL HEIGHT {mm}	CLINICAL BUCCO LINGUAL WIDTH {mm}
1	34/M	21	7	8	6.7	15.5	10
2	33/M	22	7.3	8.2	7.1	14.5	9.2
3	43/F	11	6.8	7.3	6.8	11.5	9.3
4	40/F	21	7.2	7	6.9	14.5	9.4
5	27/M	14	6.9	7.2	6.5	14.6	8.9
6	29/M	11	6.9	9.7	6.6	14.	11.1
7	26/F	21	6.7	7.1	7.4	12.9	9.1
8	22/M	22	7.6	8.8	7.1	13.9	10.1
9	42/M	11	6.9	8.2	6.4	13.2	9.2
10	20/M	11	6.3	6.7	6.1	12.8	8.2
11	50/F	22	6.8	8.2	6.9	15.5	9.8
12	45/F	23	7.2	8.1	6.5	4.4	9.5
13	42/M	11	6.5	7.2	5.8	11.5	9.7
14	38/F	12	7.1	6.9	5.9	13.5	9.3
15	34/M	24	6.3	7.7	6.8	14.6	8.8
16	28/F	11	6.4	9.5	6.7	14.3	10.1
17	26/F	21	6.2	7.3	7.2	12.9	9.2
18	21/M	22	7.5	8.5	7.1	12.8	9.8
19	25/F	24	5.9	8.4	5.9	13.9	8.3
20	24/F	14	5.3	6.6	6.3	14.2	10.2
21	47/F	22	6.2	8.1	6.5	13.5	11.1
22	43/F	22	6.7	7.2	6.8	12.5	10.8
23	49/F	21	7.1	6.6	5.9	13.5	8.5
24	42/M	22	6.5	7.3	5.6	13.2	9.4
25	37/F	21	7.5	8.5	6.7	12.9	10.4
26	34/M	22	6.3	6.9	7.1	13.8	8.2
27	25/M	11	7.8	8.4	6.9	4.5	9.8
28	36/F	21	7.3	8.2	5.9	13.5	8.3
29	32/F	11	7.1	6.8	6.1	12.5	11.1
30	29/M	12	6.9	7.2	7.2	11.8	9.8

MASTER CHART - II

PARAMETERS AT 6 MONTHS

NO	AGE/ SEX	TOOTH NO	BL WIDTH AT CREST {mm}	BL WIDTH AT 5MM	BL WIDTH AT 10MM	APICO CORONAL HEIGHT {mm}	CLINICAL BL WIDTH {mm}
1	34/M	21	4.5	6.5	5.7	13.5	8.5
2	33/M	22	6.8	6.7	6.2	12.9	7.7
3	43/F	11	4.8	5.8	5.6	9.8	7.8
4	40/F	21	4.9	6.2	5.7	12.9	7.5
5	27/M	14	4.7	6.3	5.5	13.1	7.4
6	29/M	11	4.9	8.8	5.6	12.3	8.6
7	26/F	21	4.9	5.6	5.1	12.8	7.6
8	22/M	22	5.6	7.3	5.8	13.4	8.8
9	42/M	11	5.2	7.2	5.2	11.2	8.4
10	20/M	11	5.1	5.5	5.2	11.9	7.8
11	50/F	22	4.6	6.7	5.6	14.5	8.3
12	45/F	23	6.7	6.4	6.1	13.3	8.1
13	42/M	11	4.9	6.8	5.5	10.4	8.2
14	38/F	12	5.1	5.9	4.7	12.1	7.8
15	34/M	24	4.8	6.1	5.5	13.3	7.3
16	28/F	11	4.8	5.9	5.6	12.2	8.5
17	26/F	21	4.6	8.7	6.8	11.5	7.7
18	21/M	22	5.7	6.5	6.9	10.5	8.3
19	25/F	24	5.5	7.1	4.5	12.5	6.8
20	24/F	14	5.5	6.9	6.2	12.2	8.5
21	47/F	22	4.7	5.4	6.4	12.4	9.5
22	43/F	22	5.9	6.8	5.8	11.1	9.3
23	49/F	21	4.8	6.3	6.1	11.3	7
24	42/M	22	5.3	5.8	5.5	11.1	8.1
25	37/F	21	4.7	5.9	6.3	10.5	9.2
26	34/M	22	5.2	6.1	7.2	11.5	6.9
27	25/M	11	5.6	5.8	6.5	13.5	8.3
28	36/F	21	5.2	8.6	5.8	12.2	6.9
29	32/F	11	4.8	6.4	5.9	11.5	10.8
30	29/M	12	5.3	5.9	5.6	10.8	9.7

Table 1
Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
BUCCOLINGUAL WIDTH AT CREST - BASELINE	30	6.3	7.6	6.950	.1147	.3629
BUCCOLINGUAL WIDTH AT CREST - AFTER 6 MONTHS	30	4.5	6.8	5.140	.2072	.6552
BUCCOLINGUAL WIDTH AT 5 - BASELINE	30	6.7	9.7	7.880	.2886	.9126
BUCCOLINGUAL WIDTH AT 5 - AFTER 6 MONTHS	30	5.5	8.8	6.600	.3152	.9967
BUCCOLINGUAL WIDTH AT 10 - BASELINE	30	6.0	7.4	6.740	.1222	.3864
BUCCOLINGUAL WIDTH AT 10 - AFTER 6 MONTHS	30	5.2	6.2	5.650	.0992	.3136
APICOCORONAL HEIGHT - BASELINE	30	11.5	15.5	13.760	.3712	1.1740
APICOCORONAL HEIGHT - AFTER 6 MONTHS	30	9.8	13.5	12.340	.3581	1.1325
SOFT TISSUE WIDTH - BASELINE	30	8.2	11.1	9.410	.2532	.8006
SOFT TISSUE WIDTH - AFTER 6 MONTHS	30	7.0	8.8	7.930	.1904	.6019

Table 2

PAIRED T TEST TO COMPARE CLINICAL BUCCOLINGUAL WIDTH – AT BASELINE AND - AFTER 6 MONTHS

	PAIRED DIFFERENCES					
GROUPS	**MEAN**	**SD**	**95% CONFIDENCE INTERVAL**		**T VALUE**	**P VALUE**
			LOWER	**UPPER**		
Labiopalatal width – baseline vs Labiopalatal width - after 6 months	7.17	1.4	6.49	7.84	22.16	0.000*

Table 3

PAIRED T TEST TO COMPARE BUCCOLINGUAL WIDTH AT CREST – BASELINE AND BUCCOLINGUAL WIDTH AT CREST - AFTER 6 MONTHS

	PAIRED DIFFERENCES					
GROUPS	**MEAN**	**SD**	**95% CONFIDENCE INTERVAL**		**T VALUE**	**P VALUE**
			LOWER	**UPPER**		
Buccolingual width at crest – baseline vs Buccolingual width at crest - after 6 months	4.54	1.5	3.82	5.26	13.27	0.000*

Table 4

PAIRED T TEST TO COMPARE BUCCOLINGUAL WIDTH AT 5 – BASELINE AND BUCCOLINGUAL WIDTH AT 5 - AFTER 6 MONTHS

	PAIRED DIFFERENCES					
GROUPS	**MEAN**	**SD**	**95% CONFIDENCE INTERVAL**		**T VALUE**	**P VALUE**
			LOWER	**UPPER**		
Buccolingual width at 5 – baseline vs Buccolingual width at 5 - after 6 months	5.74	1.4	5.04	6.43	17.17	0.000*

Table 5

PAIRED T TEST TO COMPARE BUCCOLINGUAL WIDTH AT 10 – BASELINE AND BUCCOLINGUAL WIDTH AT 10 - AFTER 6 MONTHS

	PAIRED DIFFERENCES					
GROUPS	**MEAN**	**SD**	**95% CONFIDENCE INTERVAL**		**T VALUE**	**P VALUE**
			LOWER	**UPPER**		
Buccolingual width at 10 – baseline vs Buccolingual width at 10 - after 6 months	4.69	1.1	4.16	5.22	18.65	0.000*

Table 6

PAIRED T TEST TO COMPARE APICOCORONAL HEIGHT – BASELINE AND APICOCORONAL HEIGHT - AFTER 6 MONTHS

	PAIRED DIFFERENCES					
GROUPS	**MEAN**	**SD**	**95% CONFIDENCE INTERVAL**		**T VALUE**	**P VALUE**
			LOWER	**UPPER**		
Apico coronal height – baseline vs Apicocoronal height - after 6 months	11.55	1.7	10.76	12.33	30.86	0.000*

Figure – 1

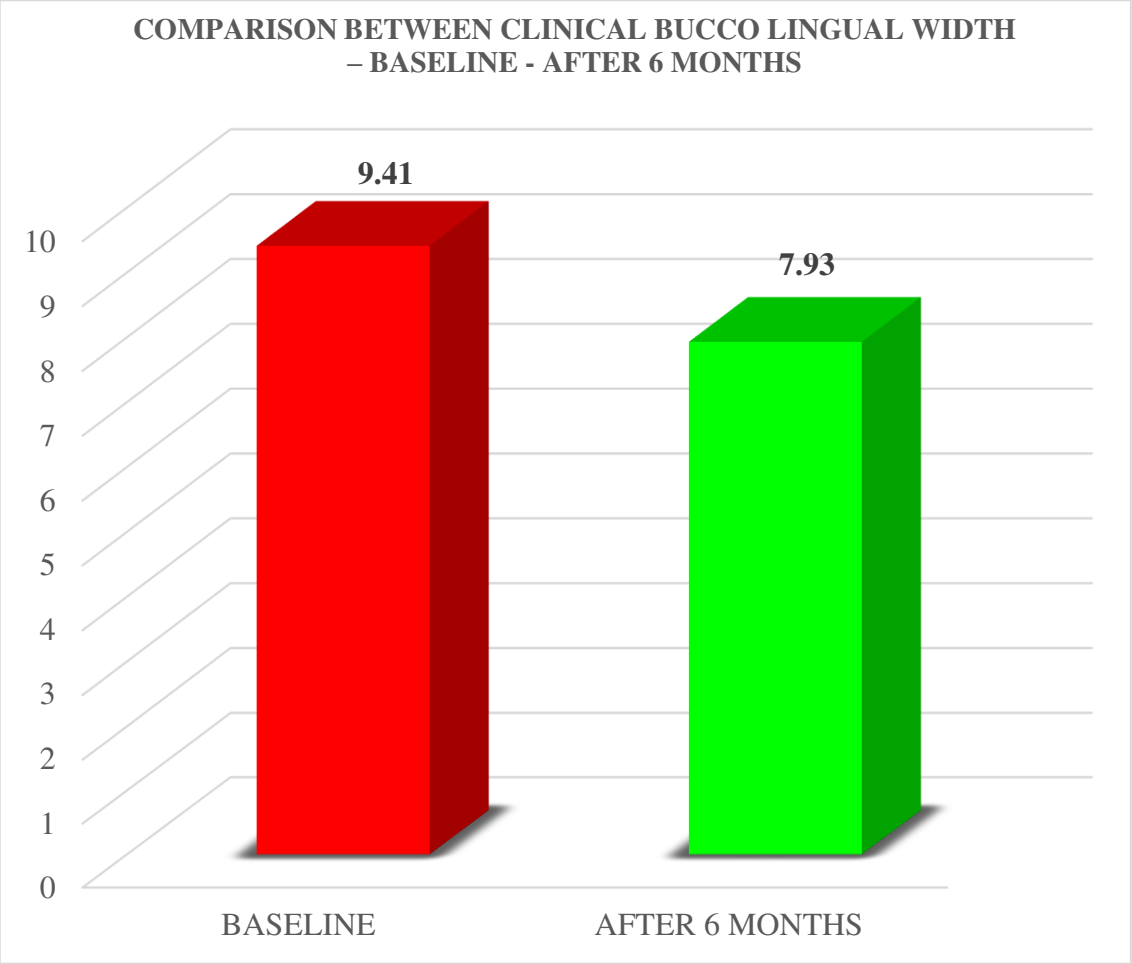

COMPARISON BETWEEN CLINICAL BUCCO LINGUAL WIDTH – BASELINE - AFTER 6 MONTHS
9.41
7.93
10
9
8
7
6
5
4
3
2
1
0
BASELINE
AFTER 6 MONTHS

Figure – 2

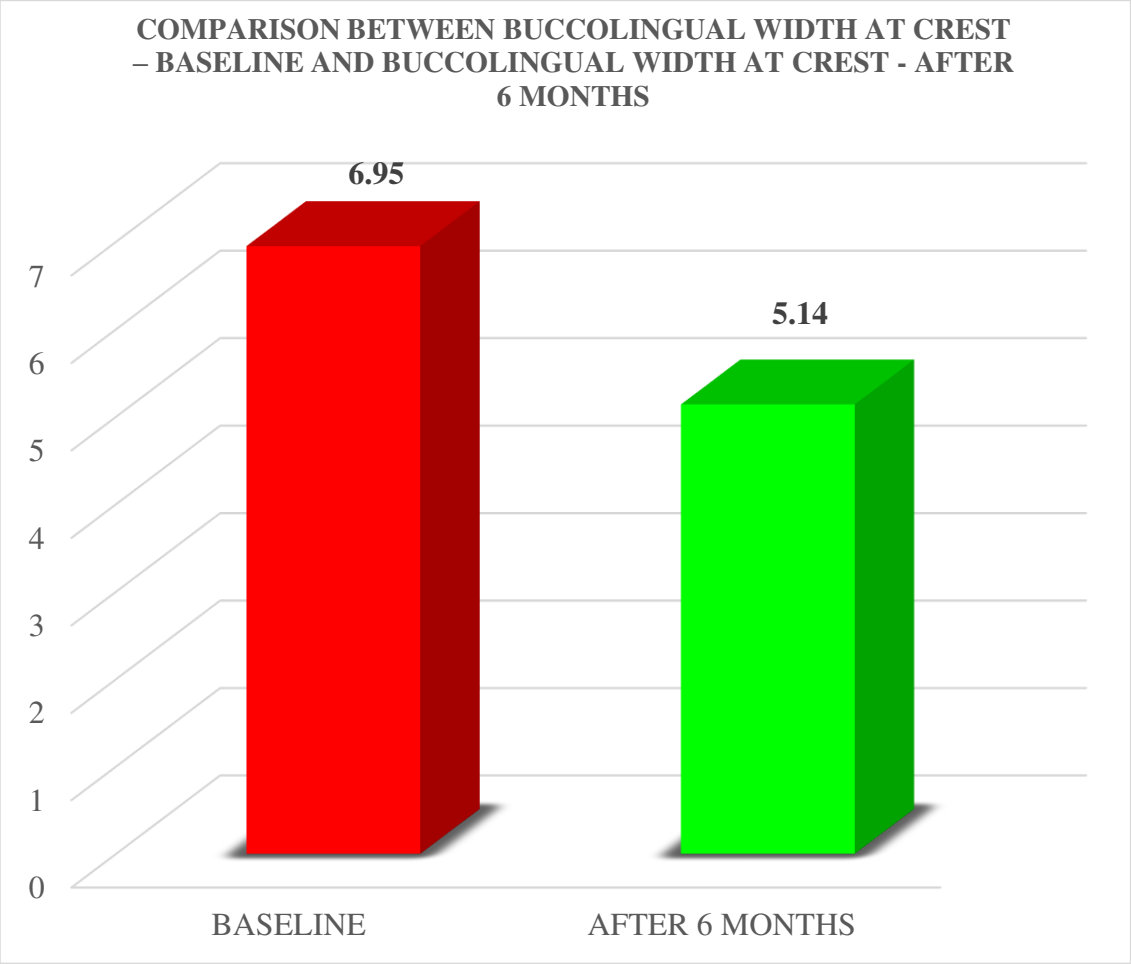

COMPARISON BETWEEN BUCCOLINGUAL WIDTH AT CREST – BASELINE AND BUCCOLINGUAL WIDTH AT CREST - AFTER 6 MONTHS
6.95
5.14
7
6
5
4
3
2
1
0
BASELINE
AFTER 6 MONTHS

Figure – 3

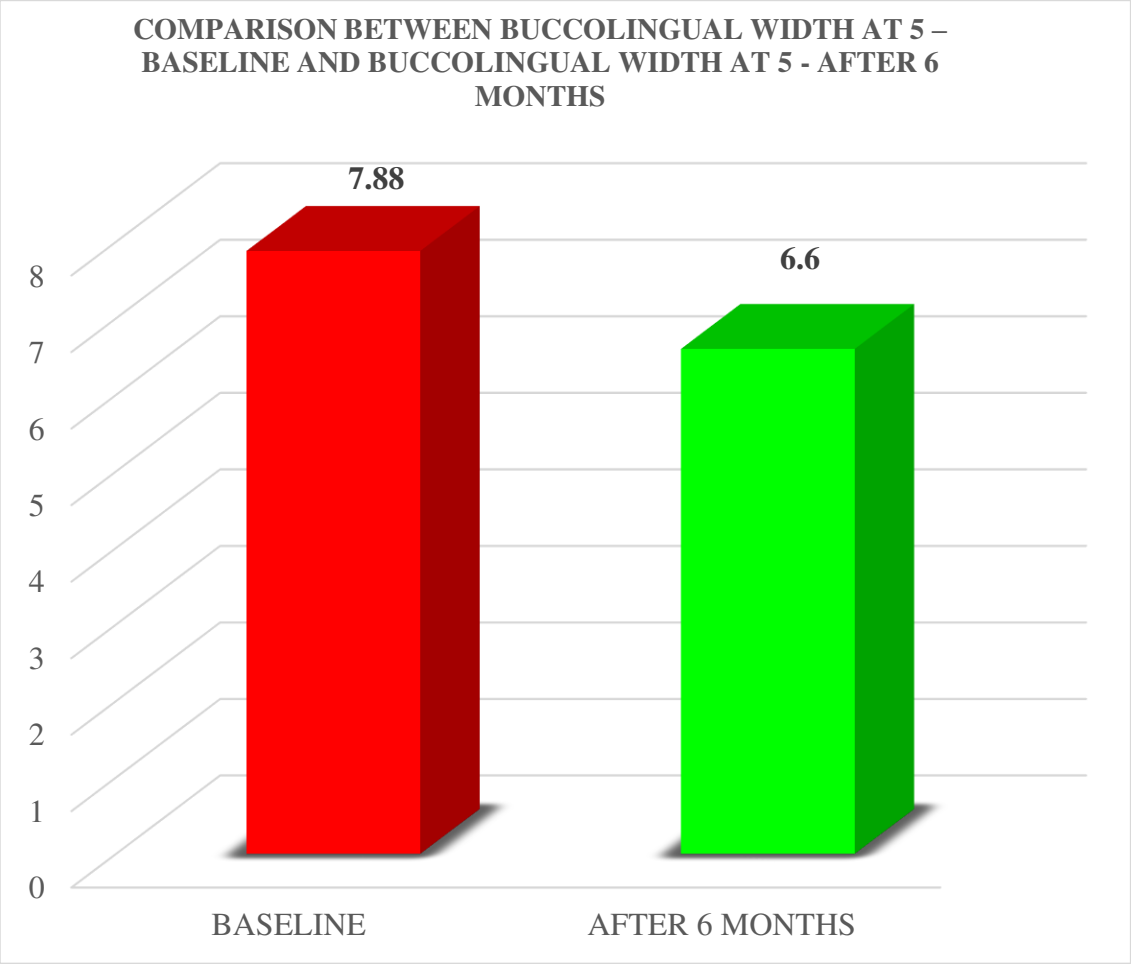

COMPARISON BETWEEN BUCCOLINGUAL WIDTH AT 5 – BASELINE AND BUCCOLINGUAL WIDTH AT 5 - AFTER 6 MONTHS
7.88
6.6
8
7
6
5
4
3
2
1
0
BASELINE
AFTER 6 MONTHS

Figure - 4

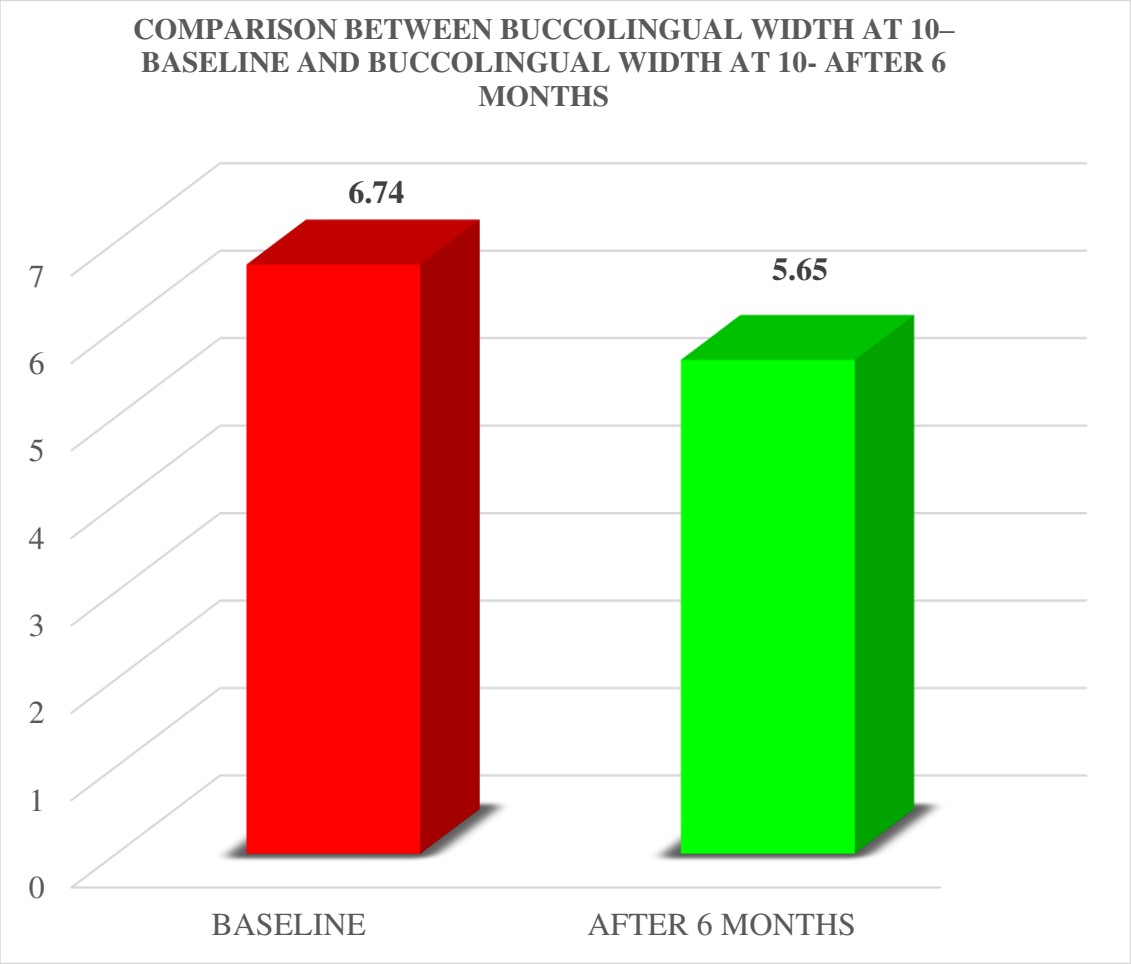

COMPARISON BETWEEN BUCCOLINGUAL WIDTH AT 10– BASELINE AND BUCCOLINGUAL WIDTH AT 10- AFTER 6 MONTHS
6.74
5.65
7
6
5
4
3
2
1
0
BASELINE
AFTER 6 MONTHS

Figure – 5

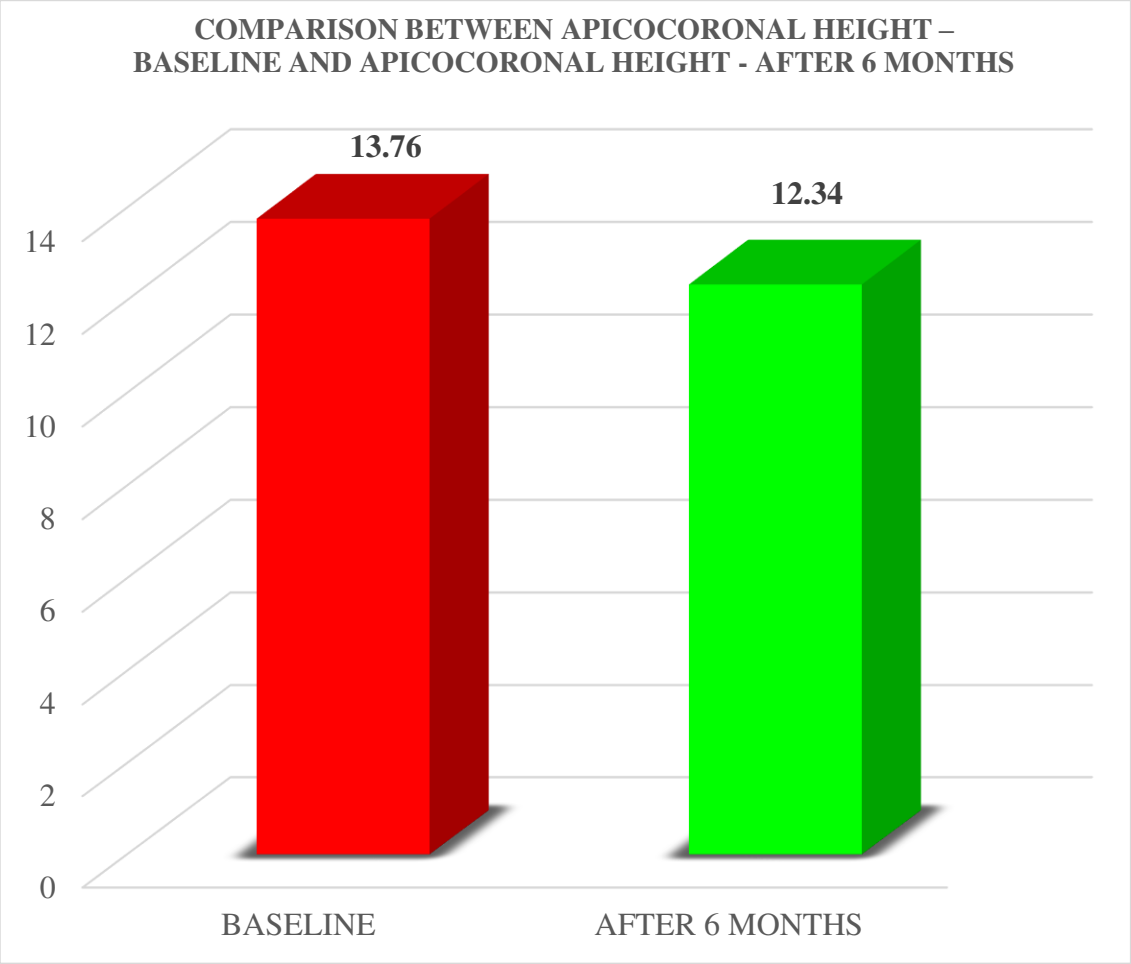
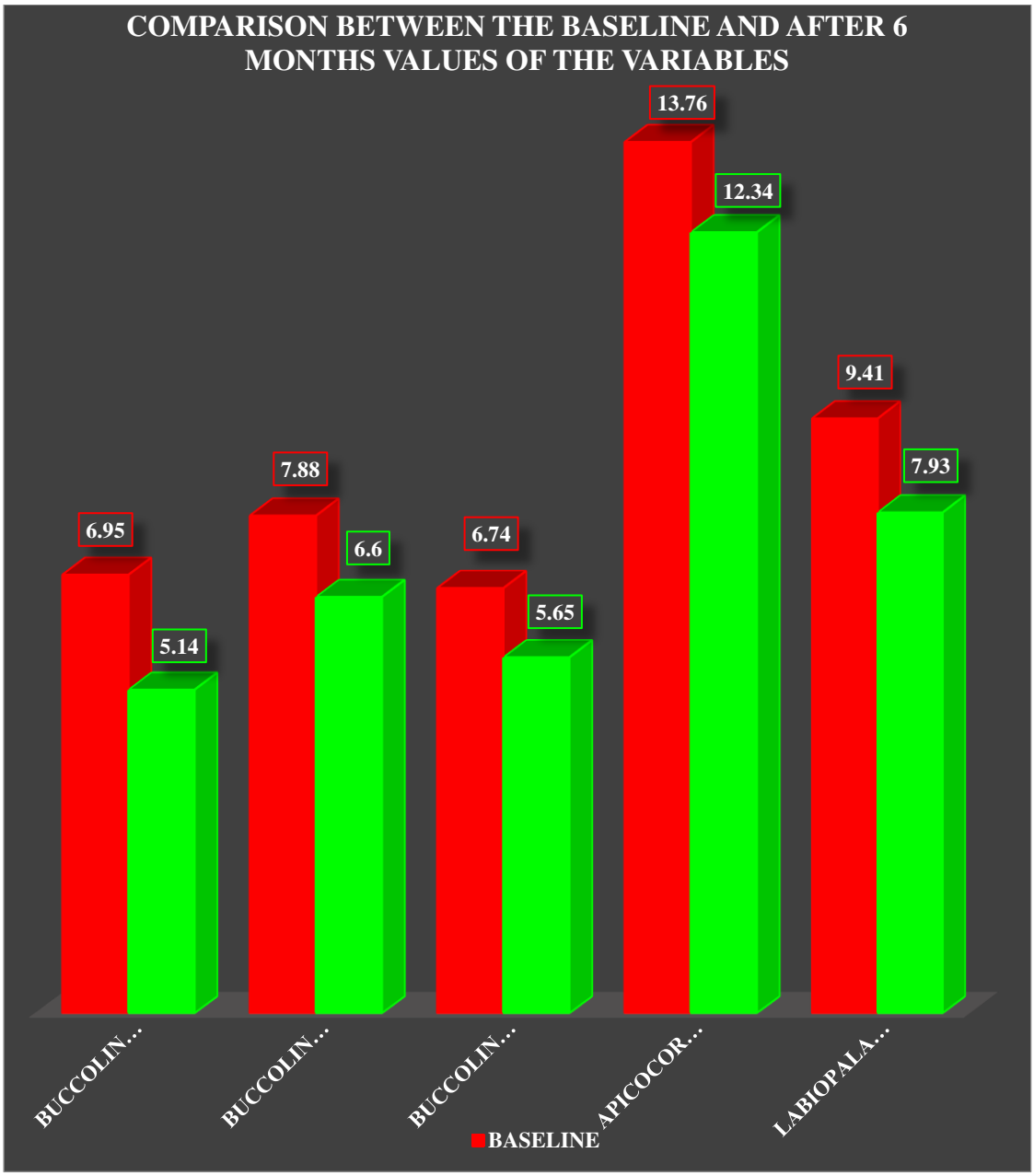

COMPARISON BETWEEN APICOCORONAL HEIGHT – BASELINE AND APICOCORONAL HEIGHT - AFTER 6 MONTHS
13.76
12.34
14
12
10
8
6
4
2
0
BASELINE
AFTER 6 MONTHS

Figure – 6


COMPARISON BETWEEN THE BASELINE AND AFTER 6 MONTHS VALUES OF THE VARIABLES
6.95
5.14
7.88
6.6
6.74
5.65
13.76
12.34
9.41
7.93
BUCCOLIN…
BUCCOLIN…
BUCCOLIN…
APICOCOR…
LABIOPALA…
BASELINE

Discussion

DISCUSSION

Bone is a complex and constantly changing tissue that is self-repairing and adapts to new loads. The healthy natural tooth stimulates the alveolar bone, thus maintaining its volume and density. The extraction of teeth is followed by three-dimensional bone resorption which is lifelong, irreversible, chronic and cumulative. Progressive atrophy following tooth loss ultimately results in to thin, knife edge or total loss of alveolus down to basal bone.

Socket preservation or alveolar ridge preservation is the technique to reduce bone loss after tooth extraction. After extraction the jaw bone has the tendency to become narrow, and lose its original shape and this is because of the quick resorption which results in 30-60% loss in bone volume within the first 6 months.

Dimensional changes in the alveolar bone occurs due to various underlying factors. One among them is traumatic extraction. In day to day practice extractions are being performed without the aim of maintaining alveolar ridge dimensions.

Extraction of grossly decayed teeth and fractured teeth need to be extracted which results in dimensional change in alveolar ridge which in turn complicate the rehabilitation procedures such as removable or fixed partial dentures and implant supported prosthesis. Healing pattern also may pose a problem in fabrication of suitable prosthetic rehabilitation framework.

However it is imperative and advisable to preserve the alveolar ridge dimension both horizontally and vertically by advocating atraumatic extraction. This should be followed by ridge preservation techniques. Several studies have been conducted to evaluate the effectiveness of various graft materials in the preservation of the extraction socket and subsequent dimensional changes.

Multiple bone graft procedure and studies have been evaluated for socket grafting at the time of extraction. Various bone graft materials such as autograft, allograft, xenograft, resorbable barrier membrane, acellular dermal matrix, and collagen sponge mixed with bone graft materials were used. Autogenous graft has the highest osteogenic potential as well as osteoconductive and osteo-inductive potential. But creating secondary surgical site might decrease the compliance of the patient due to discomfort and time consumption. This is the biggest disadvantage in collecting autogenous bone graft.

To overcome these encountered difficulties, **AUTOLOGOUS PLATELET CONCENTRATES** were introduced such as platelet rich plasma, platelet rich fibrin, and concentrated growth factor. These autologous platelet concentrates were derived from fibrin glue which is the precursor.

Autologous platelet concentrates were first used in Oral and Maxillo Facial Surgery by ***Marx and colleagues in (1998)***[39].

Autologous platelet concentrates contain all growth factors such as platelet derived growth factor, vascular endothelial growth factor, fibroblastic growth factor and insulin like growth factor which are involved in recruitment of differentiated cells from undifferentiated mesenchymal stem cells of periodontal ligament and bone marrow. These growth factors facilitate cell proliferation and maturation, involved in regeneration by establishing specific signalling events.

This present study was conducted to evaluate the effectiveness of concentrated growth factor in ridge preservation after atraumatic tooth extraction 30 sites were treated with minimum atraumatic extraction by Periotome followed by placement of concentrated growth factor into the socket. Healing period was satisfactory without any graft rejection or infection.

Clinical analysis was done by using boley's gauze both at baseline and 6 months post operatively.

Cone Beam Computed Tomography (CBCT) was taken on the day of extraction immediately after placing CGF into the socket. 3-dimensional picture was taken by CBCT was measured in both horizontal and vertical dimension. At the end of 6months CBCT analysis was done.

In this present study, clinical analysis of the ridge width reduced from 9.41±0.82mm at the baseline to 7.93±0.19mm at the end of 6months. The horizontal dimensions of the ridge decreased by 1.48±0.2mm.

Radiographically The mean difference of preoperative and postoperative **width at crest** was 1.89±0.29 which found to be statistically significant with a p value of $p=0.000(p<0.05)$.

The mean difference of preoperative and postoperative **width at 5mm** from crest was 1.28±0.08 which was found to be statistically significant with a p value of $p=0.000(p<0.05)$.

The mean difference of preoperative and postoperative **width at 10mm** from crest was 1.09±0.07 which was found to be statistically significant with a p value of $p=0.000(p<0.05)$.

Radiographically, the **height of the socket** was assessed at baseline which showed a mean height of 13.76±1.17mm. The height of the socket was assessed postoperatively at the end of 6months which showed a mean height of 12.34±1.13mm. The vertical dimension or the height of the socket decreased by 1.42±0.04mm which is statistically significant.

The result of the present study is similar to the result obtained by ***Romano et al (2009)***[46].

They studied about the clinical and histologic healing of human extraction sockets filled with calcium sulphate. In their study they showed that the socket height was reduced by 0.7 - 1.5mm. The reduction of height in present study is 1.42±0.04mm which is similar with study done by ***Romano et al.***

Vander Weijden (2009)[47], in his systematic review about alveolar bone dimensional changes of extraction socket in human studies which showed that there is greater horizontal width reduction than vertical. He concluded that there is a width reduction of 3.87mm and height loss of 1.67mm. Whereas the present study proved that there is lesser horizontal width reduction around 1.09 mm to 1.89mm and almost similar height reduction around 1.42mm.

The result of present study was similar to the result obtained by ***Mardas et al (2010)***[48]. He showed that buccolingual dimension of alveolar ridge decreased by 1.1±1mm in the synthetic bone substitute group and by 2.1±1mm in the bovine derived xenograft group.

The present study showed that the effectiveness of concentrated growth factor in maintaining the horizontal and vertical dimension of the alveolar socket is similar to the effects of secondary soft tissue in maintaining the dimensions of the alveolar socket.

Barone et al (2012)[49], in his study compared the tissue changes in extraction sockets of humans between spontaneous healing and ridge preservation with secondary soft tissue healing. Results showed that, there is a vertical dimension reduction by 1.02±0.7mm and in horizontal dimension reduction is by 3.6±0.72mm in control group.

In test group 1.6±0.55mm has been reduced in vertical dimension and 1.8±0.5mm in horizontal direction.

The present study showed that the effectiveness of concentrated growth factor in maintaining the horizontal and vertical dimension of the alveolar socket is similar to the effects of secondary soft tissue in maintaining the dimensions of the alveolar socket.

The results of the present study is correlated with the study done by ***Gholam Ali et al (2011)***[50], who compared xenograft with synthetic bone. The reduction in horizontal dimension with xenograft was from 7.75±1.55mm to 6.6±1.85mm and the reduction in horizontal dimension with synthetic bone graft was from 7.36±1.94mm to 6.43±2.08mm.

Suttaprayasri et al (2013)[51], evaluated the horizontal changes in the alveolar socket with second generation platelet concentrate- PRF. Evaluation done after 8 weeks and measured the horizontal dimensional changes using the cast. The results showed that there is less dimensional change in PRF group than in control group.

The results obtained by the present study is correlated with the study done by ***Morachini et al (2015)***[42]. In his systematic review about the effects of Autologous Platelet Concentrates on alveolar socket preservation revealed that horizontal dimensional changes are greater than vertical dimensional changes. Bone loss in vertical height is greater in control group than test group.

The results obtained in this study were in accordance with study done by ***Swati Das et al (2016)***[44], who compared the socket preservation by beta-tri-calcium phosphate and collagen (group-2) with PRF-Platelet Rich Fibrin (group-1) which is a clinico-radiographic study. Authors revealed that clinically greater socket depth reduction occurred in group 2 compared with group 1. Radiographically the mean

difference in socket height and width was higher in group 1. The mean density also higher in group 1 when compared to group 2.

From the above discussed studies, it is clear that the effectiveness of concentrated growth factor in preserving alveolar ridge dimensions of the extracted socket shows predictable results in both vertical and horizontal dimensions. This autologous platelet concentrates avoids the secondary creation of surgical site thereby enhancing the patient compliance. Because of its antigenicity, graft rejection will be minimized due to absence of hypersensitivity reactions. Cost effectiveness also shows considerable importance.

Summary and Conclusion

SUMMARY AND CONCLUSION

Extraction of teeth leads to rapid decrease in residual bone width. Grafting the socket improves the prognosis to maintain the width and height of the remaining bone. To conclude from the present study, although so many techniques and materials are available for ridge preservation procedures, autologous platelet concentrates like **concentrated growth factor** shows effective hard tissue and soft tissue wound healing post operatively. It has of comparable significant value in preserving alveolar socket in both horizontal dimension and vertical dimension for future rehabilitation prosthesis, thus enhancing the quality of life.

A total of 30 sites were taken for this study. After obtaining institutional ethical committee approval Atraumatic extraction was performed with periotome and subsequent placement of concentrated growth factor was done both clinical and radiological analysis done at baseline and after 6 months post operatively.

Following conclusions were drawn from the study,

The mean difference in the soft tissue ridge width between preoperative and postoperative analysis were statistically significant.

The mean difference in the hard tissue width between preoperative and postoperative analysis were statistically significant.

The mean difference in height of the socket between preoperative and postoperative analysis were statically significant.

From this present study of evaluating the effectiveness of concentrated growth factor in alveolar ridge preservation after atraumatic extraction, it is clearly evident that

the contour changes in alveolar bone was minimum on using CONCENTRATED GROWTH FACTOR which is autologous, non-immunogenic, and cost effective.

Bibliography

BIBLIOGRAPHY

[1]. Rothemel D, Schwartz F, Herten M,chiriac G.et al. Dimensional ridge alteration following tooth extraction An experimental study in dog. Mind kiefer Gesichchir.2007;11(2): 89-97.

[2]. Ohgli,A.A.Steveling.H. Ridge preservation following tooth extraction ;a comparison between atraumatic extraction and socket seal surgery. quintesssanse international.2010; 41;605-609.

[3]. Yalcin S,Aktas I,Emes Y et al. A technique for atraumatic extraction before immediate implant placement using implant drills.Implant dent 2009: 18(6): 464-472.

[4]. Borzini and Marzzuco [2005]. Tissue regeneration and in loco administration of platelet derivatives : clinical outcome, heterogenous products, and heterogenecity of the effector mechanisms. TRANSFUSION2005;45:1759-1767.

[5]. Amler MH, Johnson PL, Salman I. Histological and histochemical investigation of human alveolar socket healing in undisturbed extraction wounds. J Am Dent Assoc 1960;61:31–34.

[6]. Pietrokovski J, Massler M. Alveolar ridge resorption following tooth extraction. J Prosthet Dent. 1967; 17(1): 21-7.

[7]. Schropp L, Wenzel A, Kostopoulos L, Karring T. Bone healing changes and soft tissue contour changes following single-tooth extraction: a clinical and radiographic 12-month prospective study. Int J Periodontics Restorative Dent 2003;23:313–323.

[8]. Schropp L, Wenzel A, Kostopoulos L, Karring T. Bone healing changes and soft tissue contour changes following single-tooth extraction: a clinical and radiographic 12-month prospective study. Int J Periodontics Restorative Dent 2003;23:313–323.

[9]. Lam RV. Contour changes of the alveolar processes following extractions. J Prosthet Dent. 1960; 10(1): 25-32.

[10]. Araujo MG, Lindhe J. Dimensional ridge alterations following tooth extraction. An experimental study in the dog. J Clin Periodontol 2005;32:212–218.

[11]. Lekovic V, Kenney EB, Weinlaender M, et al. A bone regenerative approach to alveolar ridge maintenance following tooth extraction. Report of 10 cases. J Periodontol 1997;68:563–570.

[12]. Lekovic V, Camargo PM, Klokkevold P, et al. Preservation of alveolar bone in extraction sockets using bioabsorbable membranes. J Periodontol 1998; 69:1044–1049.

[13]. I Darby, S Chen, R De Poi Ridge preservation: what is it and when should it be considered Australian Dental Journal 2008; 53: 11–21.

[14]. Atwood DA, Coy WA. Clinical, cephalometric and densitometric study of reduction of residual ridges. J Prosthet Dent 1971;26:280–295.

[15]. Tan WL, Wong TL, Wong MC, Lang NP. A systematic review of post-extractional alveolar hard and soft tissue dimensional changes in humans. Clin Oral Implants Res. 2012; 23 Suppl 5: 1-21.

[16]. Artzi Z, Tal H, Dayan D. Porous bovine bone mineral in healing of human extraction sockets. Part 1: Histomorphometric evaluations at 9 months. J Periodontol 2000 (2016); 71:1015-1023.

[17]. Bartee BK. Extraction site reconstruction for alveolar ridge preservation. Membrane-assisted surgical technique. J Oral Implantology 2001;27:194-97.

[18]. Misch CE, Dietsh F. Bone-grafting materials in implant dentistry. Implant Dent 1993; 2: 158-67.

[19]. Evian CI, Rosenberg ES, Coslet JG, et al. The osteogenic activity of bone removed from healing extraction sockets in humans. J Periodontol. 1982; 53: 81-5.

[20]. Rose L MB, Genco R, Cohen W. Periodontics: Medicine, Surgery, and Implants: Elsevier Mosby 2004.

[21]. Barboza E, Caula A, Machado F. Potential of recombinant human bone morphogenetic protein-2 in bone regeneration. Implant Dent 1999; 8: 360-7.

[22]. Becker W, Caffesse R. A comparison of demineralized freeze-dried bone and autologous bone to induce bone formation in human extraction sockets. J Periodontol 1994;65:1128–1133.

[23]. Clementini M., Morlupi A., Agrestini C., Ottria L (2011). Success Rate of Dental Implants Inserted in Autologous Bone Graft Regenerated Areas: A Systematic Review. Oral Implantol, 4(3-4).

[24]. Araujo MG, Lindhe J. Ridge preservation with the use of Bio-Oss collagen: A 6-month study in the dog. Clin Oral Implants Res. 2009; 20(5): 433-40

[25]. Buck BE, Resnick L, Shah SM, Malinin TI. Human immunodeficiency virus cultured from bone. Implications for transplantation. Clin Orthop Relat Res. 1990(251): 249-53.

[26]. Delloye C., Cornu O., Druez V., Barbier O. (2007). Bone allografts: What they can offer and what they cannot. J Bone Joint Surg Br, 89(5), pp. 574-579.

[27]. Han B., Yang Z., Nimni M. (2008). Effects of gamma irradiation on osteoinduction associated with demineralized bone matrix. J Orthop Res, 26(1), pp. 75-82.

[28]. Shigeyama Y., D'Errico J.A., Stone R., Somerman M.J. (1995). Commercially-prepared allograft material has biological activity in vitro. J Periodontol, 66, pp. 478-487.

[29]. Calori G.M., Mazza E., Colombo M., Ripamonti C. (2011). The use of bone-graft substitutes in large bone defects: any specific needs? Injury, 42(S2), pp. 56-63.

[30]. Aspenberg P, Kalebo P, Albrektsson T. Rapid bone healing delayed by bone matrix implantation. Int J Oral Maxillofac Implants 1988;3:123–127.

[31]. Lindhe J, Araujo MG, Bufler M, Liljenberg B. Biphasic alloplastic graft used to preserve the dimension of the edentulous ridge: an experimental study in the dog. Clin Oral Implants Res. 2013; 24(10): 1158-63.

[32]. Shakibaie MB. Comparison of the effectiveness of two different bone substitute materials for socket preservation after tooth extraction: a controlled clinical study. Int J Periodontics Restorative Dent. 2013; 33(2): 223-8.

[33]. Nemcovsky CE, Serfaty V. Alveolar ridge preservation following extraction of maxillary teeth. Report on 23 consecutive cases. J Periodontol 1996;67:390–395.

[34]. Froum S, Cho S-C, Rosenberg E, Rohrer M, Tarnow D. Histological comparison of healing extraction sockets implanted with bioactive glass or demineralised freeze-dried bone allograft: a pilot study. J Periodontol 2002;73:94–102.

[35]. Guarnieri R, Pecora G, Fini M, et al. Medical grade calcium sulfate hemihydrate in healing of human extraction sockets: clinical and histological observations at 3 months. J Periodontol 2004;75:902–908.

[36]. Haris AG, Szabo G, Ashman A, Divinyi T, Suba Z, Martonffy K. Five-year 224-patient prospective histological study of the clinical applications using a synthetic bone alloplast. Implant Dentistry 1998;7:287–299.

[37]. Intini G. The use of platelet-rich plasma in bone reconstruction therapy. Biomaterials 2009; 30:4956–4966.

[38]. Matras H. Effect of various fibrin preparations on reimplantations in the rat skin Osterr Z Stomatol. 1970; 67:338–359.

[39]. Marx RE, Carlson ER, Eichstaedt RM, Schimmele SR, Strauss JE, Georgeff KR. Platelet-rich plasma: Growth factor enhancement for bone grafts. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1998;85:638–646.

[40]. Sunitha Raja V, Munirathnam Naidu E. Platelet Rich Fibrin: evolution of a second generation platelet concentrate. Indian J Dent Res. 2008; 19:42–46.

[41]. Sacco L. Lecture at international academy of implant prosthesis and osteoconnection. Lecture. 2006; 12:4.

[42]. V. Moraschini, E.S.P. Barboza: Effect of autologous platelet concentrates for alveolar socket preservation: a systematic review.Int.J.Oral Maxillofac Surgery.2015;44:632-641.

[43]. Jing Qiao, Na, An effect of Concentrated Growth Factors on function and Wnt3a expression of human periodontal ligament cells *in vitro*, Platelets, 2016, 28(3): 281-286.

[44]. Swati Das, R Jhingran, V.K.Bains, R. Madan, Socket preservation by beta-tri-calcium phosphate with collagen compared to platelet rich fibrin: A clinic- radiographic study, Europian journal of dentistry, 10(2), 264,2016.

[45]. Mandeep Sharma, Praveen Akhtar Lone, Rohit Singh, Abdul Waheed and Vinay Patil, Effects of autologous platelet rich fibrin in bone regeneration in post extraction mandibular sockets, Intl. journal of Applied Dental Sciences, 2018; 4(3);309-313.

[46]. Romanos. E, Sergio Alexandre Gerhke, Gerardo Gomez- Moreno, Jose Eduardo Mate Sanchez de Val, Joes Luis Calvo- Guirado, Biological effects of compressive forces exerted on particulate bone grafts during socket preservation: animal study. Clinical oral implants research 29(7), 792-801, 2018.

[47]. Vander Weijden F, Dell aqua Slot DE: Alveolar bone dimensional changes in post extraction sockets in humans. A systemic review.J Clin periodontology 2009; 36; 1048-1058.

[48]. Mardas, Vivek Chandha, Nikolaos Donos: Alveolar ridge preservation with guided bone regeneration and a synthetic bone substitute or a bovine- derived xenograft: a randomized, controlled clinical trial. Clin .Oral Impl. Res. 2I, 2010;668-698.

[49]. Barone, A., Aldini, N.N., Fini, M., Giardino, R.Calvo Guirado, J.L. & Covani, U. (2008) Xenograft versus extraction alone for ridge preservation after tooth removal: a clinical and histomorphometric study. Journal of Periodontology 79: 1370–1377.

[50]. Gholam Ali Gholami Babak Najafi Fatemeh Mashhadiabbas Werner Goetz. Clinical, histologic and histomorphometric evaluation of socket preservation using a synthetic nanocrystalline hydroxyapatite in comparison with a bovine xenograft: a randomized clinical trial. Clinical Oral Implant Research; 2011, 1-7.

[51]. Suttapreyasri S Lee pong N: influence of platelet rich fibrin on alveolar ridge preservation. Journal of craniofacial surgery 2013; 24:1088-1094.

Annexures

ANNEXURE 1

PARTICIPANT INFORMATION SHEET

TITLE OF THE STUDY:

Clinical and radiological evaluation of "ridge preservation after tooth extraction by using platelet rich fibrin with hydroxy apatite and concentrated growth factor with hydroxy apatite" - a comparative study.

NAME OF THE RESEARCH INSTITUTION:

Tamil Nadu Government Dental College and Hospital, Chennai.

PURPOSE OF THE STUDY:

The purpose of this study is to preserve alveolar ridge resorption after tooth extraction.

PROCEDURE:

Case history, Intra Oral examination X rays will be taken. About two table spoon of blood will be drawn from your hand. Extraction will be done under Local anaesthesia. Growth factor from your own blood will be kept inside the socket .0 will be called after 3 to 6 months for evaluate bone regeneration.

RISK OF PARTICIPATION:

Pain, swelling can happen during blood sample collection. Radiation exposure during IOPA view radiographs procedure Pain and discomfort due to local anaesthetic effect

BENEFITS OF **PARTICIPATION:**

Patients get extracted the grossly decayed or unrestorable tooth. Ridge will be preserved for future rehabilitation.

CONFIDENTIALITY:

The identity of the patients participating in the research will be kept confidential throughout the study. In the event of any publication and presentation resulting from the research, no personally identifiable information will be shared.

PARTICIPANTS RIGHTS:

Taking part in the study is voluntary. You are free to decide whether to participate in the study or to withdraw at any time. Your decision will not result in any loss of benefits to which you are otherwise entitled.

COMPENSATION: Nil

_____

Signature of the participant Name of the participant

For queries related to study:
xxxxxxxxxxxxxxxxxxxx

For queries related to rights of participant:
xxxxxxxxxxxxxxxxxxxxxx

ANNEXURE 2

ஆராய்ச்சி பற்றிய தகவல் படிவம்

ஆராய்ச்சி நிறுவனத்தின் பெயர்- தமிழ்நாடு அரசு பல் மருத்துவக் கல்லூரி மற்றும் மருத்துவமனை

ஆராய்ச்சியின் தலைப்பு-
பல் எடுத்த பின்பு எலும்பை பாதுகாக்க திறன் மிகுந்த வளர்ச்சிக் காரணி பயன்படுத்தும் மருத்துவ மற்றும் கதிரியக்க ஆய்வு

ஆராய்ச்சியின் நோக்கம்-
பற்குழிவு பாதுகாப்பிற்காக திறன் மிகுந்த வளர்ச்சி காரணி பயன்படுத்து மருத்துவ மற்றும் கதிரியக்க மதிப்பீடுகளை அறுவை சிகிச்சைக்கு முன் மற்றும் மூன்று மற்றும் ஆறு மாதங்களுக்குப் பின் ஆய்வு செய்தல்

செய்முறை-
கீழ்கண்ட ஆய்வகள்/பரிசோதனைகள் உங்களுக்கு செய்யப்படும்-

- வாய் பரிசோதனை- உட்புறம், வெளிப்புறம்
- நோயுற்ற பகுதியின் ஊடுகதிர்படம் எடுக்கப்படும்
- வழக்கமான இரத்தப் பரிசோதனை செய்யப்படும்
- உங்கள் கையிலிருந்த பரிசோதனைக்காக 5 மிலி அளவு (ஒரு மேஜைக் கரண்டி அளவு) இரத்தம் எடுக்கப்படும்.
- சிகிச்சை தேவைப்படும் பல்லின் அளவானது ஆல்ஜினேட் அச்சு கொண்டு எடுக்கப்படும்
- ஒவ்வாமை ஏற்படுகிறதா என்பதை தெரிந்துகொள்ள 0.5 மி.லி 2% லிக்னோகெயின் என்னும் மரத்துப்போக செய்யும் மருந்து உங்களின் கையில் பரிசோதனைக்காக செலுத்தப்படும். பின்பு நோயுற்ற பகுதியில் இம்மருந்து செலுத்தப்படும்
- அல்ட்ரா சோனிக் ஸ்கேலர் மற்றும் கைக்கருவிகள் பயன்படுத்திப ல் மற்றும் பல்லி வேர் சுத்தம் செய்யப்படும். உப்புநீர் கொண்டு நோயுற்ற பகுதி சுத்தம் செய்யப்படும்
- அதிகம் சேதமடைந்து அகற்ற வேண்டிய நிலையில் உள்ள பல் எடுக்கப்பட்டு அந்த பற்குழி தங்களின் திறன் மிகுந்த வளர்ச்சி காரணி கொண்டே பாதுகாக்கப்படும்
- மருத்துவ மற்றும் கதிரியக்க மதிப்பீடு தொடக்க நிலை மற்றும் ஆறு மாதங்களுக்குப் பின் செய்யப்படும்

பங்கேற்பதினால் வரக்கூடிய பக்கவிளைவுகள்-

- ஊடுகதிர் படம் எடுக்கும் பொழுது கதிர்வீச்சினால் பாதிப்பு ஏற்பட வாய்ப்பு உள்ளது
- சிகிச்சைக்குப்பின் வலி ஏற்பட வாய்ப்பு உள்ளது

பக்க விளைவுகள் ஏற்படாமல் தடுக்க உரிய முறைகள் பின்பற்றப்படும்-

- ஊடுகதிர் படம் எடுக்கப்படும் பொழுது உாயி பாதுகாப்பு உபகரணங்கள் பயன்படுத்தப்படும்
- சிறந்த தரம் மற்றும் சுத்தமான கருவிகள் பயன்படுத்தப்படும்

சிகிச்சைக்குப் பின் வலி அல்லது வீக்கம் ஏற்பட்டால் தேவையான மருந்துகளும் மருத்துவமும் வழங்கப்படும்

பங்கேற்பதினால் விளையும் நன்மைகள்-

அதிகம் சேதமடைந்து அகற்ற வேண்டிய நிலையில் உள்ள பல் எடுக்கப்பட்டு அந்த பற்குழி தங்களின் திறன் மிகுந்த வளர்ச்சி காரணி கொண்டே பாதுகாக்கப்படும்

இரகசியகாப்பு-

உங்களை பற்றிய குறிப்புகள் பிறர் அறியாவண்ணம் ஆராய்ச்சி முடியும்வரை இரகசியமாக பாதுகாக்கப்படும் அதை வெளிப்படுத்தும் நேரங்களின் எந்த தனி நபர் அடையாளங்களும் வெளிப்பட வாய்ப்பு கிடையாது.

தன்னார்வ பங்கேற்பு-

இந்த ஆராய்ச்சியில் பங்கு பெறுவது தங்களின் தனிப்பட்ட முடிவு மற்றும் இந்த ஆராய்ச்சியிலிருந்து தாங்கள் எப்பொழுது வேண்டுமானாலும் விலகிக்கொள்ளலாம். தங்களின் இந்த திடீர் முடிவு தங்களுக்கோ அல்லது ஆராய்ச்சியாளருக்கோ எவ்வித பாதிப்பும் ஏற்படுத்தாது என்பதை தெரிவித்துக்கொள்கிறோம்.

.....	.....
நோயாளியின் பெயர்	நோயாளியின் கையொப்பம்

.....

ஆராய்ச்சி தொடர்புடைய தகவல்களுக்கு- xxxxxxxxxxxxxxxxxxxxxxxxxxxx	பங்கேற்பாளரின் உரிமை தொடர்புடைய தகவல்களுக்கு- xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

ANNEXURE 3

INFORMED CONSENT FORM
RIDGE PRESERVATION AFTER TOOTH EXTRACTION BY USING CONCENTRATED GROWTH FACTOR – A CLINICAL EVALUATION

Name: Mr/Mrs……..

Address: …… Sex: Male / Female

…… Age: Years

…….

I, ……. exercising my free power of choice, hereby give my consent to be included as my son or daughter participant in the study.

I agree to the following:

1. I have been informed to my satisfaction about the purpose of the study and study procedures. I agree to co-operate fully for complete examination.
2. I hereby give permission to use my medical records for research purpose.
3. I am told that the investigating doctor and the institution will keep my identity confidential.
4. I understand that I have rights to withdraw from the study and also that the investigator has the rights to exclude me from the research at any point of time.

Name of Participants: Signature / Thumb impression of Investigator

Date: Parent / Guardian

ANNEXURE 4

ஆராய்ச்சி ஒப்புதல் படிவம்

ஆராய்ச்சி தலைப்பு

பல் எடுத்த பின்பு எலும்பை பாதுகாக்க திறன் மிகுந்த வளர்ச்சிக் காரணி பயன்படுத்தும் மருத்துவ மற்றும் கதிரியக்க ஆய்வு

பெயர்- வயது/பால்-

முகவரி- தொலைபேசி-

புறநோயாளி எண்- ஆராய்ச்சி சேர்க்கை எண்-

நான் .....வயது..... என்னுடைய சுய நினைவுடனும் மற்றும் முழு சுதந்திரத்தித்துடனும் இந்த மருத்துவ ஆராய்ச்சியில் என்னை சேர்த்துக்கொள்ள ஒப்புதல் அளிக்கிறேன்.

கீழ்காணப்படும் நிபந்தனைகளுக்கு நான் சம்மதிக்கிறேன்-

நான் இந்த ஆராய்ச்சியின் நோக்கம் மற்றும் செய்முறைகள் பற்றி முழுமையாக தெரிவிக்கப்பட்டுள்ளேன்.

நான் இந்த ஆய்வுக்காக ஈறு அறுவை சிகிச்சை மற்றும் பல் எடுக்கும் சிகிச்சைகளை செய்துகொள்ள வேண்டியதாக அறிகிறேன்.

சிகிச்சையின்போது திறன்மிகுந்த வளர்ச்சி காரணி பயன்படுத்த சம்மதிக்கிறேன்

என் உடல்நலம் பாதிக்கப்பட்டாலோ அல்லது எதிர்பாராத வழக்கத்திற்குமாறான நோய்குறிகள் தென்பட்டாலோ அதற்கு சிகிச்சை பெற்று கொள்வதற்கும் முழு உரிமை உள்ளதாக அறிகிறேன்.

நான் ஏற்கனவே உட்கொண்ட மற்றும் உட்கொள்கின்ற மருந்துகளின் விபரங்களை ஆராய்சியாளரிடம் தெரிவித்துள்ளேன்.

என் மருத்துவ குறிப்பேடுகளை இந்த ஆராய்ச்சியில் பயன்படுத்திக்கொள்ள சம்மதிக்கிறேன்.

இந்த ஆராய்ச்சி மையமும் ஆராய்ச்சியாளரும் என்னுடைய விபரங்கள் அனைத்தையும் இரகசியமாக வைப்பதாக அறிகிறேன்.

.....	.....	.....
நோயாளியின் பெயர்	கையொப்பம்	தேதி
.....	.....	.....
ஆராய்ச்சியாளரின் பெயர்	கையொப்பம்	தேதி

ANNEXURE 5

CLINICAL AND RADIOLOGICAL EVALUATION OF RIDGE PRESERVATION AFTER TOOTH EXTRACTION BY USING CONCENTRATED GROWTH FACTOR

Date:	OP No:	S No:
Name:	Age:	Sex:
Occupation:	Income:	Address:

CHIEF COMPLAINT:

HISTORY OF PRESENTING ILLNESS:

PAST MEDICAL HISTORY:

PAST DENTAL HISTORY:

PERSONAL HISTORY:

Oral hygiene practice:

Habits:

Menstrual History:

Meno pause:

H/O stress factor:

GENERAL EXAMINATION

Extra oral examination

Examination of lymph nodes

INTRA ORAL EXAMINATION

Buccal mucosa:

Vestibule:

Hard palate:

Tonsils :

Tongue :

Floor of the mouth

Teeth :

Decayed

Missed

Filled

INVESTIGATIONS

1.Biochemical / haematological investigation:

2.others:

Blood pressure:

Test dose for L A:

RADIOGRAPHIC EVALUATION: IOPA/OPG/CBCT

PROVISIONAL DIAGNOSIS:

PROGNOSIS:

TREATMENT PLAN:

FITNESS FOR TREATMENT:

TREATMENT DONE:

MAINTENANCE PHASE:

CLINICAL AND RADIOGRAPHICAL PARAMETERS

CLINICAL PARAMETER	**BASELINE**	**AFTER 6 MONTHS**
BUCCO LINGUAL WIDTH		

RADIOLOGICAL PARAMETER	**BASELINE**	**AFTER 6 MONTHS**
BUCCO LINGUAL WIDTH AT CREST		
BUCCO LINGUAL WIDTH AT 5mm		
BUCCO LINGUAL WIDTH AT 10mm		
APICO CORONAL HEIGHT		

SIGNATURE OF PG STUDENT **SIGNATURE OF GUIDE**