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ASSESSMENT OF BONE OSSEOINTEGRATION IN IMMEDIATE IMPLANT USING 3D IMPLANT WITH PLATELET-RICH FIBRIN IN THE UPPER ANTERIOR MAXILLA (Interim and Clinical Study)

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INTRODUCTION:

Anterior tooth loss has a major impact on patient's daily life and satisfaction with their appearance, general performance and eating.

Immediate implant placement may be great in terms of decreased surgical requirements, and total procedure time. It is essential to ensure that any such procedure can be termed safe and predictable in terms of implant survival and aesthetic success.

Indications of Immediate implant placement is most commonly indicated when tooth extraction is due to trauma, endodontic lesion, root fracture or extensive decay, and the bony alveolus are still intact. Contraindications of immediate replacement is active infection, when there is insufficient bone < 3mm beyond the tooth socket apex for initial implant stability when there is a wide and / or long gingival recession **(Saadoun A.,2002).**

Osseointegration is also defined as : "the formation of a direct interface between an implant and bone, without intervening soft tissue". For osseointegrated dental implants, metallic, ceramic, and polymeric materials have been used, in particular titanium. To be termed osseointegration the connection between the bone and the implant does not need to be 100 percent, and the essence of Osseo integration derives more from the stability of the fixation than the degree of contact in histologic terms. In short it represents a process whereby clinically asymptomatic rigid fixation

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of alloplastic materials is achieved, and maintained, in bone during functional loading. When osseointegration occurs, the implant is tightly held in place by the bone **(Zarb,et al.,1991).**

Dental implants offer the most suitable replacement for teeth loss. Moreover, in many cases the procedure proved itself to represent the perfect solution. With times and with the help of the rapid improvement in the dental field, getting a dental implant will grow to be a basic, a very easy, and the best method of treatment.

Aim of study:

The aim of this study is to assess the osseointegration of the bone around 3D implant (TIXos) with and without the aid of the Platelet-Rich Fibrin membrane to enhance healing in immediate dental implantation.

MATERIALS :

Materials and methods:

Study place: Outpatient Clinics of The Department Of Oral And Maxillofacial surgery Department, Cairo university ,Cairo, Egypt.

Eligibility criteria :.

Criteria for patient selection:

Inclusion criteria:

Exclusion criteria:

1)Diagnosis :

All Patients will be diagnosed and selected according to inclusion and exclusion criteria.

1-a)Case history :

Through medical history is obtained from the patient, to be sure that no medical condition may affects the healing process .

1-b) Clinical examination:

1-c) Radiographic examination:

2)Post-operative care:

3)Prosthetic procedure:

Materials :

Tixos implant:

Tixos implant are direct laser metal formed ,screw shaped implants that are available in varying insertions depth (8,10,11.5,13,16) endosteal diameter (3.3,3.75,4.5,5.5).

The implant DLMF is a time saving metal forming procedure in which a high power laser beam is directed on a metal powder bed and programmed to fuse particles according to a CAD file, thus generating a thin metal layer.

The surgical procedure :

Experimental Group: application of Direct Laser Metal Forming implant with the Platelet Rich Fibrin membrane .

Comparative Group: Application of Direct Laser Metal Forming implant without PRF membrane .

Surgical procedures

platelet rich fibrin membrane

Platelet Rich Fibrin Preparation:

Surgery ; tooth extraction and immediate fixture installation :

Post operative care and instructions :

2-Radiographic Examination :

Statistical methods

Data management and statistical analysis were performed using the Statistical Package for Social Sciences (SPSS)**** version. 22.

Numerical data were summarized using means and standard deviations or medians and ranges. Comparisons between the 2 groups with respect to normally distributed numeric variables were done using the t-test. None

normally distributed numeric variables were compared by Mann-Whitney test. Comparisons over time regarding numeric variables were done by paired t test and Wilcoxon signed rank test. All p-values are two-sided. P-values ≤0.05 were considered significant.

Results :

Postoperative healing was uneventful in all patients. Soft tissue healing was keratinised gingiva within 21 days .No inflammation or infection or tissue dehiscence was observed.

At the second stage (abutment connection) after the 6 months waiting period, all implants were considered successful since all implants were immobile when manually examined. There was no pain or suppuration around the implants.

RADIOGRAPHIC RESULTS :

The Cone beam C.T. taken immediately after implant placement and the cone beam C.T. taken after 6 months of implant placement were evaluated for changes in bone density adjacent to the implants .

The readings of Bone Density adjacent to the implants increased by time after 6 months and subsequently successful osseointegration

I. Radiography

II. Comparisons between groups

III. After 1 week: Median bone density was 51.8 and raging from (-275, 212) for the group with PRF compared to 139.3 (-67, 270) without PRF, this was statistically not significant p=0.423

After 6months: Mean bone density was 661.3±140.5for group with PRF compared to 344.3±106.4without PRF, this was statistically significant p= 0.001.

Comparisons over time in each group

PRF Mean bone density was 22.5±186.4 at 1 week after treatment, and then increased to 661.3±140.5 at 6 months after treatment. This was statistically significant p<0.001

Without PRF: Mean bone density was 112.6±131.5at 1 week after treatment, and then increased to 344.3±106.4 at 6 months after treatment. This was statistically significant p=0.003

Comparison of percent change between groups

The median bone density percent change in PRF group was 253.46 % with range (-646.5,5209.1) compared to 54% with range (-2828, 358.5) in group without PRF. This was **NO** statistically significant p=0.262

DISCUSSION:

This study was conducted to evaluate osseointegration clinically and radiographically when using Direct Laser Metal Forming (tixos) implant in immediate implant placement with the application of platelet rich fibrin membrane.

This study involved six patients with 12 fresh extraction sockets, who required dental implant therapy to replace the extracted single rooted maxillary anterior teeth, 6 of them were covered with PRF membrane . The patients were chosen from the Outpatient clinic in the Oral and Maxillofacial Surgery Department, Faculty of Oral and Dental Medicine, Cairo University. The patient's age in this study ranged from 25 to 45 years old with mean age 35 years old. The need for extraction was confirmed by clinical and radiographic examination.

Immediate placement of endo-osseous implants into freshly extraction socket has been recommended by several investigators.

The concept of immediate implantation has been successfully used for some patients and even immediate loading specially for anterior teeth for fear of lost aesthetics and function after extraction of these teeth .

Platelet-Rich-Fibrin (PRF) is one such material that holds on to these growth factors enmeshed in the fibrin network resulting in

their sustained release over a period of time that can accelerate the wound healing process**.** The antihemorrhagic properties of PRF are also advantageous and convenient for this type of surgery **.**

Typical healing of an extraction socket Six months after tooth removal, which includes flap elevation, the extraction sockets manifest a mean 1.24 mm vertical bone loss (range 0.9 to 3.6 mm). Usually there is approximately 3.79 mm horizontal bone decrease (range 2.46 to 4.56 mm) **(Tan WL. et al.,2012).** In contrast, extractions of teeth with no flap demonstrate a reduced amount of horizontal and vertical bone loss. However, others suggest there is no difference in the amount of vertical osseous resorption if procedures are done flapless or with a flap when placing implants, but these studies did not necessarily address immediate implants**(Job S, Bhat V. et al.,2008) .** Bone reduction after flapless extractions may be due to elimination of the blood supply from the periodontal ligament (PDL). Differences in osseous resorption rates in the above studies may also be attributed to buccal plate thickness (thicker plates resorb less) **(Ferrus J. et al.,2010).** Nevertheless, especially in the esthetic zone, it is suggested that immediate implants be placed without elevating a buccal flap to preserve bone and avoid soft-tissue recession. Socket healing after immediate placement many studies verified that immediate implant placement is accompanied by bone loss **(Vignoletti F. et al.,2009)**. Commonly, there is a reduction of vertical bone height and even a greater amount of horizontal bone loss **(Botticelli D. et al.,2004).**

Implants immediately placed into fresh extraction sockets and healed ridges have similar survival rates (97.3% to 99%) **(Lang NP. et al.,2012)**. Furthermore, immediate implants inserted into infected sites or locations with periapical lesions have comparable survival rates to implants placed into healthy ridges. However, these studies did not delineate the amount of bone grafting that was performed or extent of infections that were present **(Waasdorp J. et al.,2010) and (Crespi R. et al.,2007).**

In the present study, twelve Tixos implants which are made by DLMF were inserted immediate after tooth extraction in upper anterior teeth , 6 implants of those were applicated with PRF membrane.

Summary:

This study was conducted to evaluate osseointegration in immediate implant placement Direct Laser Metal Forming (tixos) with the application of platelet rich fibrin membrane, clinically and radiographically.

This study involved six patients with 12 fresh extraction sockets, who required dental implant therapy to replace the extracted single rooted maxillary anterior teeth, 6 of them were covered with PRF membrane . The patients were chosen from the Outpatient clinic in the Oral and Maxillofacial Surgery Department, Faculty of Oral and Dental Medicine, Cairo University. The patient's age in this study ranged from 25 to 45 years old with mean age 35 years old. The need for extraction was confirmed by clinical and radiographic examination.

The patients grouped as two groups :

Group A: 6 DLMF implants with PRF membrane and bone graft .

Group B: 6 DLMF implants with bone graft but without PRF membrane.

The follow up for all patients of the 2 groups was CBCT after 1 week

After 3 months the cases was evaluated clinically

After 6 months CBCT was done for all patients with clinical evaluation .

CONCLUSION:

The Direct Laser Metal Forming Implants (Tixos) showed good results of osseointegration in immediate implantation replacement of upper anterior teeth.

Platelet rich fibrin membrane when used

with the immediate implant it shows more rapid healing of soft tissue and osseointegration of bone and limited post operative bleeding and pain .

The results of this study showed that PRF membrane is successful in achieving primary coverage over immediately placed implants. It provides good esthetic results as regards labial soft tissue contours. PRF could serve as a resorbable membrane for guided tissue regeneration.

The tissues around the implant after loading was gradually enhanced if strict post-operative care instructions were followed .

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