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"AN OLD FRIEND IN NEW DISGUISE" PLATELET RICH FIBRIN IN IMMEDIATE IMPLANT PLACEMENT- A CLINICAL STUDY

Periodontology

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ABSTRACT

Immediate implantation has provided the opportunity to achieve better and faster functional results. The placement of implant immediately not only prevents the collapse of the socket by reducing the crestal bone loss, but also enhances the soft tissue esthetics. Platelet rich fibrin (PRF) possesses an inherent property to accelerate soft and hard tissue healing. It has several advantages which include ease of preparation/application, minimal expense, and lack of biochemical modification. The objective of the current study was to clinically and radiographically evaluate the soft and hard tissue changes around immediately placed implants along with platelet rich fibrin in freshly extracted sockets and re-evaluate at 3 months, 6months and 9months. A total of 12 patients were included and all the 12 implants were successful and overall success rate of implants in this study was 100%, with good stability and osseointegration. None of the cases reported peri-implant radiolucency and mobility of the implant.

KEYWORDS

Immediate implant placement, Platelet rich fibrin.

Introduction:

The main cause for loosening and eventual exfoliation of teeth includes the loss of supporting periodontium around the teeth. In the latest era, the main concern of the patients for replacement of missing teeth is by means of those materials that can probably have a striking resemblance with that of natural teeth.

In the present scenario, dental Implants has heralded a major progress that has provided a strong foundation for replacement of teeth owing to its improved esthetic appearance, improved comfort and speech, durability and improved self esteem.

During the decades that have passed since the widespread acceptance of implant dentistry, placement protocols have evolved to vary the timing of implant placement from late (in completely healed sites) through delayed and, finally, immediate placement following extraction. These procedures were actually developed to better meet patients' expectations (Horwitz J and Machtei E.,2011).

The timing of implant placement is crucial, since it has an influence on esthetic treatment outcomes and the risk of complications (Wilson T *et al.*, 2011). Immediate placement results in fewer surgeries compared to other approaches, ultimately reducing time and morbidity and simultaneously reducing the patient's economic burden.

Autogenous bone and a variety of xenogenic graft materials have been employed in conjunction with immediate implantation, with many of them showing successful results. Nevertheless, none of them have been shown to be superior to the others (Schropp L *et al.*, 2003).

Thus to overcome the implant failure and to attain osseointegration, platelet-rich fibrin (PRF) has been introduced by Choukroun et al in 2001 which belongs to a new generation of platelet concentrates, with simplified processing and is without any biochemical blood handling (Dohan DM *et al.*,2006, Choukroun J *et al.*,2001).

The present study was thus undertaken to evaluate the clinical and radiographic efficacy of platelet rich fibrin (PRF) membrane used with immediately placed dental implants.

Patients and methods:-

The present clinical study comprised of 12 patients attending Department of Periodontics, Government Dental College and Hospital, Hyderabad who participated for immediate placement of implants.

Preparation of Platelet rich fibrin (PRF):-

Around 5 ml of whole venous blood will be collected from the patients in a sterile vacutainer tube of 6 ml capacity without anticoagulant.

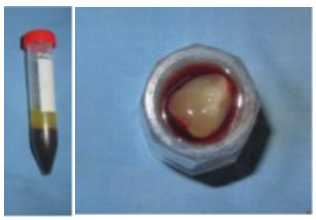

Fig-1 & 2 PRF

The vacutainer tube will then be placed in a centrifugal machine at 3000 revolutions per minute (rpm) for 10 minutes. The middle fraction containing the fibrin clot is then collected 2 mm below lower dividing line, to obtain the PRF (Fig-1 & 2).

Surgical procedure

The Fig-3 shows preoperative view. Extractions were performed atraumatically (Fig-4) and were done under local anaesthesia using 2% lignocaine containing

Fig-3Preoperative view

Fig-4 Extraction of 34

adrenaline. The socket was then degranulated with curettes and irrigated thoroughly with Povidine-Iodine.The length and width of the extracted roots was measured with UNC-15 probe.

Fig-5 Sequential drilling

Fig-6 Immediate Implant placement

The drilling of Osteotomy site was done using socket (Fig-5) walls as guides starting with smallest drill of 2 mm which is pilot drill. Sequential drilling was carried out with 2.2, 2.8, 3.2, 3.65, 4.3 and 5 mm with speed ranging from 500- 1200 rpm.

Drill was then extended 3-4 mm beyond the apex of socket to ensure primary stability, taking care of anatomical boundaries and immediate implant was placed (Fig-6). Periodontal dressing was placed after suturing with 3- 0 silk (Fig-7) and then systemic antibiotics were prescribed.

Fig-7 sutures placed

Fig-8 stage II surgery-gingival former placed

The second stage surgical procedures were again performed 6 months after the first procedure. All clinical and radiographic parameters are recorded.

Fig-9 Abutment placed

Fig-10 After prosthesis

Punch incision is made and implants were exposed, the cover screw was then removed and healing cap was placed for 15 days (Fig-8). Impressions were made with abutment placed (Fig-9), super structure was fabricated and cemented with IRM cement (Fig-10). At 9 months post implant placement patients were recalled and clinical and radiographic measurements were finally recorded (Fig-11).

Fig-11 After 9 months

Fig-12 pre& Postoperative Radiographs

After the placement of implant, patient was recalled at 3months, 6months and 9 months for assessment of the implant success by considering of the following clinical parameters:-

1. Modified plaque index (MPI) was taken on the mesial, distal, buccal and lingual-palatal surfaces of the implants.
2. Width of keratinized mucosa was measured as the distance from the gingival margin to the mucogingival junction including both marginal and attached gingiva at mid buccal aspects.
3. Papillary index was measured from the line connecting the highest gingival curvatures of implant crown restoration and adjacent tooth on buccal side.
4. Gingival index was assessed to check for any inflammation of the gingiva after the placement of the implant.

Radiographic parameters:-

1. After the surgical therapy, Intra Oral Periapical radiographs (Fig-12) and orthapanoramic images were taken for every patient before and after placement of the implant at 3 months, 6 months, and 9 months respectively and were evaluated for peri-implant radiolucency and for presence of any bone loss.
2. Distance from the implant shoulder to the point of the first bone-implant contact (DIB) was measured mesially and distally by vernier callipers.

Statistical analysis:

Descriptive statistical analysis had been carried out in the present study by *Friedman's test*. The statistical analysis of the parameters obtained was using paired "t" test.

Results:

Out of the 12 implants, 12 implants were successful and overall success rate of implants in this study was 100%, with good stability and osseointegration.

The study had included a total sample of 12 patients, within the age range of 21-50 years. The distribution of the age is divided as age interval of 10 years as shown in **Table 1.**

Age (Years)	No. of patients	
	n	%
21-30	5	41.7
31-40	4	33.3
41-50	3	25.0
Total	12	100.0

Table 1:- Age distribution of the study sample:

The MPI was 0.98±0.20 at 3months which was decreased to 0.73±0.17 at 6months, which was decreased to 0.69±0.16 at 9months follow up visit. The improvement at these visits showed a statistically significant difference (p value<0.001). These results are depicted in **Table 2.**

Follow up	MEAN	SD	P VALUE
3 Months	0.98	0.20	<0.001
6 Months	0.73	0.17	
9 Months	0.69	0.16	

Table 2:- Mean comparisons of modified plaque index (MPI) among follow up visits.

Statistical Analysis: Friedman's test. Statistically significant if P<0.05

The width of keratinized gingiva at baseline was 4.63±0.48, which decreased to 4.25±0.26 at 3months and again increased to 4.54±0.26 and 4.58±0.36 at 6months and 9months follow up visit, respectively. The difference at these visits was not statistically significant (p value= 0.061). These results are shown in **Table 3.**

Table 3:- Mean comparison among follow ups in width of keratinized gingiva in (mm):-

Follow up	MEAN	SD	P VALUE
At Baseline	4.63	0.48	0.061 NS
3 Months	4.25	0.26	
6 Months	4.54	0.26	
9 Months	4.58	0.36	

The papillary index on mesial aspect had showed a mean value of

1.50±0.52 at baseline, 1.42± 0.51 at 3months, 2.08±0.29 at 6months and 2.33±0.49 at 9months. These values had shown a statistically significant difference as depicted in **Table 4.**

Table 4: Mean comparison among follow ups in papillary index (Mesial group)

Mesial	MEAN	SD	P value
At Baseline	1.50	0.52	<0.001 S
3 Months	1.42	0.51	
6 Months	2.08	0.29	
9 Months	2.33	0.49	

Statistical Analysis: Friedman's test. Statistically significant if P<0.05

The papillary index on distal aspect had showed a mean value of 1.50±0.52 at baseline, 1.83±0.39 at 3months, 2.33±0.49 at 6months and 2.50±0.52 at 9months. These values had shown a statistically significant difference as depicted in **Table 5.**

Table 5: Mean comparison among follow ups in papillary index (Distal group)

Distal	MEAN	SD	P value
At Baseline	1.50	0.52	<0.001 S
3 Months	1.83	0.39	
6 Months	2.33	0.49	
9 Months	2.50	0.52	

Statistical Analysis: Friedman's test. Statistically significant if P<0.05
The modified bleeding index at 3 months was obtained as 1.02±0.20, at 6 months was 0.77±0.20 and at 9 months as 0.73±0.13. The mean values at 3 follow up visits showed a statistically significant difference as depicted in **Table 6.**

Table 6:- : Mean comparison among follow ups in modified bleeding index

Follow up	MEAN	SD	P VALUE
3 Months	1.02	0.20	0.001 S
6 Months	0.77	0.20	
9 Months	0.73	0.13	

Statistical Analysis: Friedman's test. Statistically significant if P<0.05

The distance from the implant shoulder to first bone implant contact on mesial aspect at baseline was 0.24±0.13 and at 3months, 6months and 9months were 0.39±0.14, 0.65±0.15 and 0.73±022, respectively. The mean values at baseline and 3 follow up visits had showed statistically significant difference as shown in **Table 7.**

The distance from the implant shoulder to first bone implant contact on distal aspect at baseline was 0.28±0.17 and at 3months, 6months and 9months were 0.44±0.17, 0.74±0.17 and 0.90±0.24, respectively. The mean values at baseline and 3 follow up visits had showed statistically significant difference as shown in **Table 8.**

Table 7:- Mean comparison among follow ups in distance from implant shoulder to first bone implant contact (DIB) mesial group

Mesial	MEAN	SD	P value
At baseline	0.24	0.13	<0.001 S
3 Months	0.39	0.14	
6 Months	0.65	0.15	
9 Months	0.73	0.22	

Statistical Analysis: Friedman's test. Statistically significant if P<0.05

Table 8: Mean comparison among follow ups in distance from implant shoulder to first bone implant contact (DIB) distal group

Distal	MEAN	SD	P value
At baseline	0.28	0.17	<0.001 S
3 Months	0.44	0.17	
6 Months	0.74	0.21	
9 Months	0.90	0.24	

Statistical Analysis: Friedman's test. Statistically significant if P<0.05

The graph (Fig- 13) shows the comparision of distance from implant shoulder to first bone between baseline, 3 momths, 6 months and 9 months.

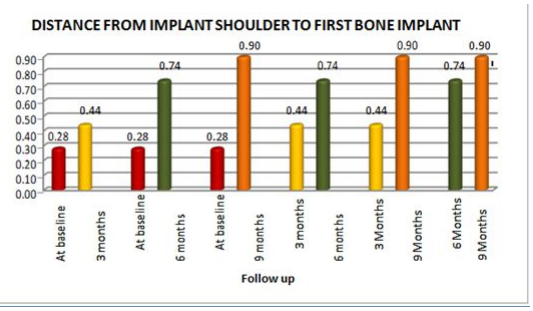

Fig-13 Graph: Mean comparision between follow ups in distance from implant shoulder to first bone implant contact

Discussion:

The advantages of immediate implant insertion after tooth extraction are elimination of post-extraction healing period, preservation of alveolar height and width, reduction of the number of surgical sessions, lower risk of dehiscences or fenestrations around dental implant, improved surgical orientation in relation to pertinent anatomical structures, better angulation leading to improved esthetics and axial occlusal loading. Greater primary stability of implant is often the desired goal for immediate placement of implant, which implies that there is less micromotion between the implant and bone, leading to better osseointegration.

It has been stated by Covani et al and Schropp et al (Covani et al.,2004 and Schropp et al.,2003) that placement of an implant into a fresh alveolus will usually result in a gap/space between the occlusal part of the implant and the bone walls ("jumping space"), and immediate placement of implant cannot prevent dimensional changes of the alveolar ridge after extraction of tooth. These dimensionsal changes may be predicted on basis of the defect size and configuration resulting from tooth extraction as stated by Tomasi et al (Tomasi et al.,2010).

In 2001, Choukron's et al., had developed Platelet-rich fibrin (PRF) which is a second generation platelet concentrate that facilitates favorable healing (Dohan DM et al.,2006). Enhancement of the regenerative process of human body by utilizing the patient's own blood is a unique concept that is evolved in dentistry. Platelet rich fibrin (PRF) also allows to avoid the use of membranes and barriers, thus reducing the risk of possible exposure to the oral cavity and of the consequences that the bacterial contamination may have on the regenerative process.(Hotwani K et al.,2014, Choukroun J et al.,2006).

In the present study, immediate placement of implants was done in a total of 12 patients and patients were recalled at 3months, 6months and 9months following the initial surgical procedure. Based on the short term results of the current study, immediate placement of impant along with Platelet rich Fibrin had shown 100% success rate with no occurrence of

implant mobility and no evidence of peri-apical radiolucency in any of the cases after 9months of function. These results were comparable to other short term studies by Anand et al., Kenawy et al, Viswambaran et al (Anand et al.,2012, Kenawy et al.,2014., Viswambaran et al.,2014). Gomez-Roman et al.,2001 had shown 99% success in immediate post extraction implant placement after 1 year followup period and 97% after 5.6 years observation period. Thus, it can be well accepted that immediate implant placement in terms of osseointegration and biological acceptance is unquestionable (Gomez-Roman et al.,2001).

The results of the current study had shown a significant improvement in the modified plaque index at the follow up visits and thus revealed good oral hygiene status which was in accordance with the observations by Gomez-Roman et al., Viswambaran et al. The possible explanation may be good oral hygeine reinforcement and periodical oral prophylaxis which had thus showed a better treatment outcome.(Gomez-Roman et al.,2001., Viswambaran et al.,2014).

The modified bleeding index is a clinical indicator for absence or

presence of inflammation. The modified bleeding index in the present study was obtained as 1.02±0.20 at 3 months, and 0.77±0.20 and 0.73±0.13 at 6 months and 9months respectively. The mean values at 3 follow up visits showed a statistically significant improvement and there was no suppuration detected during the follow up period which was not in accordance with the observations by Kenawy et al which represented the mean value of modified sulcus bleeding index (mSBI) was 0.3±0.3 at baseline and 0.4±0.4 at 12 months and had shown no statistically significant difference through the whole study period (Kenawy et al.,2014).

In the current study better soft tissue maintenance, reduction in healing time and favorable optimal bone regeneration was observed as in accordance with the study by Tatullo et al (Tatullo et al., 2012).

The results of the present study had shown a significant improvement in the mesial and distal papillary index which was in accordance to the study by Cooper et al., who had reported that in both extracted and healed sockets papillae had increased over time (Cooper et al., 2014).

The immediate placement of implants in the present study had achieved pleasing gingival aesthetics, which was similar to the case study done by Singh et al (Singh et al.,2012).

Conclusion:

Within the limitations of this study, platelet-rich fibrin (platelet-rich fibrin PRF) placed along with immediate implants in patients after tooth extraction showed high success rate .This technique offers advantages for patient comfort and the healing process as it contains many growth factors. It also facilitates elimination of post extraction healing period, reduction of the number of surgical sessions, preservation of alveolar width and height.

References

1. Horwitz J, Machtei E. Immediate and Delayed Restoration of Dental Implants in Patients with a History of Periodontitis: A Prospective Evaluation up to 5 Years. Int J Oral Maxillofac Implants 2012; 27: 1137–1143.
2. Wilson T, Buser D. Timing of Anterior Implant Placement Post extraction: Immediate Versus Early Placement. Clinical Advances in Periodontics 2011; 1(1): 61-74.
3. Schropp L, Kostopoulos L, Wenzel A. Bone Healing Following Immediate Versus Delayed Placement of Titanium Implants into Extraction Sockets: A Prospective Clinical Study. Int J Oral Maxillofac Implants 2003; 18:189–199.
4. Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJ, Mouhyi J et al. Platelet-rich fibrin (PRF): A second-generation platelet concentrate. Part II: Platelet-related biologic features. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006; 101:45-50.
5. Covani U, Bortolaia C, Barone A, Sbordone L. Bucco-Lingual Crestal Bone Changes After Immediate and Delayed Implant Placement. J Periodontol 2004;75:1605-1612.
6. Tomasi C, Sanz M, Cecchinato D, Pjetursson B, Ferrus J, Lang NP, Lindhe J. Bone dimensional variations at implants placed in fresh extraction sockets: a multilevel multivariate analysis. Clin Oral Implants Res. 2010 Jan;21(1):30-6.
7. Choukroun J, Adda F, Schoeffler C, Vervelle A. Une opportunite en paro-implantologie: le PRF. Implantodontie 2001;42:55-62.
8. Hotwani K, Sharma K. Platelet rich fibrin a novel acumen into regenerative endodontic therapy. Restor Dent Endod. 2014 Feb; 39(1): 1–6.
9. Choukroun J, Diss A, Simonpieri A, Girard MO, Schoeffler C, Dohan SL, et al. Platelet rich fibrin (PRF): a second-generation platelet concentrate. Part V: histologic evaluations of PRF effects on bone allograft maturation in sinus lift. Oral Surg Oral Med Oral Pathol Oral RadiolEndod. 2006; 101(3):299–303.
10. Anand U, Mehta DS. Evaluation of Immediately Loaded Dental Implants Bioactivated with Platelet-Rich Plasma Placed in the Mandibular Posterior Region: A Clinico-Radiographic Study. J Indian Soc Periodontol 2012; 16(1):89–95.
11. EL Kenawy, M., EL Shinnawi, U., Salem, A., & Ahmed, F. Efficacy of Platelet Rich Fibrin (PRF) Membrane in Immediate Dental Implant. Mansoura Journal of Dentistry 2014; 1(3): 78-84.
12. Viswambaran CM, Arora MG, Tripathi RC, Dhiman CRK. Clinical evaluation of immediate implants using different types of bone augmentation materials. Medical Journal of Armed forces India 2014;70:154-162.
13. Gomez-Roman G, Kruppenbacher M, Weber H, Schulte W. Immediate Postextraction Implant Placement with Root-Analog Stepped Implants: Surgical Procedure and Statistical Outcome After 6 Years. Int J Oral Maxillofac Implants 2001;16:503–513.
14. Tatullo M, Marrelli M, Cassetta M, Pacifici A, Stefanelli LV, Scacco S, Dipalma G, Pacifici L, Inchingolo F. Platelet Rich Fibrin (P.R.F.) in Reconstructive Surgery of Atrophied Maxillary Bones: Clinical and Histological Evaluations. Int J Med Sci 2012; 9(10):872-880.
15. Cooper LF, Reside G, Raes F, Garriga JS, Tarrida LG, Wiltfang J et al. Immediate provisionalization of dental implants in grafted alveolar ridges in the esthetic zone: a 5-year evaluation. Int J Periodontics Restorative Dent 2014; 34(4):477-86.
16. Singh A, Gupta A, Yadav A, Chaturved TP, Bhatnagar A, Singh BP. Immediate placement of implant in fresh extraction socket with early loading. Contemp Clin Dent 2012; 3: 219-22.