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Assessment the impact of platelet Rich Fibrin on healing process after teeth extraction

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ABSTRACT

Objective: The highlight focusing on bioactive material to regulate and improve healing process after tooth extract in recent years .So this study conducted to evaluate the impact of platelet rich fibrin (PRF) method in improve soft tissue healing and socket complication after tooth extraction. **Methods:** Out of 40 patients male and female who attending to that to extract their tooth about twenty patients using PRF and regard as treated group while 20 patients who extract their tooth without treated with PRF named as control group. The soft tissue healing effect was assessed at 7 days. **Results:** The result revealed there was a significant difference with decreased the hemostatic time in experimental group than in control group also the soft tissue healing were highly significant ($P<0.01$) in experimental group while all patients not revealed any difference in socket infection . **Conclusion:** PRF was safe, inexpensive, easy to use with efficient activity in oral and maxillofacial human surgery .

Keywords: *PRF, Tooth Extraction, Soft Tissue Healing, PRF*

INTRODUCTION

A dental extraction (exodontia) is the removal of teeth from the dental alveolus in the alveolar bone that is caused by dental trauma, infection and periodontal disease (1).

Healing process after teeth extraction is a delicate process which included three stage an inflammatory phase, a proliferative phase and a maturation phase (2). First step in healing process is the formations of blood clot that begin by vasoconstriction to decrease the bleeding, followed by platelet activation which aggregate and act as plug to stop bleeding then release its content from mediators which regulate healing process by attract macrophage and neutrophil to secrete cytokine and growth factors also activate smooth tissue and fibroblast.(3) The dental socket contains granulation tissue, consisting of fibrovascular tissue, inflammatory cells and red blood cells during 1st week - 2ndweeks (4 , 5).

Soft tissue becomes keratinized and woven bone formed and fills the socket at 4^{th}–6^{th} weeks after tooth extraction. At 4^{th}–6^{th} months woven bone is reinforced by deposition of additional minerals within it (5, 6)

Platelet-rich fibrin (PRF) a new generation of platelet concentration rich in fibrin, platelets, leukocyte , growth factors, cytokines (IL-1 , IL-6 ,IL- 4 and TNF-α …) , and other material involve in tissue repair and regeneration as well as in oral and maxillofacial surgery (7) . Growth factors are proteins play important role in cellular growth, proliferation, differentiation and healing which are stored in platelets and secreted upon platelet activation giving the platelets crucial role in wound healing and regeneration of injured tissues besides their hemostatic functions(8) .The PRF characterized by safety , efficiency , simple in preparation , handling and place in the indicated local (9) .

The important trouble in decreased socket healing that face the clinician are

esthetic problems in fabrication of an implant-supported restoration or a conventional prosthesis; and it may make the placement of an implant challenging if not unfeasible (10) . So the study aimed to investigate the impact of PRF in improving tissue healing ,regeneration and decrease the complication after tooth extraction

Methodology

*** Study design**

The current study was conducted on 40 patients were attending to dental clinic in Tikrit university , college of dentistry for extraction, some of them extracted hopeless carious tooth for future removable and fixed restoration therapy and other were suffer from partial impacted third molar .the age of patients range from 22-54year. each patient signed a consent, answered an extensive questionnaire which cover age, sex, medical history from all patients without any history of systemic disease were included in this study , while patients with diabetic , osteoporosis , bone diseases and any systemic disease that may effect on healing process were excluded. This study was in agreement with ethics of Tikrit Teaching Hospital and Health ministry of Iraq

The patients were divided into :

Group I (test group-n=20): extraction sockets which received platelet rich fibrin.

Group II (control group-n =20): extraction sockets left for normal healing (blood clot).

A- Preparation of PRF : Before tooth extraction **,** Five ml of blood were collected from each patients in experimental group then put in sterile plain tube and centrifuged for ten minutes at 3000 rpm which separated the blood into 3 layer PRF located in the tube center , red blood cell layer at the bottom and a cellular plasma at the top. The middle layer was removed using sterile tweezers, and the RBC layer was removed from the PRF gel. The PRF clot was then placed on the grid in the PRF Box slightly adapted by PRF kit (ProcessLtd. Pakistane) to be ready for use (Fig 1& 2).

(a)

(b)

Fig (1): (a) Withdraw blood from patient. (b) Compact centrifuge to separate the blood

(a)

(b)

Fig (2): (a) PRF preparation by centrifuge. (b) PRF formation

B- Clinical procedure

Under aseptic conditions, All patients were given local anesthesia of lidocaine HCl 2% with epinephrine 1:100,000 . The selected teeth were extracted by simple extraction and some of them by surgical extraction (A mucoperiosteal flap) with minimal trauma. PRF clot implanted into the extraction socket following tooth extraction in experimental group of patients, while no material was placed in the control sockets, teeth extracted by simple extraction, Pressure application and figure of 8 suture using 3–0 silk sutures. While teeth extracted by surgical extraction close wound by interrupted suture. All patients received the same post-operative treatment and instructions which was consisted of *Augmentin 652 mg t.d.s.* for seven days, *Ibuprofen 400 mg t.d.s.* as pain killer for the day of surgery Sutures removed in the seventh postoperative day (Fig 3).

(a)

(b)

Fig (3): (a) Teeth extraction tools. (b) Tooth extraction and suturing.

C-Evaluation the healing process after PRF

Patients were evaluated for healing process for seven day after surgery which included observed pain , soft tissue healing according to healing index (11) which depends on tissue color, presence of bleeding on palpation, epithelialization of wound margins, granulation tissue ,and suppuration.

Complications of tooth socket were assessed by criteria suggested by LK Cheung (12) which include: infection in socket was observed by painful socket, purulent, edema, and erythema in associated with increased body temperature.

Statistical analysis

Statistical analyses were done using SPSS version 20 computer software (Statistical Package for Social Sciences) in association with Microsoft Excel 2010. Data were expressed as means± standard deviation (SD). Statistical differences between the groups were determined using one-way analysis of variance. A value of $P < 0.05$ was considered statistically significant.

Results

A prospective study were conducted on 40 patients divided into two group 20 patients as experimental group which treated with PRF locally after extraction and 20 patients not received PRF after tooth extraction regard as control group and the result revealed there was no significant difference between experiment group and control group in gender , median age and a significant difference ($p < 0.05$) between groups in hemostatic time as shown in Table (1)

Table (1) Distribution patients according to gender, mean age and Hemostatic time

parameter	Patients with PRF	Patients without PRF	
gender	**No.(%)**	**No(%)**	***P-value***
male	**3 (30%)**	**4(40%)**	**0.04**
female	**7(70%)**	**6(60%**	
Mean age	**30** ± **6.8**	**32** ± 7.6	
Hemostatic time			
< 2 hrs	13 ± 1.8	3 ± 0.6	0.05
< 4 hrs	3 ± 0.8	9 ± 1.2	
>4 hrs	4 ± 0.5	8 ± 1.4	
total	20	20	40

The result explain that no significant difference between patient treated with PRF after surgery and patients left to physiological healing in socket infection (Table 2) .

Table (2) assessment the socket infection (complication) in test and control groups

	With PRF	Without PRF	Total
Signs of infection	8 ±1.3	10 ± 0.98	18
No signs of infection	12± 1.8	10 ± 1.2	22
total	20	20	40

The result illustrated that patients treated with PRF after tooth extraction revealed very good healing higher than patients not treated with PRF as shown in Table (3) with a significant difference between them

Table (3) Comparison between test and control group according to Soft tissue healing after one week

	With PRF	Without PRF	*P-value*
Very good	12 ± 1.5	2 ± 0.04	0.04
good	4 ± 0.7	8 ± 1.2	
accepted	4± 1.0	10 ± 1.8	
Total	20	20	

Discussion

Teeth extraction consider surgical operation which like other operations may associated with bleeding ,pain ,swelling and delay healing . The PRF considered one of new modalities in decreasing post extraction complications and decreasing healing time(Moraschini and Barboza ,2015) . PRF is contain platelets and growth factor which increased the bone regeneration and enhance wound healing also contain cytokines like IL-6 , TNF-a , VEGF that have important role in angiogenesis , reduced local inflammatory response and cicatrization(18 Choukroun *et al*.,2006 ; Naik *et al*.,2013).

In our study evaluated the role of PRF on decreasing hemostatic time follow extraction surgery with significant value. Saluja, *et al*.,2011 study indicated that PRF used in faciomaxillary surgical procedures showed faster healing and decreased haemostatic time to half the time in comparison to physiologic healing. In other hand there was no significant different between test and control patients in infection and healing process after teeth extraction . while statistical analysis for use of PRF in decrease post extraction infection was not significant in this study . Similarly Al-Hamed *et al*., (2017) they observed non-significant difference between platelet rich fibrin and control groups regarding infected or inflamed sockets and soft tissue healing .While disagree with (Zhang et al.,2018) they appear the increased improvement of soft tissue healing in the experimental group compared with control group . Also the result of (Barone *et al*.,2015) confirmed increased tissue healing by using PRF after teeth extraction . The main causative factors is the field of extraction operation was not fully sterilized ,and some patients was neglected according to oral hygiene and not follow the instructions of the dentist .

According to healing time which evaluated after one week of teeth extraction , the result was significant statistically .Nilima *et al*.,(2015) illustrated that using PRF make the healing of socket more effective and faster comparing with control.

Conclusions

PRF is new modality used in dentistry and its effective in decreasing bleeding time and healing time after teeth extraction.

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