



WOUND HEALING WITH AND WITHOUT PLATELET RICH FIBRIN AFTER EXTRACTION OF MANDIBULAR THIRD MOLAR : A COMPARITIVE STUDY

Maxillofacial Surgery

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ABSTRACT

Background: To evaluate the efficacy of autologous platelet- rich fibrin (PRF) in healing and to assess clinical compatibility of the material in mandibular third molar extraction socket. **Materials & Methods:** This study was conducted in 30 patients visiting the outpatient wing, Department of Dentistry, Government Medical College & Hospital, Ramagundam . 30 patients of age group between 15-30 years who are advised with unilateral surgical extraction of impacted lower third molars are divided into two groups of 15 each. . Following extraction, platelet rich fibrin prepared from patients own blood was placed in one extraction socket (study group) and not placed in control group .A clinical comparison was made on the 1st, 3rd, and 7th post-operative days. The patients were assessed for postoperatively pain, soft tissue healing, post operative bleeding, mouth opening and post op infection. **Results:** Based on the clinical analysis, 14 patients significantly experienced lower levels of pain on visual analog scale (VAS) in PRF group. On assessment of soft tissue healing better and early soft tissue healing with less swelling is noted in 11 patients of PRF group when compared to non PRF group. Increased mouth opening was observed post operatively in all cases of PRF group. Post operative bleeding was seen in 3 cases of non PRF group and post op infection seen in 2 cases of non PRF group. **Conclusion:** The study showed that autologous PRF is biocompatible and has significant improved soft tissue healing.

KEYWORDS

Platelet rich fibrin, mandibular third molar extraction socket, pain, soft tissue healing

INTRODUCTION

The incidence of impacted wisdom teeth (third molars) is high. Approximately 77% of the Swedish population aged 20 years show a prevalence of four third molars [1]. The presence of third molars can cause inflammatory and/or infectious dental diseases, resulting in pain and swelling, as well as the spread of pathologies to the adjacent teeth and bone. Removal of impacted third molars is a surgical procedure that is commonly performed by oral and maxillofacial surgeons. The annual incidence of third molar removal is estimated to be 4 per 1000 persons in England and Wales, placing it among the top 10 inpatient and day- case procedures. However, fewer operations are being performed than in the past, possibly due to changes to the guidelines [2,3]. The early postoperative period after third molar removal is often associated with pain, swelling, trismus, and oral dysfunction. Other complications include alveolar osteitis (AO) and postoperative infection (PI) [4,5]. AO or 'dry socket' is a condition involving the exposed bone that occurs during the postoperative healing period, and is accompanied by severe pain, regional lymphadenitis, halitosis, and uncomfortable taste sensations. PIs present with pus, which may spread to the surrounding tissues and cause a raised body temperature. The reported frequency of AO ranges from 1% to 35%, while the frequency of PI ranges from 2.0% to 4.2% [5-7]. All of the complications mentioned above can impair the patient's social activities and their ability to work post-surgery. Many interventions have been tested to reduce these postoperative symptoms, including preoperative and postoperative anti biotics, corticosteroids, laser application, and platelet-rich plasma (PRP), as well as the use of piezoelectric surgery, among others [8-11]. Platelet-rich fibrin (PRF) is a second- generation platelet concentrate that is composed of concentrated autologous platelets and leukocytes, as well as various growth factors and cytokines within a fibrin matrix. This concentrate acts as a reservoir and secretes growth factors that are essential for wound healing [12,13]. The production of PRP requires additional coagulation factors and time-consuming preparation steps when compared to PRF. Furthermore, PRP has been shown to release most of its growth factors within the first day. In contrast, PRF retains higher levels of cytokines and growth factors within its supportive fibrin scaffold, which dissolves slowly, providing continuous release of growth factors and cytokines over a period of up to 10 days. This autologous, healing- promoting biomaterial favours cell migration, proliferation, and differentiation, and appears to accelerate the physiological healing of various soft tissue defects [13]. PRF has been used in many different surgical applications, including vascular surgery, plastic surgery, the treatment of oral ulcers, periodontal healing, and bone augmentation, all with promising results [14]. The

hypothesis of the present study was that PRF applied in the alveolar socket reduces postoperative complications following the surgical removal of a mandibular third molar. The specific aim was to compare patients who received PRF in the alveolar socket (test, PRF group) with those who did not receive PRF treatment (control group)

MATERIALS AND METHODOLOGY

This study is carried out in government medical college and hospital, Ramagundam, Telangana. The inclusion criteria included 1. Unilateral partially impacted mandibular third molar which are advised for surgical removal 2. Patient within age group of 18-50 3. Both males and females 4. Patients with no medical history of Hypertension and Diabetes. Patients with Impacted mandibular third molars were included in the study. Thirty patients were selected and divided into two equal groups of fifteen each for the study.

Group A: 25 Patients/ PRF GROUP

Patients who are indicated for surgical removal of impacted mandibular third molar followed by placement of PRF and mucosa is approximated and sutured using 3-0 silk suture.

Group B: 25 Patients/ NON PRF GROUP

Patients who are indicated for surgical removal of impacted mandibular third molar and mucosa is approximated using 3-0 silk suture (no PRF placed)

Prior to the study start, the surgeons were calibrated regarding their surgical technique, so as to minimize potential surgical bias. The calibration was made through a consensus meeting, in which the surgeons reviewed all of the surgical steps and produced a checklist, which all of them had to follow meticulously. The patients underwent surgery in accordance with sterility rules, exclusively under local anaesthesia. Prior to surgery, a 40 ml (PRF group) sample of blood was collected from the cephalic vein of each patient. The blood from the PRF group patients was centrifuged according to Choukroun's protocol to obtain four fibrin clots. The blood from the control group patients was centrifuged and thereafter discarded. Three 1.8-ml doses of xylocaine-adrenaline (20 mg/ml + 12.5 µg/ml; Dentsply, Weybridge, UK) were injected locally. An incision was made from the second molar to the ascending ramus, as well as a releasing incision over the ascending ramus, and a mucoperiosteal flap was raised. Bone removal, tooth sectioning, and bone contouring were performed with a rotary instrument (40,000 rpm, using a round bur and fissure bur, respectively) under sterile saline irrigation. Prior to PRF application, curettage and further irrigation with 60 ml of sterile saline were carried

out. Depending on the size of the defect, three or four PRF clots were applied to the alveolus, while avoiding over-contouring. Thereafter, the flap was re-adapted anatomically and sutured with silk suture. Clinical examinations were made on the 1st, 3rd and 7th post-operative day, surgical site was evaluated for parameters like pain, oedema, alveolar osteitis, bleeding, mouth opening, soft tissue healing, time taken. Swelling assessment was done using gabka and matsumara criteria. Facial measurements were taken in 3 planes using modified measuring tape method described by Ustun, Gabka, Matsumara, Schultze Mosgau and co-authors (Swelling measurement = Measurement at base line – Post-op measurement).

The three facial planes (mm) were:

M1: Distance from the tragus of the ear to the corner of the mouth.

M2: Distance from the tragus of the ear to the pogonion

M3: Distance from lateral canthus of the eye to the angle of the mandible.

The sum of all these measurements were considered as the base line of that side, and the mean was extracted from them. The measuring was done post operatively, on the 3rd and 7th days.



Pain was graded using visual analog scale as 1) Mild only when there was dull intermittent pain, 2) Moderate when there was throbbing intermittent pain, 3) Severe when there was continuous throbbing pain. Inter incisal distance is measured in millimeters with the help of Vernier callipers between maxillary and mandibular central incisor in maximum mouth opening.



RESULTS

Based on the clinical study, patients significantly experienced lower levels of pain on visual analog scale (VAS) in PRF group. On assessment of soft tissue healing better and early soft tissue healing with less swelling is noted in PRF group when compared to non PRF group and no other complications occurred in any of our cases. Increased mouth opening was observed post operatively in PRF group. Based on the clinical analysis, 14 patients significantly experienced lower levels of pain on visual analog scale (VAS) in PRF group. On assessment of soft tissue healing better and early soft tissue healing with less swelling is noted in 11 patients of PRF group when compared to non PRF. Post operative bleeding was seen in 3 cases of non PRF and post op infection seen in 2 cases of non PRF group. 2 cases of non PRF group had alveolar osteitis.

DISCUSSION:

The results of this clinical study support the hypothesis that PRF usage significantly reduces the incidences of AO and PI. However, it was found that PRF usage significantly reduced the levels of postoperative pain and analgesic drug usage, which is beneficial for the patient. AO is one of the most common, painful, and unwanted complications following third molar removal. AO is burdensome in terms of both time and costs for the patient and the healthcare system. Several studies in the literature have shown a significant reduction in AO when using PRF. In the present study, the incidence of AO was lower in sockets treated with PRF when compared to the control sockets: 11.9% vs 3.0%, although this difference was statistically significant. PRF treatment did not yield any reduction in the number of

PIs, even though there is some evidence in the literature regarding the antimicrobial properties of PRF, with leukocytes having considerable bactericidal capability. Of note, the incidence of PI in the present study was slightly higher than those reported in other studies, regardless of the intervention group⁵. When diagnosed with a PI, the patient was treated with antibiotics. The incidence of PI was very similar in the PRF (6.1%) and control (7.1%) groups, which means that treatment with antibiotics per se did not affect the outcomes for the parameters in the patient diary. The main benefit of PRF treatment seems to be reduced postoperative pain. PRF usage resulted in significantly lower patient self-reported pain scores compared to the baseline from day 1 to day 6 postoperatively in the PRF group, as compared with the control group. This result was supported by the reduced consumption of painkillers in the patients in the PRF group, and by the results presented in previous publications. PRF is a biomaterial and it would have been difficult to hide it in the wound from the surgeon; therefore, designing a double-blind study is difficult. Eshghpour et al. managed this problem by including a second surgeon, who applied the PRF and performed the suturing, although the second surgeon was not blinded during the final part of the surgery. A further limitation of the present study is that the patient themselves performed the MMO measurements. While these measurements might have been more reliable if a person with appropriate experience had performed them with a stiff ruler rather than a flexible ruler, this would have required the patient to attend the department each day during the study protocol. In summary, this study demonstrated the important capability of PRF to reduce pain over the first 6 days post operative. Although PRF did not show a statistically significant reduction in the incidence of alveolar osteitis, the incidence was lower in the PRF group (11.9%) than group (3.0%).

CONCLUSION:

This study concludes that PRF application after mandibular third molar extraction significantly reduces postoperative pain and inflammation, accelerates soft tissue healing, and effectively lowers the incidence of complications such as dry socket and alveolar osteitis.

REFERENCES

- Hugoson A, Kugelberg CF. The prevalence of third molars in a Swedish population. An epidemiological study. Community Dent Health 1988;5:121-38.
- Shepherd JP, Brickley M. Surgical removal of third molars. BMJ 1994; 309:620-1.
- Dodson TB, Susarla SM. Impacted wisdom teeth. BMJ Clin Evid 2014; 2014:1302.
- Osborn TP, Frederickson G, Jr, Small IA, Torgerson TS. A prospective study of complications related to mandibular third molar surgery. J Oral Maxillofac Surg 1985;43:767-9.
- Mercier P, Precious D. Risks and benefits of removal of impacted third molars. A critical review of the literature. Int J Oral Maxillofac Surg 1992;21:17-27.
- Noroozi AR, Philbert RF. Modern concepts in understanding and management of the "dry socket" syndrome: comprehensive review of the literature. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;107:30-5.
- Bailey E, Kashbour W, Shah N, Worthington HV, Renton TF, Coulthard P. Surgical techniques for the removal of mandibular wisdom teeth. Cochrane Datab Syst Rev 2020(7):CD004345
- Olurotimi AO, Gbotolorun OM, Ibikunle AA, Emeka CI, Arotiba GT, Akinwande JA. A comparative clinical evaluation of the effect of preoperative and post operative antimicrobial therapy on post operative sequelae after impacted mandibular third molar extraction. J Oral Maxillofac Res 2014;5:e2.
- Bamgbose BO, Akinwande JA, Adeyemo WL, Ladeinde AL, Arotiba GT, Ogunlewe MO. Effects of co-administered dexamethasone and diclofenac potassium on pain, swelling and trismus following third molar surgery. Head Face Med 2005;1:11.
- Romeo U, Libotte F, Palaia G, Tenore G, Galanakis A, Annibali S. Is erbium:yttrium-aluminum-garnet laser versus conventional rotary osteotomy better in the postoperative period for lower third molar surgery? Randomized split-mouth clinical study. J Oral Maxillofac Surg 2015;73:211-8.
- Uyanik LO, Bilginaylar K, Etikan I. Effects of platelet-rich fibrin and piezosurgery on impacted mandibular third molar surgery outcomes. Head Face Med 2015;11:25.
- Marx RE. Platelet-rich plasma: evidence to support its use. J Oral Maxillofac Surg 2004;62:489-96.
- Choukroun J, Diss A, Simonpieri A, Girard MO, Schoeffler C, Dohan SL, Dohan AJ, Mouhyi J, Dohan DM. Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part IV: clinical effects on tissue healing. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006;101:e56-60.
- Eshghpour M, Majidi MR, Nejat AH. Platelet-rich fibrin: an autologous fibrin matrix in surgical procedures: a case report and review of literature. Iran J Otorhinolaryngol 2012;24:197-202