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Original Article

A Comparative Study on the Efficacy of Platelet-Rich Fibrin vs. Standard Care in Reducing Pain and Swelling Post-Surgical Extraction of Impacted Mandibular Third Molars

Jazib Pervez, Sobia Manzoor*, Taimur ul Hassan*, Rizwan Zafar Langrial, Mujeeb Ahmed*, Memoona Ali**

Department of Operative Dentistry, Bakhtawar Amin Dental College & Hospital, Multan Pakistan, *Department of Oral & Maxillofacial Surgery, Bakhtawar Amin Dental College & Hospital, Multan Pakistan, **Department of Periodontology, Bakhtawar Amin Dental College & Hospital, Multan Pakistan

ABSTRACT

Objective: To compare outcomes of Application of platelet-rich fibrin versus standard care on pain and swelling in patients who are having surgical extraction of impacted mandibular 3rd molars.
Study Design: Randomized controlled trial (ACTRN: 0000387594).
Place and Duration of Study: Bakhtawar Amin Dental College & Hospital, Multan Pakistan, from Aug 2022 to Feb 2023.
Methodology: One hundred and sixty-eight patients included for surgical extraction of impacted third molar, were randomly assigned to Group A (platelet-rich fibrin) and Group B (standard care). In Group A, PRF was introduced in extraction sockets. On follow-up the outcomes in the form of pain and facial swelling were assessed on 3rd post-operative day.
Results: Mean age of patients in Group A was 34.45±9.04 years and Group B was 36.30±9.12 years with p-value of 0.187. There were 31(36.9%) males and 53(63.1%) females in Group A and 28(33.3%) males and 56(66.7%) females in Group B with insignificant *p*-value of 0.628. Mean facial swelling in Group A was 9.75±1.33mm and Group B was 11.19±1.48mm with *p*-value of <0.001. The Median pain score was 3 (IQR: 2) of all the patients included in this study. The median pain score of patients in Group A was (IQR: 2) and Group B was 4 (IQR: 1) with *p*-value of <0.001.
Conclusion: The application of PRF decrease postoperative pain and swelling after extraction of mandibular 3rd molars. Using PRF to fill a socket can be an effective way to reduce post-operative complications and is convenient to use in clinical practice.

Keywords: Impaction, Platelet Rich Fibrin, Post-Operative Pain, Surgical Extraction, Swelling, Third Molars.

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INTRODUCTION

The third molars are mostly impacted causing pain, inflammation, and resorption of adjacent roots.[1] Surgical extraction of impacted lower 3rd molars can cause post-operative complications due to the increased cortical bone density in mandible.[2] Complications may occur as immediate postoperative tissue inflammation, pain, swelling, trismus, fever and lymphadenopathy.[3] Platelet rich fibrin (PRF) in the alveolar socket after tooth extraction is used to decrease the postoperative complications.[4] PRF is a part of newest generation of regenerative procedures. Due to its reparative potential, it is used in oral surgery for post-extraction alveolar defect, periodontology and implant dentistry for horizontal and vertical bone regeneration, treatment of recessions, pulpotomy procedures, and re-vascularization.[5] PRF has been shown to promote faster healing, reducing postoperative pain and swelling more effectively than traditional methods. This accelerated recovery process allows patients to return to their daily routines and normal activities more quickly, thus improving the oral health of the patient. The objective of this study is to evaluate outcomes of platelet-rich fibrin application versus standard care on pain and swelling after the surgical extraction of impacted mandibular 3rd molars.

Correspondence: Dr Jazib Pervez, Department of Operative Dentistry, Bakhtawar Amin Dental College & Hospital, Multan Pakistan
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METHODOLOGY

This was a randomized controlled study (ACTRN: 0000387594), conducted at Bakhtawar Amin Dental College & Hospital, Multan Pakistan, from August 2022 to February 2023. WHO sample size calculator was used, using a formula for hypothesis testing between two population proportions; keeping power of the study =80%, confidence level =95%, mean postoperative pain in standard care Group = 2.91±1.99 and Mean postoperative pain in PRF Group = 2.13±1.59.[6]

Inclusion Criteria: Patients with age 18 to 55 years of male or female gender who are planned for surgical extraction of 3rd mandibular molar.

Exclusion Criteria: Patients with history of Allergic reaction to blood products, thalassemia patients and radiotherapy to head and neck region.

After permission from institutional ethics review committee no.2053 and informed consent, a total of 168 patients, who fulfill the inclusion criteria were included in the study, were planned for surgical excision of impacted 3rd molars, in a non-probability sampling technique. Before undergoing surgical extraction facial measurements for swelling were recorded. Visual analogue scale (VAS) was used for pain assessment, (0-10) meant no pain to severe pain. Pain was assessed 3rd post-operative day. A value was calculated for the swelling of that day, measurements were taken pre-operatively and on third day using nylon thread and a ruler, and difference was noted in millimeters. The sum of following values was noted: (a) the distance between tragus and corner of the mouth; (b) distance between lateral side of eye and mandibular angle (c) distance between tragus of the ear and soft tissue pogonion.

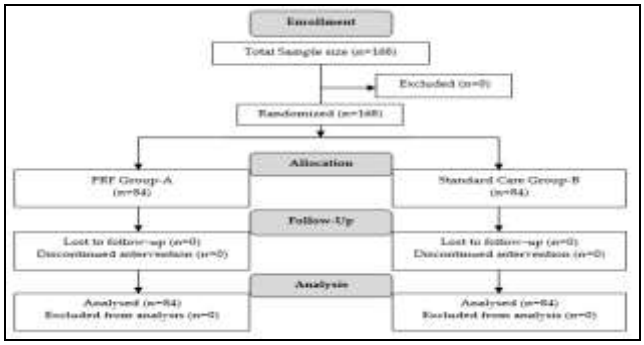

Figure: Patient Flow Diagram

Patients were randomly allocated to Group A (platelet-rich fibrin) and Group B (standard care) using balloting method. Before surgical extraction A 5ml blood without anticoagulant was obtained aseptically from the patient and centrifuged at 3000 rpm for 10 minutes. The blood was separated into three layers: the upper pale yellow colored plasma, the middle layer had PRF, and the lower red layer contained RBC. The upper layer was discarded, and PRF was collected approximately 2 mm below the lower line. The surgical extractions were done in sterile conditions under local anesthesia by consultant dental surgeon with ≥ 3-years post-fellowship experience. PRF was inserted in alveolus of each patients included in Group A. while the alveolus of patients in the Group B did not receive anything. The follow-up was on day three, the outcomes in the form of pain and facial swelling were assessed by the dental surgeon neither involved in the study nor aware of treatment assigned.

Data analysis using Statistical Package for the Social Sciences (SPSS) version 23 was done. The quantitative data i.e. age, facial swelling were given as mean with standard deviation and the VAS pain score was given as Median with IQR. The qualitative data i.e. gender was presented as frequency and percentages. Chi square test (for qualitative variables) Independent t-test (for normally distributed variables) and Mann-Whittney U-test (for non-normal data) were applied and p-value of ≤ 0.05 was considered as statistically significant.

RESULTS

The study included a total of 168 patients who met the inclusion criteria. Among these, There were 31(36.9%) males and 53(63.1%) females in Group A, 28(33.3%) males and 56(66.7%) females in Group B with insignificant *p*-value of 0.628 (Table-I). The mean age of the patients was 35.38±9.10 years, ranging from 18-55 years. Patients in Group A had mean age of 34.45±9.04 years and Group B was 36.30±9.12 years with *p*-value of 0.187. Mean facial swelling (Table-II) of patients included in this study was 10.47±1.58 mm. Mean facial swelling of patients in Group A was 9.75±1.33 mm and Group B was 11.19±1.48 mm with *p*-value of <0.001. The Median pain score was 3 (IQR: 2) of all the patients included in this study. The median pain score of patients in Group A was 2 (IQR: 2) and Group B was 4 (IQR: 1) with *p*-value of <0.001 (Table-III).

Table-I: Distribution of patients (n=168) according to Age and Gender (n=168)

Age (Years)		Total Patients (n=168)	Group A (Platelet-rich fibrin) (n=84)	Group B (Standard Care) (n=84)	*p*-value
Mean & S.D.		35.38±9.10	34.45±9.04	36.30±9.12	0.187
Gender	Male	59(35.1%)	31(36.9%)	28(33.3%)	0.628
	Female	109(64.9%)	53(63.1%)	56(66.7%)	

Table-II: Comparison of Mean Facial Swelling (mm) in Study Groups (n=168)

Facial Swelling (mm)	Total Patients (n=168)	Group A (Platelet-rich Fibrin) (n=84)	Group B (Standard Care) (n=84)	*p*-value
Mean±S.D (mm)	10.47±1.58	9.75±1.33	11.19±1.48	<0.001

Table-III: Comparison of Median VAS Pain Score in Study Groups(n=168)

Pain Score	Total Patients (n=168)	Group A (Platelet-rich Fibrin) (n=84)	Group B (Standard Care) (n=84)	*p*-value
Median (IQR)	3.00(2)	2.00(2)	4.00(1)	<0.001

DISCUSSION

Our study has clinical relevance to the patients who experience postoperative pain and swelling after surgical impaction. PRF has emerged as a favorable treatment option in this context. PRF is an autologous material,[6] meaning it is derived from patient's own blood, which minimizes the risk of adverse reactions and ensures a high level of biocompatibility. Its accessibility is another advantage,[7] as PRF is safe to use,[8] can be easily obtained through a simple blood draw and centrifugation process, making it a readily available option in clinical settings. Moreover, PRF is a cost-effective solution[9] compared to other regenerative materials, reducing the financial burden on both patients and healthcare providers. Its safety profile is well-established, with studies showing that PRF does not provoke immune reactions,[10,11] further ensuring its suitability for a wide range of patients.[12,13] This study analyzed significance between PRF and the pain reduction and swelling after surgical extraction. Kapse *et al.*,[14] evaluated post-operative pain using the VAS scale in Groups with autologous PRF. The study showed that pain was reduced in the PRF Group. Trybek *et al.*,[13] studied 90 patients in a comparative study between PRF and placebo Group. The difference of soft tissue edema was not significant between two Groups. In a study by Al-Hamed *et al.*,[15] fifty 3rd molars were surgical extracted, were included in a randomized controlled trial between PRF and placebo Group. Significantly less pain was recorded on 5th day. Saad *et al.*,[16] suggested that application of autologous PRF had beneficial effect on the healing of extraction sockets after 3rd molar extraction. Ozgul *et al.*,[17] stated that the PRF Group exhibited less swelling post extraction surgery compared to the control Group. Zahid *et al.*,[18] conducted a study where they simultaneously extracted impacted mandibular 3rd molars on both sides. They augmented one of the alveolar sockets with a PRF membrane which resulted in reduced swelling on the PRF-treated side compared to the control side.

In summary, the use of PRF in managing postoperative complications offers a combination of safety, effectiveness, and patient satisfaction, making it a valuable addition to postoperative care strategies in surgical impaction cases. This version provides more context and details about PRF, highlighting its benefits and relevance to patient care.

CONCLUSION

In our study, we observed that application of PRF reduce postoperative complications, such as pain and swelling after extraction of impacted mandibular third molar. PRF is an autologous material, can be considered as an effective method of reducing complications after surgical extractions in clinical practice.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

JP & SM: Data acquisition, data analysis, critical review, approval of the final version to be published.

TH & RZL: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

MA & MA: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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