Original Article

Role of Platelet-Rich Plasma (PRP) in Wound Healing after Surgical Extraction Mandibular Third Molar

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ABSTRACT

Objective: This Study looked into and discussed the role platelet-rich plasma plays in the healing of wounds after surgical extraction of the third tooth. It seeks to provide a general review of PRP, its composition, and its possible advantages over the Study group's control group, which had no PRP insertion, in terms of pain, healing, and swelling.

Study Design: A prospective, randomized, comparative study

Place and Duration of Study: This study was conducted at the Oral & Maxillofacial Surgery Department, Punjab Dental Hospital in Lahore from January 2022 to June 2023.

Materials and Methods: The 38 patients who had surgical excision of their mandibular third molars were 19 males and 19 women. PRP was implanted but not in Group B, which included the patients (the control group), which was Group A, the Study group. Edoema, healing, and pain were assessed during the study at several time points (24 hours, three days, seven days, and 14 days).

Results: Both groups' demographics were comparable, with an average age of 27.4 years (range, 18–40 years) and a similar distribution of genders. Comparing the PRP group to the control group, different elements of wound healing indicated a substantial improvement in the PRP group. Pain: The PRP group had significantly decreased pain after 24 hours (p 0.05), three days (p 0.01), and seven days (p 0.02) when compared to the control group. This implies that effective PRP use may minimise postoperative pain.2. edoema: Patients in the PRP group had significantly decreased edoema after three days (p0.01) and seven days (p0.01) when compared to the control group.3.Healing: A study of the overall healing of the wounds revealed that the PRP group healed more rapidly and more effectively than the control group. In comparison to the control group's 47% level of epithelialization seven days after surgery, 84% of the PRP group showed complete epithelialization. Additionally, after 14 days, 100% of the PRP group exhibited complete epithelialization compared to 68% of the control group.

Conclusion: This comprehensive study provides evidence supporting the beneficial effects of PRP in the wound healing process after the surgical removal of the third molars on the mandible. By lowering postoperative pain and edoema, PRP usage significantly improved overall healing outcomes. When utilised as an adjuvant therapy in oral surgical procedures, PRP may enhance patient care and recovery.

Key Words: 3rd molar healing, PRP, pain, swelling

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INTRODUCTION

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Surgical Extraction of the mandibular 3rd molar, commonly known as wisdom tooth extraction, is a frequently performed oral surgery procedure. After Extraction, proper wound healing is crucial to prevent complications such as infection, dry socket, and delayed healing.[1] platelet. Rich plasma has gained significant attention recently for its potential to enhance wound healing processes. This article explores the role of PRP in wound healing after surgical Extraction of the mandibular 3rd molar and its potential benefits in improving patient outcomes.[2,3]. PRP is an autologous blood plasma that has been purified to have a high concentration of platelets and different growth factors. Platelets may play a vital role in wound healing by initiating and promoting tissue repair processes[4]. When activated, platelets released growth factor such as platelet-derived growth factor (PDGF), Transforming

growth factor-beta (TGF-B) and vascular endothelial growth factor (VEGF), Among others these growth factor stimulate cell migration ,proliferation and differentiation ,thereby accelerating wound healing[5]. PRP Application in wound healing : the use of PRP in wound healing has shown promising results in various medical and surgical discipline in (oral and maxillofacial surgery), PRP has been utilized to enhance tissue regeneration ,reduce postoperative complications, and expedite the healing process[6]. After the surgical Extraction of mandibular 3rd molars, the application of PRP to the extraction socket may provide several benefits Accelerated soft tissue healing: PRP promotes angiogenesis the formation of new blood vessels which improves blood supply to the wound area[7]. The increased blood flow facilitates the delivery of oxygen, nutrients, and immune cells, thereby accelerating soft tissue healing. Enhanced bone Regeneration: PRP has the potential to improve bone regeneration by stimulating osteoblast activity, which is essential for new bone formation[8]. It can be particularly beneficial cases where bone loss or damage occurs during the extraction procedures Reduction in postoperative complications. The antimicrobial properties of PRP help reduce the risk of postoperative infection a common concern after mandibular third molar Extraction.

Additionally, the use of PRP may reduce the occurrence of dry socket, a painful condition brought on by the loss or dislodging of the blood clot in the extraction socket[9]. Improved patient comfort and satisfaction The accelerated healing and reduced complications associated with PRP application can lead to improved patient comfort and joy. Patients may experience less postoperative pain, swelling, and discomfort, allowing for a smoother recovery process[10]. There is a decreased incidence of alveolar osteitis after using PRP at 3.4% compared to 12.8% in non-PRP-treated patients. Extraction of the impacted teeth can lead to multiple postoperative complications, commonly in older patients and immuno-compromised patient[11,12]. This study was carried out to promote wound healing by using PRP in the extracted sockets after surgical Extraction to reduce pain, swelling, and accelerated soft tissue healing[13].

MATERIALS AND METHODS

Study Design: This was a prospective, randomized, comparative study conducted at the Punjab (Dental Hospital's and De' Montmorency College of Dentistry's) departments of oral and maxillofacial surgery; ethical permission was acquired. Before being enrolled in the Study, every subject gave their signed, informed permission.

Patient Selection: The research comprised 38 individuals who needed surgical removal of a third molar and were between the ages of 18 and 40. Patients having a history of bleeding disorders, systemic conditions that interfere with wound healing, or those who were already on antiplatelet or anticoagulant medication were disqualified.

Data Collection: Age, gender, and dental hygiene habits were among the demographic information gathered. Patients were divided into Groups A and B at random. One oral and maxillofacial surgeon had surgical Extraction of all mandibular third molars. Incisions were produced lingually for lingual impaction and buccally for buccal impaction. PRP was solely administered to the extraction site in Group A of the Study and Group B of the control. The surgeon evaluated edema at 24 hours, three days, seven days, and 14 days after surgery, as well as postoperative pain on a five-point verbal rating scale (VRS) (none, mild, moderate, severe, agonizing).7 and 14 days, respectively, was used to evaluate oral hygiene behaviors and overall wound healing.

Statistical Analysis: Data analyzation done by using SPSS software version 26 Mann-Whitney and t-tests were used for quantitative data, and the chi-square test was used for qualitative data. All comparisons were conducted at a 5% level of significance.

RESULTS

The average age of both groups was 27.4 years (range 18-40 years) and gender distribution was similar. The PRP group outperformed the control group in several wound healing areas. Pain: The PRP group had significantly reduced pain after 24 hours [p-0.05], three days [p-0.01], and 07 days than the control group. This implies that PRP may reduce postoperative pain.2. Swelling: After three and seven days, PRP patients had significantly reduced swelling than the control group (p0.01).3.Wound healing: The PRP group recovered quicker and better than the control. Seven days after surgery, 84% of the PRP group exhibited full epithelialization, in comparison to 47% of the controls group..100% of the PRP group showed complete epithelialization after 14 days, compared to 68% of the control group.

Pain assessment: Postoperative pain was assessed using a visual analogue scale. It's interesting to note that the study group had less discomfort than the control group. Statistics indicate a little difference. In the first six hours after surgery, the study group's mean pain score was 2.5 on a scale of 0–10, compared to 5.8 for the control group. The study group had 1.9 after 24 hours, whereas the control group had 4.3.1.3 in the study group and 3.6 in the control group on the third day; 0.8 and 2.4 on the seventh.

Assessment of swelling: Postoperative facial swelling was assessed on the (1st,3rd,7th, and 14th) days after tooth extraction. The study revealed a noteworthy disparity in facial swelling between the two groups during these observation periods.

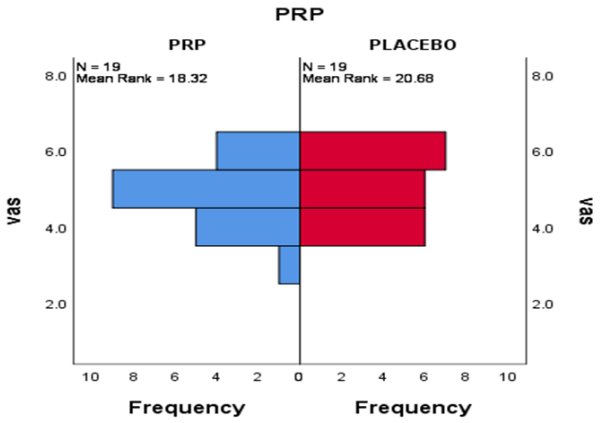

Figure No. 1: Independent-samples Mann-whiney U-Test

Soft tissue healing assessment: On the third postoperative day, when soft tissue healing was assessed, the study group's mean value was 3.0 and the control group's was 2.63 (P=0.00). On the seventh postoperative day, the study group's mean value was 3.95, while the control group's was 3.42 (P=0.030). On the fourteenth postoperative day, the Study group's average value was 4.74, while the control group's was 4.45 (P=0.594).

Table No. 1: The frequency of Gender wise and percentage

Gender	Frequency	Percent	Percent	Cumulati -ve Percent
male	[20]	[52.6]	[52.6]	[52.6]
female	[18]	[47.4]	[47.4]	[100.0]
Total	[38]	[100.0]	[100.0]	

Table No. 2: Finding of group statistics of postoperative

Group Statistics					
POSTOPERATIVE DAY	GROUP	N	Mean	Std. Deviation	Std. Error Mean
day1	Study	19	9.1579	.89834	.20609
	Control	19	10.7895	.78733	.18063
day3	Study	19	6.0000	.74536	.17100
	Control	19	7.8947	.80930	.18567
day7	Study	19	4.0000	.88192	.20233
	Control	19	5.9474	.77986	.17891
day14	Study	19	3.0526	.84811	.19457
	Control	19	4.1579	.83421	.19138

Table No. 3: Statistics of Soft Tissue Healing

Postoperative day	GROUP	N	Mean	Std. Deviation	Std. Error Mean
3rd day	Study Group	19	3.00	.000	.000
	Control Group	19	2.63	.496	.114
7th day	Study Group	19	3.95	.524	.120
	Control Group	19	3.42	.607	.139
14th day	Study Group	19	4.74	.452	.104
	Control Group	19	4.16	.602	.138

DISCUSSION

The findings presented in the study highlight the significant potential of platelet-rich plasma (PRP) in promoting soft tissue healing after surgical procedures[14]. PRP contains bioactive proteins and growth factors that are known to play key roles in the wound healing process, stimulating cellular activities and accelerating tissue repair. This, combined with the scaffold provided by the high concentration of viable platelets in PRP, creates a favorable environment for cellular movement and proliferation at the wound site[15]. The findings of the study suggest that PRP administration may positively impact pain management after the surgical Extraction of third molars. PRP's abundance in growth factors hastens tissue healing, which may help to lessen pain and inflammation brought on by the surgical incision. Even though further investigation is required to pinpoint the specific mechanisms behind PRP's analgesic effects, early results are encouraging for its potential use in improving postoperative patient comfort[16]. The investigation of PRP's potential to reduce post-extraction edema is another area of Study. Swelling management is crucial for maintaining patient comfort and minimizing potential complications. Swelling is a common adverse reaction to oral operations. The study's results suggest that PRP treatment may reduce edema due to its ability to encourage tissue regeneration and boost the body's natural healing mechanisms.

Another crucial aspect that the Study looks at is the effect of PRP on soft tissue repair[17]. Because PRP contains growth factors that promote tissue regeneration, the surgical wound site may heal more quickly. The study's results are promising and imply that PRP may be useful in enhancing soft tissue healing, which hastens recovery and improves the outcomes of wound healing in general[18].

CONCLUSION

The effect of platelet-rich plasma (prp) in wound healing after surgical extraction of third molars is discussed in detail in this paper. The Study examines the control of pain, the decrease of swelling, and the repair of soft tissues as factors and hypothesizes that the injection of prp may be promising in enhancing these elements of postoperative recovery. the most efficient prp application methods for oral surgical operations must be determined via further, more in-depth, and controlled investigations, which will corroborate these results. by building on this study, clinicians may improve patient outcomes and satisfaction in the treatment of third molar extractions.

Future Finding: future Study on the benefits of prp on wound healing after the extraction of mandibular third molars would include bigger sample numbers evaluated over longer periods and give more clear data. furthermore, greater Study on various application strategies will help determine the best dosage and methods for clinical results.

Author's Contribution:

Concept & Design of Study:	Shahid Ali
Drafting:	Zohra Rahim, Rafay Mannan
Data Analysis:	Ali Farooq, Shahzad Babbar, Kashif Khattak.
Revisiting Critically:	Shahid Ali, Zohra Rahim
Final Approval of version:	Shahid Ali

Conflict of Interest: The study has no conflict of interest to declare by any author.

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