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Platelet-Rich Fibrin and Post-Extraction Healing in Patients Aged 70 Years or Older with Type 2 Diabetes: A Prospective Comparative Clinical Study

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Abstract
Background: Platelet-rich fibrin (PRF) may promote post-extraction healing. Objective: To compare postoperative pain, clinical healing and complications among patients aged ≥70 years with type 2 diabetes mellitus. Methods: This prospective comparative clinical study included 40 patients (20 PRF and 20 controls). Pain was evaluated using the visual analogue scale (VAS, 0–10) on postoperative days 1, 3 and 7, and healing on days 7 and 14. Results: Mean VAS scores in the PRF and control groups were 0.40 versus 3.80 on day 3 and 0.15 versus 1.80 on day 7 (both $p<0.001$). Mean healing scores were 3.45 versus 2.55 on day 7 ($p=0.00075$) and 3.80 versus 3.50 on day 14 ($p=0.219$). A mixed 2 × 3 ANOVA indicated a group-by-time interaction for pain (reported $F(2,76)=45.38$; $p<0.001$; partial $\eta^2=0.544$). Complication rates did not differ significantly. Conclusion: PRF was associated with reduced postoperative pain and better early clinical healing in this cohort; the apparent benefit was most pronounced during early recovery.

Keywords: *platelet-rich fibrin; type 2 diabetes mellitus; tooth extraction; postoperative pain; socket healing.*

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I. INTRODUCTION

Tooth extraction initiates a complex sequence of haemostasis, inflammation, cellular proliferation and tissue remodelling. The integrity of the initial clot, angiogenesis, granulation tissue formation and epithelialisation influence recovery. Pain is also a clinically relevant measure of postoperative patient experience.

Oral surgical care in patients aged 70 years or older requires attention to systemic conditions that can alter tissue repair. In type 2 diabetes mellitus, disturbances in microcirculation, immune function and collagen metabolism may influence wound healing. The magnitude of this effect depends on metabolic control and patient-specific factors; consequently, local interventions should be evaluated in well-defined clinical populations.

Post-extraction pain, oedema, alveolitis and infection are clinically meaningful outcomes. Serial assessment of pain using a visual analogue scale (VAS) describes the trajectory of symptoms, while a clinical healing score offers complementary information about wound recovery. Assessing both outcomes provides a more complete picture than either measure alone.

Platelet-rich fibrin (PRF) is an autologous biomaterial prepared by centrifuging blood without added anticoagulants. Its three-dimensional fibrin network contains platelets and other cellular constituents that may support clot organisation, cellular migration and tissue regeneration. Product characteristics depend on centrifugation conditions and handling [3,6,7].

Systematic reviews and clinical investigations have considered the effects of PRF on extraction socket healing, pain and soft-tissue recovery [1,2,6–12]. However, heterogeneity in preparation protocols, extraction procedures, patient characteristics and assessment tools limits direct comparisons. Older patients with type 2 diabetes represent a clinically important population in which the potential value of autologous local measures deserves focused evaluation.

The objective of this prospective comparative study was to compare postoperative pain, clinical socket healing and complications after dental extraction in 40 patients aged ≥70 years with type 2 diabetes mellitus, allocated to PRF (n=20) and control (n=20) groups. Antibiotic prescribing is a separate clinical decision guided by individual indications rather than an inherent component of PRF treatment [4,5].

II. AIM

To evaluate and compare postoperative pain, clinical wound healing and complications after dental extraction in patients aged ≥70 years with type 2 diabetes mellitus, with and without local PRF application.

III. MATERIALS AND METHODS

Study design and participants. This prospective comparative clinical study included 40 patients with type 2 diabetes mellitus aged 70 years or older. Twenty patients received PRF and 20 formed a control group without PRF. Analyses were based on individual patient records, as reported in the source manuscript. The recruitment setting, exact recruitment dates, allocation procedure and baseline group characteristics were not specified in the supplied manuscript and require confirmation before submission.

Intervention. Following dental extraction, a PRF plug was inserted into the extraction socket in the intervention group; no PRF was used in the control group. PRF was prepared from venous blood in sterile tubes without anticoagulant using a Biobase centrifuge at 1,300 rpm for 8 minutes. The source document does not specify the blood volume, rotor radius/relative centrifugal force, number and complexity of extractions, or details of concurrent postoperative treatment.

Outcome assessment. Postoperative pain was recorded on days 1, 3 and 7 using a 0–10 VAS. Clinical healing was scored on an ordinal 0–4 scale on days 7 and 14, with higher scores indicating better healing. Oedema, alveolitis and infection were also recorded. Operational definitions of each healing grade and complication should be provided from the original study protocol.

Statistical analysis. The source manuscript reports a mixed 2 × 3 repeated-measures ANOVA for VAS, with group as the between-subject factor and time as the within-subject factor. It reports F statistics, p values and partial eta squared, with Greenhouse–Geisser correction for time-related effects. Between-group comparisons by visit used Mann–Whitney tests with Holm adjustment; ordinal healing outcomes used Mann–Whitney tests and complications used Fisher's exact test. Statistical significance was set at 0.05. The analyses have not been independently recalculated from patient-level data in preparing this version.

IV. RESULTS

On postoperative day 1, mean VAS was 4.20 ± 0.95 in the PRF group versus 5.00 ± 1.34 in controls (p=0.0619). On day 3, the corresponding scores were 0.40 ± 0.50 and 3.80 ± 1.06 (p<0.001); on day 7 they were 0.15 ± 0.37 and 1.80 ± 1.51 (p<0.001). The source manuscript reports a significant group-by-time interaction in the mixed ANOVA ($F(2,76)=45.38$; p<0.001; partial $\eta^2=0.544$; Table 1).

Mean clinical healing score on day 7 was 3.45 ± 0.60 with PRF versus 2.55 ± 0.83 in controls (Mann–Whitney p=0.000751; significant after Holm correction). By day 14, the respective values were 3.80 ± 0.41 and 3.50 ± 0.76 (p=0.2192; Table 2).

Oedema was reported in 6/20 patients in each group, alveolitis in 0/20 PRF patients and 2/20 controls, and infection in 3/20 patients in each group. None of the between-group comparisons was statistically significant (Table 3).

Table 1. Mixed ANOVA for postoperative pain (VAS)

Effect	F (df)	Reported p	Partial η^2
Group	46.35 (1, 38)	<0.001	0.550
Time	355.58 (2, 76)	<0.001	0.903
Group × time	45.38 (2, 76)	<0.001	0.544

Note: F values and uncorrected degrees of freedom are reproduced as supplied; the source describes Greenhouse–Geisser correction but does not provide corrected degrees of freedom or epsilon.

Table 2. Postoperative pain and clinical healing by group

Outcome	PRF (n=20), mean ± SD	Control (n=20), mean ± SD	p; Holm-adjusted p
VAS, day 1	4.20 ± 0.95	5.00 ± 1.34	0.0619; 0.1238
VAS, day 3	0.40 ± 0.50	3.80 ± 1.06	<0.001; <0.001
VAS, day 7	0.15 ± 0.37	1.80 ± 1.51	<0.001; <0.001
Healing, day 7	3.45 ± 0.60	2.55 ± 0.83	0.00075; 0.00225
Healing, day 14	3.80 ± 0.41	3.50 ± 0.76	0.219213; 0.219213

Table 3. Postoperative complications by group

Complication	PRF (n=20)	Control (n=20)	Fisher p

Oedema	6/20 (30%)	6/20 (30%)	1.0000
Alveolitis	0/20 (0%)	2/20 (10%)	0.4872
Infection	3/20 (15%)	3/20 (15%)	1.0000

V. DISCUSSION

In this prospective comparative clinical study of older adults with type 2 diabetes, local PRF application was associated with a more favourable early postoperative recovery profile. Differences were most apparent for pain on days 3 and 7 and clinical healing on day 7. By day 14, healing scores had increased in both groups and the between-group difference was no longer statistically significant.

The marked difference in mean VAS on day 3 (0.40 with PRF versus 3.80 without PRF) is potentially relevant to patients' early postoperative comfort. The reported group-by-time interaction suggests that pain changed differently over the observation period in the two groups. Nevertheless, the magnitude and reliability of this effect should be interpreted with caution until the underlying repeated-measures dataset and model assumptions have been independently checked.

The higher mean healing score in the PRF group on day 7 is consistent with a potential benefit during the early organisation of the wound. PRF provides a fibrin scaffold that may support cell migration and soft-tissue repair [6,7]. However, this study assessed clinical outcomes rather than histological regeneration or concentrations of growth factors; the proposed biological mechanism therefore remains an explanation supported by external evidence rather than a directly measured study result.

The findings are broadly compatible with published reviews examining PRF and extraction socket healing [1,2,6,7]. Research in third-molar surgery has also evaluated postoperative pain and tissue recovery [8–12]. Comparisons must remain cautious because many of those studies enrolled different populations and used different PRF preparations and surgical procedures.

Alveolitis was observed in none of the PRF patients and two controls, but this difference was not statistically significant. Oedema and infection frequencies were identical across groups. These results do not establish a reduction in postoperative complications. PRF should be viewed as a possible adjunct to, not a replacement for, appropriate surgical care, metabolic assessment or indicated infection management.

This study has limitations, including a modest sample size and restricted age/diabetes population. The supplied manuscript does not detail allocation procedures, baseline glycaemic status, extraction complexity, analgesic/antibiotic exposure or operational definitions for the healing scale. These factors could influence postoperative outcomes and limit generalisability. The source manuscript also reports a Greenhouse–Geisser correction without its adjusted degrees of freedom; this should be reconciled against the original statistical output before publication.

Future studies with transparent allocation methods, standardised PRF protocols, clearly defined outcome measures and detailed reporting of metabolic and perioperative variables could clarify which patients benefit most and whether early differences persist over longer follow-up.

VI. CONCLUSION

Among 40 patients aged 70 years or older with type 2 diabetes mellitus, local PRF application was associated with lower pain scores on postoperative days 3 and 7 and improved clinical healing on day 7. The difference in healing on day 14 and the observed differences in complication rates were not statistically significant. PRF may be a useful adjunct for early post-extraction recovery, although further adequately reported studies are needed.

ETHICAL AND ADMINISTRATIVE DECLARATIONS

Ethics approval and informed consent. According to the authors' statement in the supplied manuscript, ethical approval covered all 40 participants (20 PRF and 20 controls), and written informed consent was obtained before study participation. The name of the approving body, approval identifier and date were not supplied and should be checked against the approval document before submission.

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