

Evaluation of Treatment Outcome After Impacted Mandibular Third Molar Surgery With the Use of Autologous Platelet-Rich Fibrin: A Randomized Controlled Clinical Study

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Purpose: To assess the effect of platelet-rich fibrin (PRF) on postoperative pain, swelling, trismus, periodontal healing on the distal aspect of the second molar, and progress of bone regeneration in mandibular third molar extraction sockets.

Materials and Methods: Over a 2-year period, 31 patients (mean age, 26.1 yr) who required surgical extraction of a single impacted third molar and met the inclusion criteria were recruited. After surgical extraction of the third molar, only primary closure was performed in the control group, whereas PRF was placed in the socket followed by primary closure in the case group (16 patients). The outcome variables were pain, swelling, maximum mouth opening, periodontal pocket depth, and bone formation, with a follow-up period of 3 months. Quantitative data are presented as mean. Statistical significance was inferred at a P value less than .05.

Results: Pain ($P = .017$), swelling ($P = .022$), and interincisal distance ($P = .040$) were less in the case group compared with the control group on the first postoperative day. Periodontal pocket depth decreased at 3 months postoperatively in the case ($P < .001$) and control ($P = .014$) groups, and this decrease was statistically significant. Bone density scores at 3 months postoperatively were higher in the case group than in the control group, but this difference was not statistically important.

Conclusions: The application of PRF lessens the severity of immediate postoperative sequelae, decreases preoperative pocket depth, and hastens bone formation.

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The optimal management of impacted mandibular third molars continues to challenge clinicians.¹ Numerous indications for surgical extraction of third molars have been outlined, one of which is the prevention or repair of periodontal defects in adjacent second molars. A partially impacted third molar exposed to the oral environment is more susceptible

to periodontal infection and thus to greater periodontal attachment loss.² There appears to be a subpopulation of patients having third molars removed that are at "high risk" for periodontal defects after third molar removal (ie, >26 yr of age; pre-existing periodontal defects [attachment level, >3 mm; probing depth, >5 mm]; and horizontal or mesioangular

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impaction). When these 3 risk factors are present concurrently, there does appear to be a predictable benefit to reconstructing the dentoalveolar defect at the time of extraction.³

The immediate postoperative sequelae after third molar surgery include pain, swelling, and trismus, and delayed sequelae are seen mostly on the distal surface of the second molar owing to distal bone loss, which include prolonged sensitivity due to root exposure or increased probing depth. Autologous platelet concentrates, such as platelet-rich plasma (PRP) and platelet-rich fibrin (PRF), are widely used for superior wound healing. PRF, a second-generation platelet concentrate, has been shown to have a more sustained release of growth factors; it is a simplified processing technique with minimal biochemical blood handling compared with PRP.⁴ Evidence of the effect of PRF on postoperative sequelae after third molar surgery is sparse. Therefore, this study was undertaken to assess the influence of PRF on wound-healing characteristics of the socket and the defect distal to the second molar after surgical extraction of mesioangular or horizontal impactions.

Materials and Methods

This study included patients reporting to an outpatient department for the surgical removal of mesioangular or horizontally impacted mandibular third molars from December 2011 to July 2013. The protocol for the study was approved by the institutional ethics committee. After preoperative evaluation and obtaining written informed consent, 31 male and female patients who could follow postoperative instructions were selected for the study. Inclusion criteria were healthy patients 19 to 35 years old, mesioangular or horizontal mandibular third molar impaction, and a preoperative platelet count higher than 150,000/mm³. Exclusion criteria were patients in whom the second molar was missing or was indicated for extraction, patients with any underlying systemic disease or compromised immunity, and pregnant or lactating women.

Patients were randomized by the closed-envelope method and divided into 2 groups. In the case group (16 patients), the impacted mandibular third molar was surgically removed and 5 mL of venous blood was drawn and centrifuged at 3,000 rpm for 10 minutes to prepare the PRF, which was placed into the extraction socket followed by flap approximation. The control group (15 patients) was treated with surgical removal of the impacted mandibular third molar and flap reapproximation.

Patients were not started on any preoperative antimicrobials or other drugs that might influence healing, and a common protocol of investigations and interventions was followed for all patients. Preoperative inves-

tigations included an intraoral periapical radiograph (IOPAR) of the impacted third molar by the parallel-cone technique, a panoramic radiograph (OPG), and platelet count. Oral prophylaxis was performed for all patients preoperatively. The Silness-Loe gingival and plaque index was recorded. Pocket depth was measured using a UNC 15 periodontal probe taken from the margin of the gingiva to the base of the pocket along the distal surface of the mandibular second molar at 3 points (distobuccal, mid-distal, and distolingual) by a single evaluator.

OPERATIVE PROCEDURE

A standardized operative procedure was carried out by a single right-handed operator for all patients after appropriate preoperative evaluation. Under strict aseptic precautions, 2% lignocaine with 1:200,000 adrenalin was used and an inferior alveolar nerve block was given. A modified Ward incision was performed and a full-thickness mucoperiosteal flap was raised. The tooth was exposed with a round bur, after which buccal guttering was performed using a straight fissure bur. Tooth sectioning was performed as deemed necessary after preoperative radiographic evaluation and the tooth was delivered with elevators. After tooth extraction, the socket was thoroughly irrigated and freed from pathologic tissue (eg, granulation tissue), follicular remnants, and bony spicules. In the case group, after the tooth was delivered, 5 mL of venous blood was drawn and centrifuged at 3,000 rpm for 10 minutes and PRF was obtained. The PRF was inserted into the extraction socket and then closure was performed using 3-0 Mersilk. In the control group, primary closure was performed using 3-0 Mersilk sutures. The average operative time from incision to suturing was 30 to 45 minutes. Postoperatively, all patients were started on a 3-day course of amoxicillin 500 mg thrice daily, metronidazole 400 mg thrice daily, a combination of aceclofenac and paracetamol twice daily, and chlorhexidine mouthwash thrice daily. All patients were given instructions on the importance of maintaining oral hygiene and jaw physiotherapy postoperatively. Suture removal was performed on postoperative day 7.

FOLLOW-UP

Patients were evaluated and compared preoperatively, postoperatively on the first postoperative day, at 1 month, and at 3 months. Pain and swelling were recorded on a visual analog scale according to Pasqualini et al⁵ on the first postoperative day, at 1 month, and at 3 months. Interincisal distance was evaluated using a divider and a scale on the first postoperative day, at 1 month, and at 3 months. Pocket depth was measured at 1 and 3 months postoperatively and compared with preoperative values. Radiographic evaluation of the

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