Acta Odontologica Turcica
The official journal of Gazi University Faculty of Dentistry
DOI: http://dx.doi.org/10.17214/gaziaot.281897

Original research article

Effect of platelet-rich fibrin in reducing postoperative complications after impacted third molar surgery: a prospective, randomized controlled clinical trial

Alparslan Esen,* Dilek Menziletoğlu, Bozkurt Kubilay Işık

Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Necmettin Erbakan University, Konya, Turkey

Abstract

Objective: The first aim of this study was to evaluate the effect of platelet-rich fibrin (PRF) on pain, swelling, and trismus after mandibular impacted third molar surgery without the use of postoperative antibiotics. A second aim was to evaluate the patients' quality of life (QOL) during the postoperative period.

Materials and Method: Forty patients, who had bony impacted, mesio-angular mandibular third molars that were fully covered with mucosa, were selected. Patients were divided into two groups: PRF was placed in the socket in the first group and, traditional surgery was performed in the second group (the socket was left empty). The same surgeon performed all surgeries under local anesthesia. No antibiotics were prescribed after surgery. The outcome variables were pain, swelling, trismus, and QOL over a follow-up period of seven days.

Results: The mean age of the patients was 23.3 (±3.9) years in the first group, and 23.3 (±4.6) years in the second group. Statistical analyses of the postoperative results showed that there were no significant differences between the groups with regard to pain, swelling, trismus, and QOL scores (p>0.05).

Conclusion: The present study showed that PRF use had no significant effect on the postoperative pain, swelling, trismus, and QOL after impacted third molar surgery.

Keywords: Oral surgery; pain; quality of life; tooth, impacted; trismus

Citation: Esen A, Menziletoğlu D, Işık BK. Effect of platelet-rich fibrin in reducing postoperative complications after impacted third molar surgery: a prospective, randomized controlled clinical study. Acta Odontol Turc 2017;34(2):46-9

Editor: Güven Kayaoğlu, Gazi University, Ankara, Turkey

Received: August 18, 2016; Accepted: December 28, 2016
*Corresponding author: Dr. Alparslan Esen, Necmettin Erbakan Üniversitesi, Diş Hekimliği Fakültesi, Ankara Cad., No:74/A, 42050, Konya, Turkey; E-mail: dtaesen@hotmail.com

Introduction

Third molar surgery is one of the most commonly performed procedures in oral surgery. Pain, swelling, and trismus are the usual complications of this procedure, and they are thought to be a result of inflammatory response.[1] These complications can not only affect a patient's quality of life but also lead to labor loss.[2] Therefore, investigations for providing comfort to patients undergoing this procedure are becoming increasingly important.

Recently, autologous platelet concentrates such as platelet-rich plasma (PRP) or platelet-rich fibrin (PRF) have been widely used in treatment procedures.[3,4] PRF was identified for the first time in 2006 as a second-generation platelet concentrate that contains various autologous cytokines, immune cells, and growth factors.[5,6] It is a simplified and cost-effective concentrate and does not require biochemical handling of blood unlike PRP.[5] PRF applications have been implemented in many areas of oral surgery, such as dental implantology, sinus lift procedures, and cyst surgeries.[7-9] However, there are only few studies regarding the effect of PRF on complications following third molar surgery.[4,10]

The aim of this study was to evaluate the effect of PRF on postoperative pain, swelling, and trismus following impacted third molar surgery. Furthermore, patient's quality of life (QOL) was assessed postoperatively.

Materials and Method

This study was approved by the Ethics Committee of Dentistry Faculty of Necmettin Erbakan University (document no: 2015/006) and was performed between December 14, 2015 and May 13, 2016 at the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Necmettin Erbakan University. Forty patients (14

males and 26 females; age range: 18–33 years) with bony impacted, fully mucosa-covered, mesio-angular mandibular third molars were selected. The patients had no systemic disease that could affect the surgery or wound healing, and there was no pathological radiolucency around the teeth. Pregnant or lactating women were excluded.

Informed consent was obtained from all patients and they were randomly divided into two groups. All surgeries were performed under local anesthesia by the same surgeon (A.E.) using a standard operating technique. Briefly, a triangular mucoperiosteal flap was raised, and bone was removed using a round bur cooled with physiological saline solution (0.9% NaCl). After the tooth was separated, it was removed, and the socket was thoroughly irrigated with the physiological saline solution. The wound was closed using (3-0) silk sutures (Troge, Troge Medical Gmbh, Hamburg, Germany). In the first group (20 patients), preoperatively, 20 mL of venous blood was drawn and centrifuged at 3000 rpm for 10 min to prepare PRF. After tooth removal, PRF was placed into the socket before flap closure. No PRF was applied in the second group (20 patients), and the socket was left empty. Operation times were also recorded for each group.

Postoperatively, a 5-day course of nonsteroidal anti-inflammatory drug (100 mg flurbiprofen twice daily; Majezik, Sanovel İlaç, Istanbul, Turkey) and antiseptic mouthwash (0.12% chlorhexidine gluconate + 0.15% benzydamine hydrochloride every 8 h; Kloroben, Drogsan İlaç, Ankara, Turkey) were initiated in all the patients. None of the patients received antibiotics postoperatively. Sutures were removed on the seventh postoperative day.

All patients were provided two forms. The first form contained two verbal rating scales ranging from 0 (no pain and no swelling) to 5 (unbearable pain and extremely severe swelling), showing the degree of pain and swelling records. Patients were asked to complete the form on the first, third, and seventh postoperative days. The second form contained numbers from 0 to 100 indicating the QOL. Scores ranged from extremely poor (0) to excellent quality of life (100). Patients were asked to complete the second form on the seventh postoperative day.

Interincisal distance was measured using a ruler preoperatively and on the seventh postoperative day. Another surgeon (D.M.) who was blinded to the operative procedures in order to eliminate inappropriate bias performed the postoperative assessments.

Statistical analyses were performed using SigmaPlot software (v12.5, Systat Software Inc., Richmond CA, USA). Pain, swelling, and QOL scores were analyzed using Mann–Whitney U test. Preoperative and postoperative mouth opening measurements were compared using Student's t-test. Significance level was set at $p<0.05$.

Results

The mean age of the sample population was 23.3±3.9 years in the first group, and 23.3±4.6 years in the second group. There were 12 females and 8 males in the first group, and 14 females and 6 males in the second group. No significant differences were observed between the two groups regarding age, gender distribution, and operation time ($p>0.05$; Table 1). Moreover, there were no significant differences among the groups regarding postoperative pain, swelling, mouth opening, and QOL scores ($p>0.05$; Tables 2 and 3).

Table 1. *Demographic information of the patients and mean operation time*

	Group 1 (PRF)	Group 2 (Control)
Number of patients	20	20
Male	8	6
Female	12	14
Mean (SD) age	23.3 (3.9)	23.3 (4.6)
Maximum age	30	33
Minimum age	18	18
Mean operation time (min)	14.75	14.25

PRF: platelet-rich fibrin; SD: standard deviation

Table 2. *Pain and swelling scores of the groups at the 1st, 3rd and 7th days after the surgery*

	Postoperative evaluation time	Group 1 (PRF) median/mean	Group 2 (Control) median/mean	p value*
Pain	1st day	2.5 / 2.6	2 / 2.7	0.945
	3rd day	2 / 1.8	1 / 1.4	0.165
	7th day	0 / 0.6	0 / 0.4	0.221
Swelling	1st day	2 / 2.6	2 / 2.6	1.000
	3rd day	3 / 2.8	2 / 2.2	0.150
	7th day	0 / 0.5	0 / 0.3	0.255

**Mann–Whitney U test; PRF: platelet-rich fibrin*

Table 3. *Preoperative and postoperative mouth opening rates, and QOL scores for the groups*

	Group 1 (PRF) mean (SD)	Group 2 (Control) mean (SD)	p value
Preoperative mouth opening (mm)	43.80 (5.64)	42.70 (4.21)	0.489*
Postoperative mouth opening (mm)	41.25 (8.05)	38.65 (6.77)	0.276*
QOL	68.00 (11.63)	66.25 (19.53)	0.956**

**Student's t-test; **Mann–Whitney U test; PRF: platelet-rich fibrin; SD: standard deviation; QOL: quality of life*

Discussion

Impacted third molar surgery is a commonly performed procedure in oral surgery. Some complications that reduce patients' QOL, such as pain, swelling, and trismus, may occur following the surgery. Therefore, clinical trials are necessary to identify methods for improving patient's QOL after surgery.[11] In this study, we applied PRF to the socket of the extracted tooth in the first group. Our goal was to examine whether the symptoms of pain, swelling, and trismus in the immediate postoperative period were relieved.

Pain, swelling, and trismus are common complications of third molar surgery. Pain may be related to the healing process in general, and the postoperative healing depends on different variables such as age, bone removal, surgeon experience, and operation time. In the present study, tooth separation and bone removal were performed by the same surgeon in all the patients. Besides, there were no significant differences between the two groups regarding age distribution and operation time.

Swelling is also a common complaint caused by edema associated with surgical trauma. It reaches the maximum level on the second or third postoperative day and normally diminishes by the fourth day. It should be completely resolved by the seventh day.[12] In the present study, maximum swelling scores were observed on the third postoperative day in both groups, but no significant differences were found between the groups. Furthermore, there was no significant difference between the groups regarding trismus. A decrease in the mouth opening was observed in both groups postoperatively.

Kumar *et al.*[4] evaluated the effect of PRF on postoperative sequel after third molar surgery. They reported that the application of PRF decreased pain, swelling, and trismus on the first postoperative day. Ozgul *et al.*[10] also investigated the efficacy of PRF in the reduction of pain and swelling after impacted third molar surgery, and they reported more swelling in the control group on the third postoperative day; however, there was no significant difference regarding pain between the groups. Singh *et al.*[13] also indicated that the use of PRF did not reduce postoperative pain. In the present study, we did not find significant differences between the two groups regarding pain, swelling, and trismus. Our findings are consistent with the findings of two previous studies[10,13] but different from the findings of one study.[4] Different results have been presented in the literature on the effects of PRF on postoperative pain, swelling, and trismus after third molar surgery.[4,10,13] The disparities may be related to the use of subjective data in these studies.[3,4,13]

In the aforementioned studies, postoperative antibiotics were prescribed. There are some clinical studies concerning the use of antibiotics after third molar surgery. Arteagoitia *et al.*[14] reported that antibiotic therapy was effective for pain relief, reduction of edema, and enabling better mouth opening after third molar surgery; some other studies have also stated that the use of postoperative antibiotics affected the postoperative sequelae after third molar surgery.[15,16] In this study, we considered that the use of antibiotics may affect the postoperative sequel; hence, we did not prescribe antibiotics.

Regarding the use of PRF following impacted third molar surgery, the studies on soft and hard tissue healing are also outstanding in the literature. Kumar *et al.*[4] reported that bone density scores at 3 months postoperatively were higher in the PRF group than in the control group; however, this difference was not significant. The same authors found that the use of PRF in the socket reduced the periodontal pocket depth. In another clinical study by Singh *et al.*[13] improved healing of both soft tissue and bone was observed. Kumar *et al.*[17] also concluded that PRF improved healing of both soft and hard tissue. They stated that although osseous healing did not differ significantly between the groups, healing of soft tissue, as judged by the pain score, was significantly better in the PRF group. In contrast, Gürbüzer *et al.*[18] reported that PRF did not seem to increase scintigraphically-detectable enhanced bone healing within the extraction sockets of soft tissue-impacted third molars at 4 weeks postoperatively.

Conclusion

The present study showed that the use of PRF had no significant effect on postoperative pain, swelling, trismus, and QOL after impacted third molar surgery.

Acknowledgements

This study was financially supported by the Scientific Research Projects (BAP) Coordinatorship of Necmettin Erbakan University, Konya.

Conflict of interest disclosure: The authors declare no conflict of interest related to this study.

References

1. Conrad SM, Blakey GH, Shugars DA, Marciani RD, Phillips C, White RP. Patients' perception of recovery after third molar surgery. J Oral Maxillofac Surg 1999;57:1288-94.

2. Savin J, Ogden GR. Third molar surgery a preliminary report on aspects affecting quality of life in the early postoperative period. Br J Oral Maxillofac Surg 1997;35:246-53.

3. Ogundipe OK, Ugboko VI, Owotade FJ. Can autologous platelet-rich plasma gel enhance healing after surgical extraction of mandibular third molars? J Oral Maxillofac Surg 2011;69:2305-10.

4. Kumar N, Prasad K, Ramanujam L, Dexith J, Chauhan A. Evaluation of treatment outcome after impacted mandibular third molar surgery with the use of autologous platelet-rich fibrin: a randomized controlled clinical study. J Oral Maxillofac Surg 2015;73:1042-49.

5.Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJ, Mouhyi J, *et al.* Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part I: technological concepts and evolution. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006;101:37-44.

6. Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJ, Mouhyi J, *et al.* Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part II: platelet-related biologic features. Oral Surg Oral Med Oral

Pathol Oral Radiol Endod 2006;101:45-50.

7. Choukroun J, Diss A, Simonpieri A, Girard MO, Schoeffler C, Dohan SL, *et al*. Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part V: histologic evaluations of PRF effects on bone allograft maturation in sinus lift. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006;101:299-303.

8. Choukroun J, Diss A, Simonpieri A, Girard MO, Schoeffler C, Dohan SL, *et al*. 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;101:56-60.

9. Magremanne M, Baeyens W, Awada S, Vervaet C. Solitary bone cyst of the mandible and platelet rich fibrin (PRF). Rev Stomatol Chir Maxillofac 2009;110:105-8.

10. Ozgul O, Senses F, Er N, Tekin U, Tuz HH, Alkan A, *et al*. Efficacy of platelet rich fibrin in the reduction of the pain and swelling after impacted third molar surgery: randomized multicenter split-mouth clinical trial. Head Face Med 2015;11:37.

11. Hyland ME, Sodergren SC. Development of a new type of global quality of life scale, and comparison of performance and preference for 12 global scales. Qual Life Res 1996;5:469-80.

12. Xue P, Wang J, Wu B, Ma Y, Wu F, Hou R. Efficacy of antibiotic prophylaxis on postoperative inflammatory complications in Chinese patients having impacted mandibular third molars removed: a split-mouth, double-blind, self-controlled, clinical trial. Br J Oral Maxillofac Surg 2015;53:416-20.

13. Singh A, Kohli M, Gupta N. Platelet rich fibrin: a novel approach for osseous regeneration. J Maxillofac Oral Surg 2012;11:430-4.

14. Arteagoitia I, Ramos E, Santamaria G, Barbier L, Alvarez J, Santamaria J. Amoxicillin/clavulanic acid 2000/125 mg to prevent complications due to infection following completely bone-impacted lower third molar removal: a clinical trial. Oral Surg Oral Med Oral Pathol Oral Radiol 2015;119:8-16.

15. Ren YF, Malmstrom HS. Effectiveness of antibiotic prophylaxis in third molar surgery: a meta-analysis of randomized controlled clinical trials. J Oral Maxillofac Surg 2007;65:1909-21.

16. Delilbasi C, Saracoglu U, Keskin A. Effects of 0.2% chlorhexidine gluconate and amoxicillin plus clavulanic acid on the prevention of alveolar osteitis following mandibular third molar extractions. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2002;94:301-4.

17. Kumar YR, Mohanty S, Verma M, Kaur RR, Bhatia P, Kumar VR, *et al*. Platelet-rich fibrin: the benefits. Br J Oral Maxillofac Surg 2016;54:57-61.

18. Gürbüzer B, Pikdöken L, Tunali M, Urhan M, Küçükodaci Z, Ercan F. Scintigraphic evaluation of osteoblastic activity in extraction sockets treated with platelet-rich fibrin. J Oral Maxillofac Surg 2010;68:980-9.

Trombositten zengin fibrinin gömülü yirmi yaş dişi cerrahisi sonrası postoperatif komplikasyonların azaltılmasına etkisi: prospektif, randomize kontrollü klinik araştırma

Özet

Amaç: Bu çalışmanın birincil amacı, mandibular gömülü yirmi yaş dişi cerrahisi sonrası, antibiyotik kullanılmaksızın trombositten zengin fibrinin postoperatif ağrı, şişlik ve trismus üzerine etkilerini incelemektir. Ayrıca, diğer bir amaç da hastaların postoperatif dönemdeki yaşam kalitelerini değerlendirmektir.

Gereç ve Yöntem: Bu çalışmaya kemik retansiyonlu, üzeri tamamen mukoza ile kapalı, meziyo-angular pozisyonda gömülü dişlere sahip toplam 40 hasta dahil edildi. Hastalar iki gruba ayrıldı. Birinci gruptaki hastaların çekim soketine trombositten zengin fibrin yerleştirildi; ikinci gruba sadece geleneksel cerrahi uygulandı (soket boş bırakıldı). Bütün cerrahi işlemler lokal anestezi altında aynı cerrah tarafından yapıldı. Cerrahi sonrası hastalara antibiyotik reçete edilmedi. Yedi günlük takip periyodunda hastaların ağrı, şişlik, trismus ve yaşam kalitesi kayıtları değerlendirildi.

Bulgular: Hastaların yaş ortalaması birinci grupta 23.3 (±3.9) ve ikinci grupta 23.3 (±4.6) olarak bulundu. İstatistiksel analizler iki grup arasında postoperatif ağrı, şişlik, ağız açıklığı ve yaşam kalitesi skorları açısından fark olmadığını gösterdi (p>0.05).

Sonuç: Gömülü yirmi yaş dişi cerrahisinde trombositten zengin fibrin kullanımının postoperatif ağrı, şişlik, trismus ve yaşam kalitesi üzerine önemli bir etkisi olmadığı sonucuna varıldı.

Anahtar Kelimeler: Ağrı; diş, gömülü; oral cerrahi; trismus; yaşam kalitesi