CASE REPORT

Recevied/ Geliş Tarihi: 18.03.2023
Accepted/ Kabul Tarihi: 29.05.2023
Published / Yayın Tarihi: 31.08.2023

Aydın Dental Journal - Volume **9** Issue **2** - August **2023** (101-105)

Aydın Dental Journal

Journal homepage: http://dergipark.ulakbim.gov.tr/adj
DOI: 10.17932/IAU.DENTAL.2015.009/dental_v09i20011

The Use of L-PRF to Prevent Bisphosphonate Osteonecrosis in Odontoma Surgery: Case Report

Odontom Cerrahisinde Bisfosfonat Osteonekrozunu Önlemek için L-PRF Kullanımı: Vaka Raporu

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ABSTRACT

Objectives: Bisphosphonate Osteonecrosis is an avascular jawbone necrosis due to the use of antiresorptive and/or antiangiogenic drugs. Today; antiresorptive and antiangiogenic drugs are frequently used in diseases such as osteoporosis, multiple myeloma, Paget's disease, and prevention of cancer metastases. Many alternative treatment methods have been proposed for MRONJ, which is increasingly common and can be difficult to resolve. Platelet-rich blood concentrates are one of these treatment methods. Soft tissue healing is very important in the prevention of bisphosphonate-induced osteonecrosis. The positive effects of the use of L-PRF on soft tissue healing have been proven.

Case Report: We aimed to see the clinical results of the use of L-PRF for the prevention of bisphosphonate-induced osteonecrosis. In this case report, L-PRF concentrate was used after the surgical removal of odontoma to prevent bisphosphonate osteonecrosis.

Conclusion: The healing after an observation period of six months was complete with no problem.

Keywords: *Impacted tooth, L-PRF, Bisphosphonate Osteonecrosis, odontoma,*

ÖZET

Amaç: İlaca bağlı çene osteonekrozu, antirezorptif ve/veya antianjiyojenik ilaçların kullanımına bağlı avasküler çene kemiği nekrozudur. Günümüzde antirezorptif ve antianjiyojenik ilaçlar osteoporoz, multipl miyelom, Paget hastalığı gibi hastalıklarda ve kanser metastazlarının önlenmesinde sıklıkla kullanılmaktadır. Giderek yaygınlaşan ve tedavisi zor olabilen ilaca bağlı çene osteonekrozu için birçok alternatif tedavi yöntemi önerilmiştir. Bifosfonata bağlı osteonekroz gelişiminin önlenmesinde yumuşak doku iyileşmesi oldukça önemlidir. Trombositten zengin kan konsantrelerinin yumuşak doku iyileşmesinde etkinliği kanıtlanmıştır.

Olgu Sunumu: Bifosfonat grubu ilaç kullanan ve odontoma cerrahisi geçirmesi gereken hastada MRONJ gelişimini önlemek için, yumuşak doku iyileşmesinde etkinliği kanıtlanmış olan L-PRF kullanımının klinik sonucunu görmeyi amaçladık. Bu vaka raporunda, ilaca bağlı çene osteonekrozunu önlemek için odontomanın cerrahisinden sonra L-PRF konsantresi kullanılmıştır.

Sonuç: Altı aylık gözlem sürecinden sonra iyileşme sorunsuz tamamlanmıştır.

Anahtar Kelimeler: *Gömülü diş, L-PRF, Bisfosfonat osteonekrozu, Odontom*

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Introduction

Skeletal complications from osteoporosis and bone metastases cause severe pain, increased mortality and poor quality of life. Bisphosphonates, antiresorptive drugs such as denosumab, and angiogenesis inhibitors are used to prevent these skeletal complications.[1] Apart from preventing osteoporosis and bone metastasis, these drugs are also used in the treatment of central giant cell tumors, malignant hypercalcemia, Paget's disease, multiple myeloma and malignant bone diseases. [2]

Bisphosphonates bind to hydroxyapatite on the bone surface. When osteoclasts attach to this site, they undergo apoptosis, thus limiting osteoclastic activity.[3] Denosumab, on the other hand, inhibits osteoclast formation and function through osteoclast precursors by preventing RANK-RANKL interaction. Thus, it reduces bone resorption.[4]

Bisphosphonate osteonecrosis is characterized by an open necrotic bone surface that has not healed for eight weeks. For the diagnosis of bisphosphonate osteonecrosis, the patient must take an antiresorptive or antiangiogenic drug for bone metastasis or osteoporosis. In addition, the patient should not have received radiotherapy from the area with bone necrosis before.[5] Bisphosphonate osteonecrosis is a rare but serious disease that is usually associated with the use of high-dose bisphosphonates or denosumab and significantly reduces the quality of life.[1]

Although dentoalveolar surgery is a major risk factor for bisphosphonate osteonecrosis, it can be seen without tooth extraction or other trauma. It is usually developed following local infection of bone or soft tissue. In the presence of systemic conditions that impair healing, such as smoking, diabetes, and kidney failure, even an unfitted prosthesis can cause bisphosphonate osteonecrosis.[2,5]

Bisphosphonate osteonecrosis can be treated or less likely to develop. Prophylactic dental care and good oral hygiene is crucial in the prevention of bisphosphonate osteonecrosis as it is less likely to develop. However, different therapeutic approaches such as laser therapy, hyperbaric oxygen therapy, ozone therapy, photobiomodulation, use of platelet concentrates can be preferred in the presence of bisphosphonate osteonecrosis.[1,6]

Platelet concentrates are fibrin materials obtained from the patient's own blood. It contains intensified factors that accelerate wound healing, such as platelet-derived growth factor, vascular endothelial growth factor, and transforming growth factor. There are many different platelet concentrations depending on the method of obtaining. L-PRF is a concentration of platelets. It is rich in platelets and leukocytes.[12] It accelerates healing by providing long-term release of growth factors, stimulates bone and soft tissue regeneration, reduces postoperative pain and edema.[11,12] Since it is autologous, it does not carry the risk of contamination.[6]

Case Report

A 57-year-old female patient applied to the Istanbul University Faculty of Dentistry Department of Oral and Maxillofacial Surgery with a chief complaint of impacted central incisor tooth. After her radiological examination, odontoma surrounded with radiopaque lesions was diagnosed. Patient's medical history was revealed the use of oral alendronic acid 70 mg/vitamin D 5600 I.U once a week for 10 years due to osteoporosis. After a consultation with her physician, the patient was asked not to use alendronic acid for six months. After the cone-beam computed tomography examination, a flap with a palatal approach was designed and therefore a surgical plate was made for the patient (Figure 1). Before the operation, four tubes of blood, 10 ml each, were taken from the patient's antecubital vein, these tubes were centrifuged at 2700 rpm for 12 minutes and L-PRF was obtained (Figure 2).

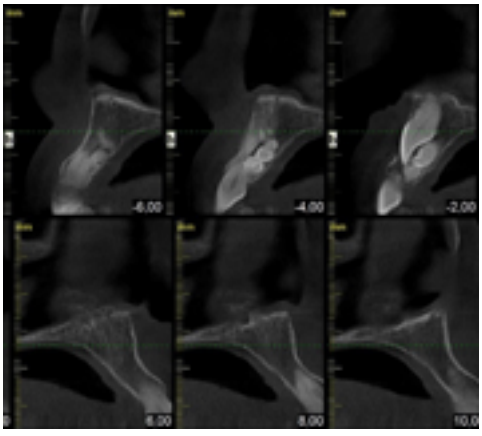

Fig. 1. Computed tomography image

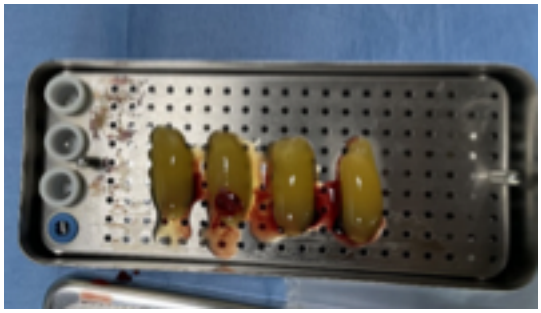

Fig. 2. L-PRFs

Mucoperiosteal flap was raised with a palatal approach under local anesthesia. The impacted tooth and surrounding radiopaque formations were removed (Figure 3,4). Surgical area was covered with L-PRF membranes (Figure 5). The area was closed primarily and a surgical plate was placed. Penicillin group antibiotics, chlorhexidine mouthwash and non-steroidal anti-inflammatory drug were prescribed to the patient. The removed formations were sent to Istanbul University Oncology Institute, Tumor Pathology and Oncology Cytology Department for histopathological examination and compound odontoma was diagnosed. The patient was observed for six months. First, she was recalled in every week for the first month following surgery and after that once in every month during a five-month period. The complete healing was seen at the end of observation period (Figure 6).

Fig. 3. Intraoperative view of the impacted tooth

Fig. 4. Extracted tooth together with dental follicle and odontomas

Fig. 5. Covering the bone with L-PRF membrane.

Fig. 5. Covering the bone with L-PRF membrane.

Conclusion

Kim et al. [7] in 2014, the use of L-PRF in patients with MRONJ showed promising results.[7] Jamalpour et al. 8 created bisphosphonate osteonecrosis lesions by zelondronic acid in 60 rats and applied PRF for the treatment. They reported that A-PRF and L-PRF application created optimum wound healing and bone regeneration in bisphosphonate osteonecrosis lesions. Healing of intraoral and extraoral fistulas was observed in most (except one) PRF cases.[8]

Miranda et al. [5] studied 37 patients who were under antiresorptive and antiangiogenic medications. They applied L-PRF to the extraction sockets of one group after tooth extractions. At the end of the study, the incidence of bisphosphonate osteonecrosis was found to be high in the control group that did not receive L-PRF. As a result of the study, they reported that the use of platelet concentrations to prevent bisphosphonate osteonecrosis gives a better outcome in addition to its economical advantage. Platelet Rich Fibrin (PRF) is a safe and healing-enhancing application, and its use will be very beneficial in cases where there is a risk of osteonecrosis.[5]

Samieirad et al. treated a case of severe bisphosphonate osteonecrosis after tooth extraction in a patient who used simvastatin 40 mg daily for

10 years with PRF application following surgical removal of the necrotic bone.[9]

PRF can prevent the formation of bisphosphonate osteonecrosis with its mechanical, inflammatory and bioactive properties. The fibrin structure acts as a barrier between the bone and the oral mucosa and prevents the toxic effect of bisphosphonates released from the bone on the soft tissue. Platelets stored in these fibrins are responsible for growth factor secretion, regulation of osteoprotogerin alkaline phosphatase, and proliferation of osteoblast.[10-12]

In this case report, the use of L-PRF after the surgical removal of odontoma in a patient under alendronic acid resulted with no signs of bisphosphonate osteonecrosis after six months of observation period. Therefore, L-PRF can be safely used in dentoalveolar surgery in patients at risk of bisphosphonate osteonecrosis.

References

1. Nicolatou-Galitis O, Schiødt M, Mendes RA, Ripamonti C, Hope S, Drudge-Coates L, Niepel D, Van den Wyngaert T. Medication-related osteonecrosis of the jaw: definition and best practice for prevention, diagnosis, and treatment. Oral Surg Oral Med Oral Pathol Oral Radiol. 2019 Feb;127(2):117-135. doi: 10.1016/j.oooo.2018.09.008. Epub 2018 Oct 9. PMID: 30393090.

2. Pichardo SE, Richard van Merkesteyn JP. Bisphosphonate-related osteonecrosis of the jaws: spontaneous or dental origin? Oral Surg Oral Med Oral Pathol Oral Radiol. 2013;116:287–92.

3. Drake MT, Clarke BL, Khosla S. Bisphosphonates: mechanism of action and role in clinical practice. Mayo Clin Proc. 2008; 83: 1032-1045

4. Food and Drug Administration. "XGEVA (denosumab) Prescribing information." (2015).

5. Miranda M, Gianfreda F, Raffone C, Antonacci D, Pistilli V, Bollero P. The Role of Platelet-Rich Fibrin (PRF) in the Prevention of Medication-Related Osteonecrosis of the Jaw (MRONJ). Biomed Res Int. 2021 May 13;2021:4948139. doi: 10.1155/2021/4948139. PMID: 34095295; PMCID: PMC8140838.

6. Cano-Durán JA, Peña-Cardelles JF, Ortega-Concepción D, Paredes-Rodríguez VM, García-Riart M, López-Quiles J. The role of Leucocyte-rich and platelet-rich fibrin (L-PRF) in the treatment of the medication-related osteonecrosis of the jaws (MRONJ). J Clin Exp Dent. 2017 Aug 1;9(8):e1051-e1059. doi: 10.4317/jced.54154. PMID: 28936298; PMCID: PMC5601107.

7. Kim JW, Kim SJ, Kim MR. Leucocyte-rich and platelet-rich fibrin for the treatment of bisphosphonate-related osteonecrosis of the jaw: a prospective feasibility study. Br J Oral Maxillofac Surg. 2014;52:854–59.

8. Jamalpour MR, Shahabi S, Baghestani M, Shokri A, Jamshidi S, Khazaei S. Complementarity of surgical therapy, photobiomodulation, A-PRF and L-PRF for management of medication-related osteonecrosis of the jaw (MRONJ): an animal study. BMC Oral Health. 2022 Jun 18;22(1):241. doi: 10.1186/s12903-022-02275-2. PMID: 35717177; PMCID: PMC9206277.

9. Samieirad S, Labafchi A, Famili K, Hashemzadeh H. Medication-Related Osteonecrosis of the Jaw (MRONJ) due to Simvastatin: An Unusual Case Report. World J Plast Surg. 2021 Jan;10(1):132-135. doi: 10.29252/wjps.10.1.132. PMID: 33833966; PMCID: PMC8016372.

10. Nørholt S, Hartlev J. Surgical treatment of osteonecrosis of the jaw with the use of platelet-rich fibrin: a prospective study of 15 patients. Int J Oral Maxillofac Surg. 2016;45(10):1256–1260. doi: 10.1016/j.ijom.2016.04.010.

11. Choukroun J, Diss A, Simonpieri A, Girard M-O, Schoeffler C, Dohan SL, Dohan AJ, Mouhyi J, Dohan DM. 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(3):e56–e60. doi: 10.1016/j.tripleo.2005.07.011.

12. Dohan Ehrenfest DM, de Peppo GM, Doglioli P, Sammartino G. Slow release of growth factors and thrombospondin-1 in Choukroun's platelet-rich fibrin (PRF): a gold standard to achieve for all surgical platelet concentrates technologies. Growth Factors. 2009;27(1):63–69. doi: 10.1080/08977190802636713.