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ORIGINAL RESEARCH

Gingival and bone tissue healing in lower third molar surgeries. Comparative study between use of platelet rich fibrin versus physiological healing

Cicatrización de tejido óseo y gingival en cirugías de terceros molares inferiores. Estudio comparativo entre el uso de fibrina rica en plaquetas versus cicatrización fisiológica

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ABSTRACT

Retained third molars are teeth linked to several conditions of the mouth, therefore, in most cases, surgical extraction is required. Surgical procedures undertaken to extract retained third molars bring about surgical procedures effects. The aim of the present study was to determine healing effectiveness in bone and gingival tissue with use of platelet rich fibrin in surgical procedures involving lower third molar extraction performed at the Surgical Center of the School of Dentistry, Central University of Ecuador in the period comprised May-September 2015. A comparative study was performed of 30 patients meeting inclusion criteria. Eight days after extraction, patients were controlled by means of direct observation of surgical site; 60 days after extraction, a digital panoramic X-ray of the jaws was taken and analyzed with software RadiAnt DICOM Viewer. For soft tissue, healing results were obtained with χ^2 test $p < 0.001$, and for bone tissue results were obtained with t-Student test $p = 0.015$.

RESUMEN

Los terceros molares retenidos son dientes que se encuentran ligados a una serie de patologías en la cavidad bucal, por lo que se requiere su extracción quirúrgica en la mayoría de los casos. Los procedimientos quirúrgicos para extraer terceros molares retenidos, traen consigo efectos propios de la cirugía. El objetivo de este estudio fue determinar la efectividad cicatrizante en tejido óseo y gingival con el uso de la fibrina rica en plaquetas en la cirugía de terceros molares inferiores en el Centro Quirúrgico de la Facultad de Odontología de la Universidad Central del Ecuador en el periodo de mayo-septiembre del 2015, mediante un estudio comparativo realizado en 30 pacientes que cumplieron los criterios de inclusión. Se controló a los pacientes a los ocho días mediante observación directa de las heridas, y a los 60 días posteriores a la intervención quirúrgica una toma radiográfica panorámica digital de maxilares, analizada en el software RadiAnt DICOM Viewer. Los resultados obtenidos en cicatrización de tejido blando fueron mediante la prueba de χ^2 $p < 0.001$ y para tejido óseo mediante la prueba t de Student $p = 0.015$.

Key words: Third molars, platelets, wound healing (scarring).
Palabras clave: Terceros molares, plaquetas, cicatrización de heridas.

Abbreviations, acronyms and units: PRF = Platelet rich fibrin, PRP = Platelet rich plasma, % = Percentage, mg = Milligrams, rpm = Revolution per minute, HU = Pixel value measure or Hounsfield units.

INTRODUCTION

Third molars are teeth most frequently found included. Lower first molars are most frequent, followed by upper first molars.[1] Third molar extraction is one of the most common procedures in dentistry.[2] Reasons for third molar extraction are varied, ranging from prophylactic measures to patients exhibiting large osteolytic lesions related to third molars.[3]

Extraction of impacted third molars causes surgery-related effects which represent great patient

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discomfort, such as pain after surgery, inflammation in the following 24 to 72 hours, trismus (lockjaw) suffered due to muscle contraction. «Extraction of third molars has an effect over the periodontal state of the lower second molar. Prevalence of periodontal disease in second molars is 77% before surgery, and 23% after surgical intervention».[4] Moreover, pain and post surgical inflammation are intimately linked to the type of surgical wound regeneration and healing (scarring).[2]

Healing of a socket after extraction, in cases when no filling materials have been used is effected through second intention.[5] This healing takes place in three phases: first the inflammatory phase, followed by proliferative phase to end with remodeling.[6] Two types of healing are known in dentistry: healing by first intention and by second intention. First intention healing is achieved with use of sutures, second intention healing is effected with spontaneous closing of the surgical wound.[7]

Tissue preparation of injured tissues in surgery to achieve healing is an important aspect of any surgical procedure, therefore, it is valuable for dental professionals to conduct this type of procedure and be knowledgeable in all aspects of normal tissue repair biology.[8]

Platelet concentrates have been in use for many years to improve postsurgical circumstances in cases of impacted third molar extractions. These concentrates are obtained from human blood, and subjected to a centrifuging process following different techniques for their procurement.

Dohan et al,[9] in their study, report that platelet rich fibrin is a second generation platelet concentrate. Fibrin is a plasmatic fibrinogen active molecule[10] which together with platelets improves and accelerates tissue hemostasis and healing.[11]

Platelet rich fibrin is used to improve processes of bone and gingival tissue neo-formation.[12] Bone tissue healing is dictated by intracellular and extracellular processes. Platelets play a fundamental role in wound healing, by forming blood clots and releasing growth factors.[13] Its use is based on accelerating healing processes of both soft and hard tissues. Due to its procurement technique,[14] it possesses certain advantages when compared to platelet rich plasma (PRP).

The present study is of a descriptive nature, where evaluation was made of healing in bone and gingival tissue either with or without use of platelet rich fibrin, used as autologous and adjuvant product for healing of wounds inflicted during lower impacted third molar surgery, to thus improve patients' recovery in a cost-effective manner without causing adverse reactions.

MATERIAL AND METHODS

Patient selection

For the present study, 30 female and male patients were selected, ages ranging 16-27 years, divided into three groups of 16-19, 20-23 and 24-27 years. Patients had undergone impacted lower third molar extraction surgery. The aforementioned age ranges were selected due to the fact that at this age patients attend more frequently the clinic for third molar extraction, because of the complications these impactions cause them. Extracted third molars were in the following positions: mesial angle, distal angle, horizontal, transversal and vertical. Type and class of position were not taken into account according to Pell & Gregory classification. Patients excluded from the study were those who exhibited alterations in platelet recount values, clotting times, hemorrhage time, prothrombin time, thromboplastin partial time, pregnant and nursing patients, patients with underlying systemic alterations, alcoholics, as well as drug and tobacco addicted patients. Patients were treated at the Surgical Center of the School of Dentistry, Central University, Ecuador. All patients were previously informed about the study and signed informed consent waivers.

Study design

Platelet rich fibrin meshes were placed in the socket corresponding to the extracted lower left third molar in order to compare it to the right lower third molar socket which had received no biological material or substance after extraction, the site had only received simple stitch suture points performed with vicryl 3-0 (Ethicon, Johnson and Johnson). Patients were prescribed amoxicillin + clavulanic acid, 875/125 every 12 hours and ketorolac, 10 mg every 8 hours, ingested by mouth. This medication was selected in order to avoid interaction in inflammation and healing processes. Inflammation was controlled with local means such as local ice and damp heat. Wounds were inspected after eight days; 60 days after surgery a digital panoramic radiograph was taken.

PRF procurement

Before surgical extraction, two 10 mL blood samples were harvested and placed in tubes (BD Vacutainer), to be both placed in a 3,000 rpm centrifuge appliance during 10 minutes[15] (centrifuge PLC series). No anti-clotting substance was added. The product of the