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Platelet rich fibrin versus Hemcon dental dressing following dental extraction in patients under anticoagulant therapy

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Abstract

Objectives: Dental extractions in heart surgery patients treated with artificial mechanical heart valves under anticoagulant oral therapy can be difficult as these patients present a significant risk for postoperative hemorrhagic complications. This study was performed to evaluate the use of Platelet Rich Fibrin (PRF) and Hemcon dental dressing (HDD) in cardiac patients taking Warfarin following dental extraction.

Methods: 20 patients were involved in this study with an age range of 36–62 years. Patients having an International Normalized Ratio (INR) >3.5 were excluded. Extraction was performed under local anesthesia and as atraumatic as possible. Patients were allocated equally in two groups; group A: where PRF was inserted into the extraction socket, while group B: the extraction socket was packed by HDD.

Results: Complete hemostasis was achieved in all cases with no delayed bleeding. Patients in group A showed minimal pain and accelerated healing, while those in group B showed extreme to moderate pain on the first few days following extraction and retarded healing. Four patients developed alveolar osteitis.

Conclusions: PRF has good antihemorrhagic properties and increases tissue healing and wound closure, thus allowing for a quick recovery without significant painful events. HDD has excellent hemostatic properties and can be used safely in such patients but with small amounts.

Keywords: Anticoagulant therapy; Platelet rich fibrin; Chitosan; Hemcon dental dressing; Dental extraction

1. Introduction

Dental extractions in heart surgery patients treated with artificial mechanical heart valves under anticoagulant oral therapy is difficult as these patients present a significant risk for postoperative hemorrhagic complications [1,2]. The most commonly prescribed oral anticoagulants for these patients are warfarin and acetylsalicylic acid. Therapeutic levels of warfarin are

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measured by the International Normalized Ratio (INR). The British Society of Hematology has published guidelines on anticoagulant control which recommend a maximum target INR of 3.5, with a range of 3−4 [3].

Currently, many authors do not recommend suspending the anticoagulant therapy and replacing it with heparin injection intravenously or deep subcutaneous before a minor surgery to avoid serious thromboembolic complications [4]. To control the hemorrhagic risk in patients under anticoagulant therapy, several protocols have been proposed in the literature. Some authors have recommended a combination of local antifibrinolytic therapy and hemostatic agents for the prevention of postoperative bleeding [5]. Other authors have suggested that many patients can safely undergo outpatient oral surgical procedures without changes in their regular therapeutic anticoagulant regimen and without additional medical interventions, or by using the tranexamic acid as an antifibrinolytic local agent for 2 days after the surgery [6−8]. While other investigators have proposed the sole use of fibrin glue to prevent the hemorrhagic complications, however these fibrin products are expensive and raise the question of the potential for infectious contaminations [9−12].

The development of platelet concentrate technologies offers simplified and optimized production protocols for concentrated platelet-rich plasma (cPRP). Because of legal restrictions on blood handling, a second-generation platelet concentrate, which is neither fibrin glue nor a classical platelet concentrate, was developed in France by Choukroun et al., in 2001 [13]. The preparation of this relatively new biomaterial, called platelet-rich fibrin (PRF) requires neither anticoagulant nor bovine thrombin. PRF is a strictly autologous fibrin matrix containing a large quantity of platelet and leukocyte cytokines and it is widely used to accelerate soft and hard tissue healing. Autologous PRF is considered as a healing biomaterial, which was initially used in oral implantology by its promoters, and presently, studies have shown its application in various disciplines of dentistry [14].

On the other hand, chitosan preparations of various molecular weights, degrees of deacetylation and with further molecular derivatization patterns have attracted much attention because of their potentially beneficial biological properties. These properties include hemostasis, antimicrobial activity, stimulation of healing, tissue engineering scaffolds, and drug delivery [15−22].

The HemCon Dental Dressing (HDD) has been used extensively under the name HemCon Bandage to stop bleeding in combat wounds and other severe trauma. HDD is a compressed chitosan acetate dressing that was developed as a hemostatic agent [23−25]. HDD is chitin, which is manufactured from freeze-dried shrimp shells. It is an insoluble polysaccharide polymer of glucosamine that is purified and partially deacetylated to form soluble chitosan aqueous gel. Chitosan gel is then freeze dried in molds to make a highly electropositive sponge-like material that is hemostatic and adapts well to oral surgical wounds [20,26]. Chitosan has a positive charge and attracts red blood cells (RBC) and platelets, which are negatively charged through ionic interaction; thus, a strong seal is formed at the wound site. [25] This supportive, primary seal allows the body to activate its coagulation pathway effectively, initially forming organized platelets. Therefore, HDDs are designed to maintain this seal and serve as a frontline support structure as the platelets and red blood cells continue to aggregate until hemostasis is achieved [23,27].

Therefore, the purpose of this study was to test the null hypothesis that there will be no difference in the effectiveness of PRF and HDD in wound healing and in the prevention of hemorrhagic complications after dental extractions in patients receiving oral anticoagulant therapy.

2. Materials and methods

This is a randomized clinical trial and was approved by the institutional review board and the ethical committee of the Faculty of Dentistry, Alexandria University, and an informed consent was obtained from all patients before their inclusion in the study.

This study was conducted on 20 patients referred to the Oral and Maxillofacial Surgery department, Faculty of Dentistry, Alexandria University. All patients were cardiac patients and had undergone heart valve replacement and were currently taking Warfarin.[1] They required extraction of a single mandibular posterior tooth. Extractions were performed for all patients without altering the dose of the anticoagulant. Patients who had an INR >3.5 on the day of operation or had a history of liver disease or coagulopathies were excluded from this study. The patients were randomly divided into two groups: group A, where the extraction sockets were packed with PRF, and group B, where the extraction sockets were packed with HDD. The allocation of patients into either group was random nonblind as there was no way to mask the HDD group

[1] Marevan®, Glaxo, Egypt.