

Prevention of Postoperative Bleeding in Anticoagulated Patients Undergoing Oral Surgery: Use of Platelet-Rich Plasma Gel

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Purpose: This study evaluated the effectiveness of a protocol using platelet-rich plasma (PRP) to prevent bleeding after dental extraction in patients treated with anticoagulant oral therapy.

Materials and Methods: Forty patients with mechanical heart-value replacement who were treated with anticoagulant oral therapy were selected for the study. Each patient was treated with PRP gel placed into residual alveolar bone after extraction without heparin administration after suspension of oral anticoagulant drugs (36 hours).

Results: Only 2 patients reported hemorrhagic complications (5%). Sixteen patients (40%) had mild bleeding that was easy to control with hemostatic topical agents; this mild bleeding terminated completely 1 to 3 days after the surgical procedures. The remaining 22 patients (55%) presented with adequate hemostasis.

Conclusions: Oral surgery in heart surgical patients under oral anticoagulant therapy may be facilitated with PRP gel. Its use is an advanced and safe procedure. This biological and therapeutical improvement can simplify systemic management and help avoid hemorrhagic and/or thromboembolic complications.

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Management of heart surgical patients treated with artificial mechanical heart valves and under anticoagulant oral therapy can be difficult in oral surgical practice. Patients receiving warfarin, who present need for dental extractions, must to be treated with-

out putting them at undue risk of postoperative hemorrhage or thromboembolic event.

Also, minor surgery requires adequate suspension of anticoagulant oral daily therapy and the use of the heparin to reduce risk of immediate, late hemorrhagic conditions after surgery and to reduce thromboembolic complications. All patients need postoperative clinical check before restart of oral dicumarolic anticoagulant therapy to avoid thromboembolic complications.

The clinical use of oral anticoagulant therapy is complicated by the necessity for frequent determinations of the prothrombin time or international normalized ratio (INR) to ensure safety and therapeutic efficacy.¹ This requirement has often imposed a significant burden on both providers and patients. Patients must be within the therapeutic INR range to decrease the incidence of adverse events associated with anticoagulant therapy.

To limit postsurgery complications in patients treated with anticoagulants, several protocols have been proposed in literature. Some authors proposed a combination of local antifibrinolytic therapy and a local hemostatic agent as effective treatment in preventing postoperative bleeding after oral surgery in

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Table 1. SURGICAL CASES BY PLATELET-RICH PLASMA GEL METHOD

Year	Age Range (yr)	No. of Patients	Men/ Women (n)	Teeth Extracted (n)	Complications
1999	43 to 54	7	3/4	28	One immediate postoperative hemorrhage Seven slight postoperative bleeding
2000	51 to 63	18	8/10	58	One late postoperative hemorrhage Four slight postoperative bleeding
2001	49 to 66	15	6/9	61	Five slight postoperative bleeding

patients treated with anticoagulants.² Other authors suggested that many patients can safely undergo routine outpatient oral surgical procedures without alteration of their regular therapeutic anticoagulation regimens and without additional medical intervention³ or with the use of local tranexamic acid as antifibrinolytic agent postoperatively for 2 days.⁴ Other authors suggested the use of human fibrin glue as a valid hemostatic agent.⁵ Rakocz et al⁶ used fibrin glue to prevent hemorrhage in patients with bleeding disorders, but high costs and potential infectious diseases are restrictive factors. Some authors refuse to use fibrin glue because of the risk of viral infections.⁷

Platelets are a natural deposit of numerous growth factors such as platelet-derived growth factor, transforming growth factor β , insulin-like growth factors I and II, and epithelial growth factor.⁸⁻¹² For this reason, some clinicians used an autologous platelet concentrate (APC) to enhance these healing processes in heart surgical patients with hemorrhagic risk.

The aim of this paper was to evaluate the use of platelet-rich plasma (PRP) with no significant modification of oral anticoagulant therapy and shown reduction in hospitalization, absence of infections, and low number of hemorrhagic complications.

Materials and Methods

From December 1999 to December 2001, 40 heart surgical patients (22 women and 18 men) from the Division of Oral Science and Surgery of the University of Naples "Federico II" were selected for the study. Patient ages ranged from 43 to 66 years.

All patients had a mechanical heart valve substitution. At the moment of study, they had no general diseases; they were on oral anticoagulant therapy, and their INR range was from 2 to 4.

These patients underwent single or multiple extractions for a total of 147 teeth. Each patient received no heparin after the suspension of oral anticoagulant drugs, but PRP gel was placed into residual alveolar bone after extraction. Oral anticoagulant drugs were suspended 36 hours before extractions. Warfarin effects are delayed for 8 to 12 hours and are maximal at

36 hours, and even persist for 72 hours. At the extraction time, the patients' INR was 1.5 to 3.

Extractions were done with minimal bone trauma to achieve an adequate base for placing PRP gel. This platelet concentrate was prepared through centrifugation from whole blood; the thrombocyte count of PRP was 1,035,000/ μ L (mean). At 24 hours after extractions, oral anticoagulant therapy was started.

To prevent infections, the patients were treated with intramuscular teicoplanin 200 mg once a day and intramuscular nebicin 5 mg/kg twice a day 2 days before and 4 days after surgical procedures.

Results

The protocol achieved good results, and there were only 2 hemorrhagic complications (5%) (Table 1). One patient, a 63-year-old woman, showed an immediate postoperative hemorrhage related to inadequate placing of platelet gel, because alveolar residual bone was minimal and had no gel retention. Another patient, a 45-year-old man, showed late postoperative hemorrhage related to formation of an excessive coagulum.

Sixteen patients (40%) had mild bleeding (defined by Souto et al¹³ as spontaneously stopped or stopped with minimal compression) that was easy to control with hemostatic topical agents; this mild noncontinuous bleeding terminated completely 1 to 3 days after surgical procedures.

The remaining 22 patients (55%) sustained adequate complete hemostasis.

There were no endocarditis complications or other postsurgical complications.

Discussion

Confusion exists about intraoperative and postoperative bleeding in patients undergoing oral anticoagulation therapy and the best management for these situations.¹⁴ The management of patients receiving oral anticoagulation therapy and requiring dental extractions has the need to balance the risk of a postextraction hemorrhage against the risk, with potentially

Table 2. PROPERTIES OF PLATELET-RICH PLASMA GEL METHOD

Advantages	Disadvantages
Easy activation and application	Careful selection of patient
Good placement into residual alveolar bone	Reduced survival of platelets
Autologous nature	Specialized personnel to derivate and manipulate
No suspension of anticoagulant systemic therapy	
Low cost	

a more serious outcome, of a thromboembolic event.¹⁵⁻¹⁷ A number of protocols have been suggested in the past, including giving patients heparin before treatment and adjusting or ceasing the warfarin dose in the days before surgery.¹⁷⁻¹⁹

Many clinicians have recommended interruption of oral anticoagulant therapy for dental surgery to prevent hemorrhage.¹⁴ However, the review of the available literature did not show well-documented cases of serious bleeding problems from dental surgery in patients receiving therapeutic levels of continuous warfarin sodium, whereas several documented cases were found of serious embolic complications in patients whose warfarin therapy was withdrawn for dental treatment.^{14,20}

Bailey and Fordyce¹⁵ comparing postoperative bleeding after extractions in patients receiving warfarin versus those not receiving warfarin found no differences in the immediate postextraction measures, but they did find a significant tendency to rebleed 1 to 5 days postextraction in patients receiving warfarin. Fundamentally, the surgeon and treating clinicians must balance the need for reducing anticoagulant therapy and preventing undue hemorrhage against the associated increased risk from the diminution of the therapeutic benefit of anticoagulation therapy resulting in potentially life-threatening thromboembolism.^{14,21} A recent survey showed that of more than 950 patients receiving continuous anticoagulant therapy who underwent more than 2,400 surgical procedures, only 12 (1.3%) needed more than local measures to control hemorrhage.²²

Recently, several authors suggested levels of anticoagulation be maintained and that any subsequent postextraction hemorrhage be treated with local measures, such as fibrin adhesive and tranexamic acid rinses.^{15,16,23}

Data from this study promote the use of PRP gel in surgical practice because it is autologous and easy

to acquire and to use (Table 2). It has plastic and mucosa-adhesive properties and reasonable cost and reduces expenses, including hospitalization. Patients have no infectious risk, and there is no risk of transmissible disease. There are no additional thromboembolic risks.

The management of oral surgery in heart surgical patient and under oral anticoagulant therapy is much facilitated because PRP gel use is an advanced and safe procedure. This biological and therapeutical improvement can simplify systemic management and avoid hemorrhagic and/or thromboembolic complications. Limitations of the present study include the small sample size (n = 40) and lack of a non-PRP control group. A larger experimental population may be needed to elucidate the safety of this approach to preoperative care. Ethical considerations do not allow for a non-PRP control group to determine the risk of bleeding without therapeutic intervention. It is clear, however, that in this study, the use of PRP with continued warfarin therapy, with INR in therapeutic range, permitted a safe outcome in all patients.

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