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COMPARATIVE STUDY

# Extraction in Patients on Oral Anticoagulant Therapy With and without Stopping the Drug: A Comparative Study

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**Abstract**
*Aim and Objective* The aim of this study was to compare postoperative hemorrhagic complications after dental extractions in two groups of patients receiving oral anticoagulants with one group receiving oral anticoagulant without interruption and another group stopping the drug 3 days prior to extraction.
*Materials and Methods* A control group consisted of 30 patients who had stopped the oral anticoagulant 3 days before undergoing dental extractions, resulting in a reduction in the average preoperative international normalized ratio (INR) from 2.8 to 1.6. The study group of 30 patients received the anticoagulant drug without any alteration before extractions and had an average preoperative INR of 2.7. All extractions were done under local anesthesia on an outpatient basis, and local measures consisting of gelfoam and sutures were used in all cases to control postoperative bleeding from extraction sockets.
*Results* None of the patients had any immediate postoperative bleeding, and only one patient from the control group and two patients from the study group had mild delayed hemorrhage which was easily managed with local measures.
*Conclusion* There is no need to alter the dosage of oral anticoagulants prior to dental extractions provided the INR is within the therapeutic range of 2.0–4.0, extractions are done in least traumatic manner and local measures are used to control postoperative hemorrhage, thereby reducing the risk of thromboembolic episodes in these patients.

**Keywords** Anticoagulants · INR · Extraction

## Introduction

Extraction in patients who are on oral anticoagulants is debatable as to whether the anticoagulant should be stopped before extraction or not. If the drug is not stopped, there is every risk of serious post-extraction hemorrhage and this has to be balanced against the potential of life-threatening thromboembolic episodes when the drug is stopped prior to the procedure [1]. Warfarin which is the most commonly used oral anticoagulant is a vitamin K antagonist and prevents vitamin K-mediated carboxylation of glutamic acid residues on clotting factors II, VII, IX and X [3]. According to some authors, oral anticoagulant therapy should be withdrawn for few days and they recommend administration of heparin before tooth extraction [4, 5]. Some authors recommend that the dosage of the oral anticoagulant drug should be reduced until the international normalized ratio (INR) is 1.5 [2, 6]. However, nowadays tooth extraction is performed in patients on anticoagulant therapy without reducing or discontinuing the drug [7–9]. Our department has been following the conventional approach of stopping the anticoagulant therapy 3 days prior to tooth extraction so that the INR comes to a level of around 1.5. The aim of this study was to compare this conventional method in a group of control patients with a study group in which the patients received unaltered oral anticoagulant therapy in terms of post-extraction hemorrhage.

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## Materials and Methods

The study was carried out in the Department of Oral and Maxillofacial Surgery, Government Dental College and Hospital, Srinagar, after granting permission from the ethical committee. A total of 60 patients on warfarin were included in the study. All patients were assessed for general medical status, drug dosage, indication for warfarin therapy and duration of treatment. Before extraction, the INR was requested and the study was only performed if INR was within the therapeutic range of 2.0–4.0 for each patient. Any patients with INR outside the therapeutic range, patients with liver disease, patients on other drugs that affect the hemostasis and patients who refused the consent were excluded from the study. All the tooth extractions were planned after consulting the patients' hematologists and after taking informed consent from the patients. Patients were randomly allocated to either control or study group each comprising of 30 patients by using random number cards, and all the extractions were carried out by the same surgeon. The patients in the control group with INR in the therapeutic range were instructed to stop warfarin 3 days before extraction and were asked to do a fresh preoperative INR again on the day of extraction to ensure that it had decreased to a value within the range of 1.5–2.0. The patients in the study group, on the other hand, were instructed to continue warfarin without any alteration of the dose prior to dental extractions, and it was ensured that the INR was within the therapeutic range of 2.0–4.0. Antibiotic prophylaxis was prescribed in patients at risk of infective endocarditis like patients with prosthetic valves according to the guidelines of AHA (American Heart Association). Two grams of amoxicillin 1 h before extraction or clindamycin 600 mg in patients who had history of allergy to the former were used for this purpose [10]. The extractions were carried out under local anesthesia using a standard solution of 2% lignocaine hydrochloride with 1: 80,000 adrenaline. For mandibular teeth, inferior alveolar, lingual, buccal and mental nerve blocks were used as necessary, while posterior superior alveolar, infraorbital nerve blocks and local infiltrations were used for maxillary teeth. The teeth were extracted by the least traumatic manner possible using forceps and elevators. Care was taken to prevent severing of tissues and excessive bone removal. The extraction sockets were then packed with gelfoam, and closure was done with 3–0 black silk sutures. All patients were then instructed to bite down on gauze for 30 min for compression, and once hemostasis was confirmed, the patients were discharged. Postoperative instructions were given to the patients including avoiding of NSAIDs (non-steroidal anti-inflammatory drugs). The patients in the control group were instructed to resume their warfarin therapy from the same day. Each patient was contacted by phone on the night of extraction, the second, third and the fifth day to gather information about hemostasis, and the patients were instructed to visit the hospital immediately in case of any serious postoperative hemorrhage. Patients were examined 1 week after surgery, and sutures were removed.

## Results

Out of 60 patients included in the study, 30 patients (17 females and 13 males) represented the control group and other 30 patients (18 females and 12 males) represented the study group (Table 1). The mean age of the patients in the control group was 53 years and ranged from 31 to 72 years. The mean age of patients in study group was 55 years with age ranging from 35 to 75 years (Table 2). The most frequent basic systemic disease was myocardial infarction (28.3%, n = 17) followed by arrhythmias (25%, n = 15), stroke (21.7%, n = 13), valvulopathy (11.7%, n = 7), prosthetic heart valves (8.3%, n = 5) and vascular thromboembolism (5%, n = 3) (Fig. 1).

On the day of extraction, the average INR for the patients of control group was 1.6 (range 1.5–2.0) and for those of study group was 2.7 (range 2.0–4.0) as depicted in Table 3. A total of 96 extractions were done with 47 in the control group and 49 in the study group (Table 4). We observed that none of the patients either in the control group or study group had any immediate post-extraction hemorrhage during the first 30 min during which they were kept under observation. One of the patients from the control group developed postoperative ooze on the third day, while two patients from the study group complained of similar bleeding episodes on the second and third days, respectively. The number of bleeding episodes when

**Table 1** Gender distribution of patients

| | Control group | Study group |
|---|---|---|
| Males | 13 (43.3%) | 12 (40%) |
| Females | 17 (56.7%) | 18 (60%) |
| Total | 30 (100%) | 30 (100%) |

**Table 2** Age distribution of patients

| Mean age (years) | |
|---|---|
| Control group | 53 (range 31–72) |
| Study group | 55 (range 35–75) |

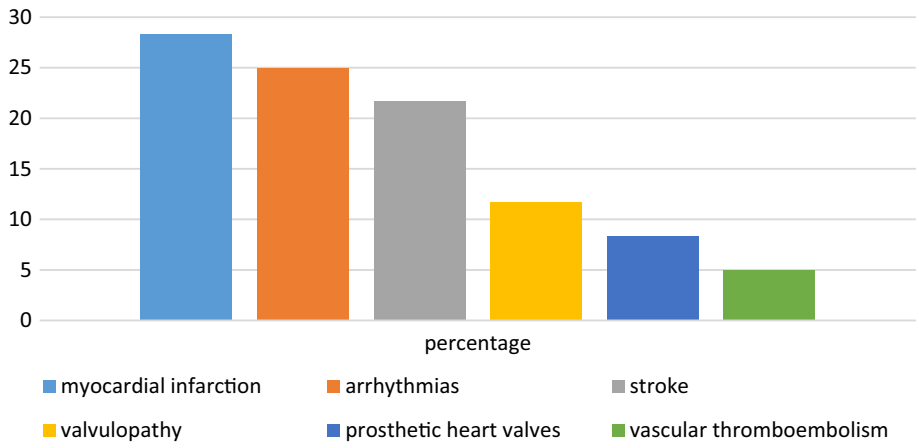


**Fig. 1** Indication for OAT in 60 enrolled patients

**Table 3** INR comparison between two groups

| Average INR | |
|---|---|
| Control group | 1.6 (range 1.5–2.0) |
| Study group | 2.7 (range 2.0–4.0) |

**Table 4** Distribution of tooth extractions in the two groups

| Tooth extractions | Control group | Study group |
|---|---|---|
| Incisors | 6 | 8 |
| Canines | 4 | 3 |
| Premolars | 16 | 13 |
| Molars | 21 | 25 |
| Total | 47 | 49 |

compared between the two groups was statistically insignificant (p value $> 0.005$). However, there was no severe or life-threatening hemorrhage in any case, and all those cases of postoperative bleeding were managed with local measures. Local measures were sufficient, and there was no need for drug administration, alteration of anticoagulant therapy, hospitalization or transfusion nor was there any thromboembolic episode in any of the patients.

## Discussion

Dental extraction in patients on oral anticoagulant therapy is a topic of debate. In the past, some authors proposed that anticoagulant therapy should be stopped 2–6 days prior to extractions as severe hemorrhagic episodes had been reported in several cases [17, 18]. But at the same time, the patient is put to the risk of "rebound hypercoagulation" which may be life threatening [19–21]. According to some authors, warfarin can be replaced with heparin before dental extractions and then resumed after treatment [11–13]. However, it requires hospitalization and careful monitoring of the drug. These patients are also at risk of postoperative thromboembolism as it can take several days for warfarin to reach therapeutic levels [14, 15]. Some other authors recommend decreasing of the anticoagulant dose prior to dental extractions [2, 16]. But this approach again makes the patient susceptible to the risk of thromboembolism. In our study, we divided the patients into a control group who stopped the anticoagulation therapy 3 days before extractions so that INR had decreased to a value within the range of 1.5–2.0 and a study group who continued the drug without any alteration of the dosage provided their INR was within the therapeutic range of 2.0–4.0. None of the patients either in the control group or study group had any immediate post-extraction hemorrhage. However, one of the patients (age 62 years, INR = 1.8) in the control group had an intermittent ooze from the socket of extracted maxillary molar on the third day. Two patients in the study group (age 53 and 60 years, INR = 3.2 and 2.9, respectively) also had similar episodes of bleeding: from extraction sockets of maxillary premolar in one patient and mandibular molar in another patient on the second and third day, respectively. Bleeding episodes when compared between the two groups were statistically insignificant (p value $> 0.005$). These hemorrhagic episodes were managed with local measures only which suggests that even if postoperative bleeding episodes occur in patients who continue their oral anticoagulant therapy without alteration, these episodes are not life threatening and can be controlled easily with local measures in most cases. Similar results have been found in many separate studies carried out by Devani et al. [22], Blinder et al. [23], Evans et al. [24], Sacco et al. [25] and Morimoto et al. [26]. There was no thromboembolic event in any of the groups. However, Devani et al [22] found that there is difficulty in

predicting a drop in INR in patients who stop the anticoagulant therapy prior to the procedure as a significant number of patients had INR values below 1.5 after stopping warfarin thereby posing a risk of thromboembolism.

## Conclusion

In patients on oral anticoagulants, if INR is in the therapeutic range of 2.0–4.0 and if extractions are performed in the least traumatic manner possible, it is not necessary to stop the anticoagulant therapy prior to the procedure. Local hemostatic techniques such as a hemostatic agent and obliterative sutures are sufficient to control the postoperative hemorrhage. From our study, we concluded that postextraction hemorrhage is not a major problem in patients who continue the oral anticoagulant therapy without alteration of the dosage provided the INR is within the therapeutic range.

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