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Risk of bleeding after dentoalveolar surgery in patients taking anticoagulants

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Abstract

To avoid increasing the risk of thromboembolic events, it is recommended that treatment with anticoagulants should be continued during dentoalveolar operations. We have evaluated the incidence of bleeding after dentoalveolar operations in a prospective study of 206 patients, 103 who were, and 103 who were not, taking anticoagulants. Seventy-one were taking thrombocyte aggregation inhibitors and 32 vitamin K antagonists. Patients were treated according to guidelines developed at the Academic Centre for Dentistry Amsterdam (ACTA), The Netherlands. The operations studied included surgical extraction (when the surgeon had to incise the gingiva before extraction), non-surgical extraction, apicectomy, and placement of implants. Patients were given standard postoperative care and those taking vitamin K antagonists used tranexamic acid mouthwash postoperatively.

No patient developed a severe bleed that required intervention. Seven patients (7%) taking anticoagulants developed mild postoperative bleeds. Patients taking vitamin K antagonists reported 3 episodes (9%) compared with 4 (6%) in the group taking thrombocyte aggregation inhibitors. Among patients not taking anticoagulants, two (2%) developed mild bleeding. The differences between the groups were not significant. All bleeding was controlled by the patients themselves with compression with gauze. We conclude that dentoalveolar surgery is safe in patients being treated with anticoagulants provided that the conditions described in the ACTA guidelines are met.

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Keywords: Haemorrhage; Tooth extraction; Apicectomy; Dental implantation; Aspirin; Acenocoumarol

Introduction

Oral anticoagulation is common, and has been proved to be effective in preventing thromboembolic events.^{1,2} The most commonly used agents are thrombocyte aggregation inhibitors (such as acetylsalicylic acid and clopidogrel) and vitamin K antagonists (such as warfarin, acenocoumarol, and fenprocoumon).

As patients increasingly tend to keep their natural dentition as they get older, dentoalveolar surgery is more often indicated for elderly people who are taking anticoagulants. Some health care providers still instruct all patients to

discontinue them before dentoalveolar surgery regardless of the individual thromboembolic risks. However, this can result in thromboembolic events (such as deep vein thrombosis and pulmonary embolism) that are worse than postoperative bleeding after dentoalveolar surgery.³

The Academic Centre for Dentistry Amsterdam (ACTA) in the Netherlands developed guidelines based on the publications of van Diermen et al.^{4–6} These guidelines recommend that anticoagulants should be continued during dentoalveolar surgery under well-described conditions.⁷ The guidelines are accepted by the professional organisation for dentists in the Netherlands (NMT) and the organisations charged with out-patient antithrombotic treatment, and are used by most Dutch oral health care professionals.

The guidelines make a distinction between the 2 types of anticoagulants. Patients using thrombocyte aggregation inhibitors can continue to take them during dentoalveolar

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Table 1

Characteristics of patients and distribution of types of procedure.

	Anticoagulant (n = 103)	No anticoagulant (n = 103)	Total (n = 206)
Sex			
Male/female	75/28	68/35	143/63
Mean age (years) at time of treatment (range)	62 (23–86)	56 (21–85)	59 (21–86)
Surgical extractions (mild bleeding)	48 (5)	55 (1)	103 (6)
Non-surgical extractions (mild bleeding)	42 (2)	37 (1)	79 (3)
Apicectomies (mild bleeding)	5 (0)	4 (0)	9 (0)
Placement of implants (mild bleeding)	8 (0)	7 (0)	15 (0)

surgery with no restrictions. In contrast, patients taking vitamin K antagonists can continue to take them only when specific conditions are met. The international normalised ratio (INR), measured within 24–72 h preoperatively, must be ≤ 3.5 . The dentoalveolar surgery should involve no more than 3 extractions at the same time, surgical removal of wisdom teeth, periodontal treatment, apicectomies, incision of an abscess, or the placement of a maximum of 3 implants. The operation must be as atraumatic as possible, the wound must be sutured after extraction, and the patient should leave the hospital with adequate instructions only once the bleeding has stopped. Finally, the patient should rinse the mouth with tranexamic acid 5% for 5 days postoperatively.⁷

In the present study we evaluated the ACTA guidelines to find out whether these procedures led to increased postoperative bleeding. We compared the incidence in patients taking anticoagulants with that in a group of patients who were not taking them.

Patients and methods

Subjects

The study group comprised 206 patients who were referred to the Department of Oral and Maxillofacial Surgery of the University Medical Center Groningen, the Netherlands, for dentoalveolar operations that met the ACTA guidelines – that is, with a maximum of 3 extractions, apicectomies, or placement of implants at the same time. The types of dentoalveolar surgery required were divided into 4 categories: surgical extractions, non-surgical extractions, apicectomies, and placement of implants. Extractions were defined as “surgical” when the surgeon had to incise the gingiva before extraction.

Of the 206 patients included, 103 were taking oral anticoagulants and 103 were not (control group). Patients on vitamin K antagonists were included if the INR measured within 72 h preoperatively was in the range 1.8–3.5. Patients taking thrombocyte aggregation inhibitors were included if they used only one drug.

Exclusion criteria were inherited or acquired coagulopathy. Patients in the control group were excluded if they used any other coagulation-altering medication. The study was conducted according to the Declaration of Helsinki, and informed consent was obtained from all participants.

Protocol of the study

Patients were treated according to the ACTA guideline. Before the procedure all patients were given a local anaesthetic (4% articaine with 1/100 000 epinephrine). The operation was as atraumatic as possible and the wound was sutured afterwards. After extraction, patients were instructed orally and in writing to apply compression with gauze for 30 min immediately postoperatively. They were not allowed to leave the hospital until the bleeding had stopped, and were instructed to call the department of oral and maxillofacial surgery if the bleeding did not stop after 30 min. The 32 patients who used vitamin K antagonists were instructed to rinse with 5% tranexamic acid 4 times daily for 5 days postoperatively.

Two types of postoperative bleeding were defined. If the patient came to the hospital because the bleeding could not be stopped at home, it was scored as severe. One week postoperatively, all patients were called by a research worker to ask if they had had any postoperative bleeding at home that was stopped by compression with gauze; such bleeding was scored as mild.

Statistical analysis

Data were analysed with the help of IBM SPSS Statistics for Windows (version 20.0, Armonk, NY, IBM Corp). Data are expressed as mean (SD). The significance of differences between continuous variables were assessed using Student's *t* test, and between dichotomous variables using the chi square or Fisher's exact test, as appropriate. Linear regression analysis was used to calculate the relation between the INR and mild bleeding. Probabilities of less than 0.05 were accepted as significant.

Results

Of the 206 patients included there were 143 men and 63 women, mean age 59 (range 21–86) years at the time of treatment. Table 1 summarises the patients' characteristics and the operations done. The difference between the sexes was not significant ($p = 0.29$), while the difference in mean age at the time of treatment was ($p < 0.01$). The most common procedures were surgical and non-surgical extractions, and all episodes of bleeding developed in these patients. There was

Table 2
Number (%) of incidents of postoperative bleeding.

	None (n = 197)	Mild bleeding (n = 9)
Anticoagulant (n = 103)	96 (93)	7
No anticoagulant (n = 103)	101 (98)	2

There were no episodes of severe bleeding.

no postoperative bleeding in patients who had apicectomies or placement of implants.

Episodes of bleeding were most common in patients who had had surgical extractions while they were taking anticoagulants. However, this incidence did not differ significantly from that in patients who had non-surgical extractions while taking anticoagulants ($p=0.4$). Among patients who did not take anticoagulants, those who had surgical extractions and non-surgical extractions each reported one postoperative bleed. Although the non-surgical group was smaller, the difference was not significant ($p=1.0$).

Table 2 shows the number of episodes of postoperative bleeding/group.

No patient had a severe postoperative bleed. Patients who did not take anticoagulants had fewer mild bleeds than the group who did take anticoagulants, but the difference was not significant ($p=0.17$).

Table 3 shows the data according to the different anticoagulants used. The patients who used vitamin K antagonists had the highest percentage of mild postoperative bleeds, and had a mean (SD) INR of 2.6 (1.9–3.4). The 3 patients who had mild bleeds had INR of 2.0, 2.9, and 3.0. Linear

Table 3
Number (%) and types of incidents postoperative bleeding by type of anticoagulant.

	No bleeding (n = 197)	Mild bleeding (n = 9)
Thrombocyte aggregation inhibitors	67 (94)	4
Vitamin K antagonists	29 (90)	3
No anticoagulant treatment	101 (98)	2

There were no episodes of severe bleeding.

regression analysis showed that the INR was not correlated with the bleed ($\beta=0.41$, $SE=0.28$, $p=0.14$). Patients who took vitamin K antagonists had a higher incidence of mild postoperative bleeds than patients taking thrombocyte aggregation inhibitors or patients who did not take anticoagulants, but not significantly so ($p=0.67$ and $p=0.09$, respectively). The control group had the lowest incidence of bleeding, but the difference between this group and the patients who took thrombocyte aggregation inhibitors was also not significant ($p=0.23$). Fig. 1 shows an overview of the percentages of mild bleeds in the different groups.

Discussion

Continuation of anticoagulants can be extremely important for patients at high risk of thromboembolic events, such as those who have mechanical heart valve prostheses and those who have recurrent or recent thromboembolic events. When planning dentoalveolar surgery in such patients, the possible consequences of postoperative bleeding in those on continuous treatment with anticoagulants must be weighed against the possible consequences of a thromboembolic event. To help guide such decisions we have analysed the incidence and severity of postoperative bleeding after dentoalveolar surgery in patients who did and did not take anticoagulants.

None of our patients developed severe postoperative bleeds, which confirms the results of Napenas et al., who found no postoperative bleeding complications among 43 patients given single or dual antiplatelet treatment. However, they did not follow up patients postoperatively to record mild bleeds.⁸

We telephoned the patients one week postoperatively and found that 7% of those taking anticoagulants had had a mild postoperative bleed. In a similar study by Brennan et al., patients who were taking one thrombocyte aggregation inhibitor were called 2 days after dentoalveolar surgery. Of 14 patients, 2 reported bleeding that stopped after gauze compression had been applied at home.⁹ This difference

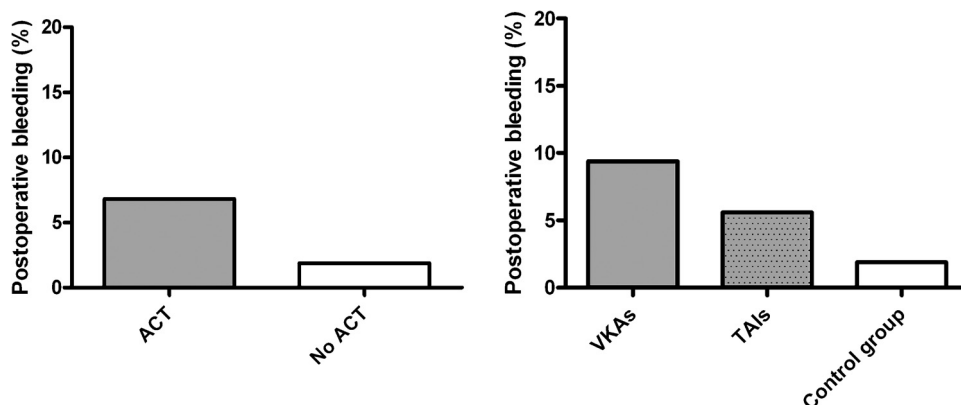


Fig. 1. Percentage of incidents of mild postoperative bleeding for the different groups. ACT = anticoagulant treatment, VKA = vitamin K antagonists, and TAI = thrombocyte aggregation inhibitors.

might be explained by the relatively low number of patients in the latter study.⁹

Other studies that have evaluated the safety of continuing anticoagulants during dentoalveolar surgery have recorded prolonged bleeding time or severe intraoperative bleeding. Lillis et al. reported prolonged immediate bleeding after extraction in 2 out of 78 patients (2.6%) taking thrombocyte aggregation inhibitors, and in 2 out of 532 patients (0.4%) given no anticoagulants. The difference was not significant.¹⁰ Like us they reported no late bleeding complications among their patients. Ardekian et al. examined the severity of intraoperative bleeding during dentoalveolar surgery.¹¹ Among the 19 patients who were prescribed one thrombocyte aggregation inhibitor, 4 developed severe intraoperative bleeding, which was a significantly higher incidence than that found in patients using no anticoagulants. All bleeding was controlled by suturing the wound and applying pressure with gauze, and no uncontrolled postoperative bleeding was reported during the week postoperatively.

In the present study we chose to record the incidence and severity of postoperative bleeding after dentoalveolar operations, because we felt that this was the most clinically relevant variable. Unlike most studies that have analysed the safety of continuing anticoagulants during dentoalveolar surgery, we contacted all patients one week postoperatively to record whether they had bled at home. This enabled us to analyse mild bleeds as well, and any severe bleeds that might have been treated by another hospital, which would go unnoticed in studies that record only whether a patient seeks contact after dentoalveolar surgery.

For the experimental group we included all patients who met the conditions described in the ACTA guidelines. Because the guidelines address the use of both thrombocyte aggregation inhibitors and vitamin K antagonists, we included patients that used either of them. This enabled us to compare the percentage of postoperative episodes of bleeding according to the anticoagulant used. We found that the vitamin K antagonists were associated with more mild bleeds, although the difference was not significant. However, any comparison between these treatment groups should be interpreted cautiously; thrombocyte aggregation inhibitors are prescribed more often, and so the study included more patients who used them.

The ACTA guidelines were modified in 2013, and now state that dual thrombocyte aggregation inhibitors may also be continued during dentoalveolar surgery. As the subjects in our study were recruited before 2013, patients on dual treatment were not included.

According to the ACTA guidelines, the antifibrinolytic agent tranexamic acid is indicated for patients who take vitamin K antagonists. Patients who take thrombocyte aggregation inhibitors were not treated with tranexamic acid or any other topical haemostatic agent. This was in accordance with other studies that have used only topical haemostatic agents for patients with postoperative bleeding or prolonged bleeding time.^{10,12} However, we know of no available

evidence to indicate when topical haemostatic agents are indicated during or after dentoalveolar surgery.

The composition of our study group could have influenced the results in several ways. All mild postoperative bleeds occurred in patients who had surgical or non-surgical extractions, while there were none in patients who had placement of implants or apicectomies. This might be because far fewer patients had implants inserted or apicectomies. Another reason could be that the wound can be closed primarily after these operations, which is not always possible after (surgical) extractions.

The baseline characteristics were not entirely balanced between the 2 groups, there being a significant difference in the mean age at the time of treatment. Elderly patients are more likely to require anticoagulation, and there were therefore more of them in the treated group. We do not think that this difference influenced the results, because the bleeding tendency in the control group was not expected to differ when the mean age was higher.

Conflict of interest

The authors declare that they have no conflict of interest.

Ethics statement

The study was conducted according to the Declaration of Helsinki, and informed consent was obtained from all participants.

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