

Safety of local anaesthesia in dental patients taking oral anticoagulants: is it still controversial?

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Abstract

The aim of this study was to investigate the safety of local infiltration techniques and the inferior alveolar nerve block (IANB) in dental patients taking oral anticoagulants. A total of 352 patients were given a total of 560 injections of local anaesthetic (119 IANB and 441 others). The study group comprised 279 patients with therapeutic international normalised ratios (INRs), and the control group 73 patients who were taking oral anticoagulants but had subtherapeutic INR on the day of operation. Blood was aspirated 7 times (7.3%) during the IANB in the study group. However, there were no clinical signs of prolonged haemorrhage into the medial pterygoid muscle or pterygomandibular space after 96 IANB, including those from whom blood had been aspirated. Only two minor haematomas developed after multiple infiltrations in the lingual sulci. The results suggest that bleeding as a result of the use of local anaesthesia in patients with therapeutic INR is unlikely, provided that the IANB is done correctly.

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Introduction

Management during oral surgical procedures of patients who are taking anticoagulants has changed drastically during the past decade, but there are still differences in the approaches of oral and maxillofacial surgeons.¹ The balance between reduction in the dose of oral anticoagulants on the one hand, and excessive bleeding during surgery in therapeutically anticoagulated patients on the other, is a major problem, particularly with outpatient procedures.² Several protocols have been proposed for such patients,^{3,4} and can be summarised as: temporary discontinuation or a reduction in dose of oral anticoagulants to obtain a subtherapeutic international normalised ratio (INR); replacement of oral anticoagulation with heparin or low-molecular weight heparins; or continuation of oral anticoagulation.⁵ However, the latest recommendations emphasise that the risk of serious

bleeding in patients with therapeutic INR is small. It has therefore been suggested that the dose of oral anticoagulant should not be discontinued or changed.^{2–7}

Interestingly, numerous studies of minor oral surgery in patients taking anticoagulants have failed to mention the possible problem of postoperative haemorrhage as a result of local anaesthesia, although several reports have suggested that block techniques, particularly the inferior alveolar nerve block (IANB), might cause serious bleeding into the medial pterygoid muscle or the surrounding soft tissue.^{2,8,9} Based on this, some recommendations have stated that these techniques of local anaesthesia may not be generally advisable in patients taking anticoagulants,¹⁰ or not advisable in those with an INR over 3.⁷ However, all the statements seem to be empirical, and lack controlled research. They merely follow guidelines established for the dental treatment of patients with inherited bleeding disorders, mainly haemophilia A,^{2,11} although it can be assumed that the risk of haemorrhage in patients with inherited bleeding disorders differs from that in patients taking oral anticoagulants.

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Finally, such statements may cause anxiety among dental practitioners who use any kind of block anaesthesia (mainly the IANB) in such patients being treated in private dental practice. The aim of this long-term prospective study, therefore, was to assess the safety of local infiltration techniques and block anaesthesia in patients taking oral anticoagulants.

Patients and methods

The purpose of this long-term prospective study (from March 2005 to March 2010) was to estimate the safety of local dental anaesthesia in therapeutically anticoagulated patients (INR 2–4). The study was approved by the local Ethics Committee, and written informed consent was obtained from all patients. All patients were treated at the Dental Clinic of Vojvodina, Department of Oral Surgery, Novi Sad, Serbia.

The study included patients taking oral anticoagulants in the long term, whose INR was less than or equal to 4.0 on the day of the operation, and who required simple dental extraction without a mucoperiosteal flap being raised. Patients with liver or renal disease and those taking drugs that affected liver function or haemostasis (antiplatelet drugs) were excluded from the study. All patients on oral anticoagulants were divided into two groups: the study group comprised patients with therapeutic INR (2–4); and the control group patients with subtherapeutic values INR (less than 2) on the day of operation.

Local infiltration anaesthesia (supraperiosteal injection and palatal submucous infiltration) in the maxilla was used as described.¹² In the mandible, the IANB was given by a standard intraoral approach, with supplemental buccal infiltration when needed; for lower incisors, local infiltration anaesthesia (labial supraperiosteal and lingual submucous infiltration) was used. In cases where the IANB was not completely successful, intraligamentary injection was added to achieve complete anaesthesia of the lower teeth to be extracted.

Local anaesthetic techniques followed strictly the recommendations generally accepted for safe local anaesthesia in dentistry.¹² It is important to emphasise that we insisted on slow advancement of the needle during IANB (up to about a minute), with repeated injections of a few drops of local anaesthetic solution during advancement. We also insisted on relatively slow deposition of local anaesthetic after the obligatory aspiration check at the point of application.

After the usual pretreatment procedures for selection and grouping of patients with respect to the measured INR, all patients had local anaesthesia induced with two local anaesthetics in regular use – 3% mepivacaine without vasoconstrictor (3% Scandonest®, Septodont, France) and 2% lidocaine with 1/80 000 adrenaline (2% lidokain – adrenalin®, Galenika, Serbia), which were randomly used in both groups of patients. Cartridge-type syringes and 27 G needles were used to give the 3% mepivacaine without vasoconstrictor, and classic disposable syringes and 25 G needles were used to give the 2% lidocaine with 1/80 000 adrenaline.

Table 1
Characteristics of the two groups of patients.

	Study group (n = 279)	Control group (n = 73)
Age (years)		
Mean (SD)	64.4 (10.3)	64.5 (11.1)
Range	25–87	23–82
Sex		
Male	178	44
Female	101	29
INR		
Mean (SD)	2.62 (0.49)	1.83 (0.1)
Range	2.04–4	1.55–1.98

INR = International normalised ratio.

Operative techniques and postoperative instructions and treatment were as usual. All teeth were extracted by the same surgeon (BB) in outpatients, with minimal surgical trauma and without raising a mucoperiosteal flap. Extraction sockets were packed with collagen or gelatin sponges. Where appropriate (a wide socket or a tendency to immediate bleeding), sutures were put across the socket. All patients were provided with a list of postoperative instructions and a pack of sterile gauze swabs. To find out if bleeding after IANB had occurred, soft tissue swelling in the region of the medial surface of the mandibular ramus was checked immediately after anaesthesia, and signs of trismus and obstruction to the airway recorded during follow up examinations. All participants were examined after 30 min, 2 h, and regularly on the first, second, fourth, and seventh days after the procedure.

Data were analysed with the help of the chi square test and analysis of variance (ANOVA) as appropriate, and probabilities of less than 0.05 were accepted as significant. Data were processed in SPSS (Statistical Package for the Social Sciences; SPSS Inc., Chicago, IL, USA), Windows version 15.0.

Results

The study included 352 patients who were taking oral anticoagulants and who were given a total of 560 injections of local anaesthesia (119 IANB and 441 others). Sixty-five patients were excluded from the study: 54 were taking aspirin and oral anticoagulants; 7 patients had an INR of more than 4.0 on the day of the procedure; and 4 patients who did not come to the control examinations, but were contacted by telephone to exclude any possibilities of haemorrhage.

The study group comprised 279 patients and the control group 73. Characteristics of patients in both groups are shown in Table 1. There was no significant difference between these two groups for sex ($p = 0.67$) or age ($p = 0.92$), but as expected, there was significant difference in INR ($p < 0.0001$). The distribution of the local anaesthetic techniques used are shown in Table 2.

Two different local anaesthetic solutions (with different needle diameters, 25 G and 27 G) were used (Table 3). During 96 IANB both solutions were used in patients with therapeutic INR ranges (2–4), while 23 were done in patients with subtherapeutic INR.

Table 2
Distribution of local anaesthetic techniques in patients on oral anticoagulant treatment having teeth extracted under local anaesthesia.

Groups	No of patients*	Jaw	Local anaesthetic technique*		
			Infiltration	Intraligamentary anaesthesia	IANB
Study	279	Mandible	118	7	96
		Maxilla	212	0	0
Control	73	Mandible	18	5	23
		Maxilla	81	0	0

* The total number of patients differs from the total number of injections as many patients were given several injections or needed more than one tooth extracted; IANB = inferior alveolar nerve block.

Table 3
Distribution of the local anaesthetic solutions used among the patients investigated.

Local anaesthetic	3% Mepivacaine without vasoconstrictor		2% Lidocaine with adrenaline (1/80 000)	
	Study group	Control group	Study group	Control group
Infiltration	161	42	169	57
Intraligamentary anaesthesia	7	5	0	0
IANB	38	12	58	11

IANB = inferior alveolar nerve block.

Seven aspirations (7.3%) showed signs of blood in the study group (Table 4). More importantly, there were no signs of prolonged haemorrhage into the medial pterygoid muscle or pterygomandibular space after 96 IANB in patients with therapeutic INR, including those in whom aspiration had shown blood. There were only two haemorrhages that presented as haematomas after multiple infiltrations in the lingual sulci, both in the study group and both after mepivacaine solution with cartridge-type syringes and 27 G needles. The INR of these two patients were 2.2 and 2.57. Both haematomas absorbed spontaneously in a few days.

Haemorrhage after extraction was noted in 16 of 352 patients (4.5%), but the observation was not the concern of this research as it was not related to the local anaesthetic given. All haemorrhages occurred on the day of extraction, were mild, and easily controlled by local haemostatic measures.

Discussion

We know of no current research data about haemorrhagic complications in anticoagulated patients induced by local

dental anaesthesia. However, the possibility of haemorrhage related to local anaesthesia is usually mentioned^{2,8,9} in connection with the dental needs of this increasing group of patients, but lacks scientific evidence. Our research was done on 352 patients taking oral anticoagulants who needed teeth extracted. Most of the patients ($n = 279$) had therapeutic INR (2–4) on the day of extraction, while 73 had subtherapeutic INR (1.99 or less). These patients, in whom haemorrhage after local anaesthesia is not likely, were suitable as a control group for estimation of risk of haemorrhage associated with local anaesthesia in dentistry.

Only two evident haemorrhagic complications were noticed, both in the study group. They presented the day after the procedure as local haematomas in the soft tissue of the anterior part of the floor of the mouth after the use of local anaesthetic solution without vasoconstrictor (3% mepivacaine) for multiple submucous infiltrations in the lingual sulcus before extraction of four incisors. However, the haematoma spread no deeper, and resolved spontaneously after a few days without any inconvenience to the patient.

There is an apparent fear of block anaesthesia techniques in dentistry because of the blood vessels and related

Table 4
Distribution of inferior alveolar nerve block (IANB) and aspiration of blood in the two groups of patients depending on the INR.

IANB anaesthesia	INR value		
	Study group		Control group
	2.0–2.99	3.0–4.0	≤1.99
3% Mepivacaine without vasoconstrictor			
Total no of patients	29	9	12
Mean INR	2.44	3.33	1.87
No of patients who had blood aspirated	1	1	0
2% Lidocaine with adrenaline			
Total no of patients	44	14	11
Mean INR	2.42	3.37	1.81
No of patients who had blood aspirated	4	1	2
Total no (%) of patients who had blood aspirated	5(6.8)	2(8.7)	2(8.7)

nerves in the vicinity. IANB, being the most often used, is of special concern. The possibility of bleeding into the pterygomandibular space together with the potential for airway obstruction is particularly stressed in patients taking anticoagulants.^{2,8,13} This could be why the French Association of Oral Surgery and Medicine does not recommend the use of block anaesthetic techniques, including IANB, in patients taking oral anticoagulants,¹⁰ whereas the British Committee for Standards in Haematology mentions the safety of IANB only if the INR is less than 3.⁷ However, we found no haemorrhagic complications after 96 IANB in patients taking anticoagulants and having therapeutic INR (2–4). There were seven aspirations of blood, which could be considered as possible causes of bleeding into the pterygomandibular space, but we found no signs of bleeding after the injection or haematoma, and the patients' recovery was uneventful. It is possible that the presence of a vasoconstrictor contributed to the absence of haemorrhagic problems after the injection. More probably, patients taking anticoagulants react as any patient would after a needle has punctured a blood vessel (as was the case in patients from whom blood was aspirated during IANB when the anaesthetic solution with no vasoconstrictor was used, who had no signs of haematoma).

There are some recommendations about lessening the risk of haemorrhagic complications related to the IANB in patients prone to a haemorrhagic response. It is usually emphasised that IANB should be used "cautiously",⁷ without any additional explanation. Carter et al² cited the advantages of short needles of small diameter (27 G), and relatively slow infusion of local anesthetic (lasting over a minute). These suggestions should be followed whenever possible. It seems that slow advancement of the needle together with repeatedly injecting the local anesthetic while advancing the needle contributes to avoiding injury to the blood vessel.

There are several techniques for block anaesthesia in the mandibular structures. It has been established that the Gow-Gates approach results in fewer aspirations of blood than the standard method of IANB.¹⁴ Unfortunately, the Gow-Gates technique is not commonly used for IANB by dentists of this region; in these circumstances, and we recommend that the safest technique is the one that has been properly learned.

A potential drawback and limitation of this study is that we could not precisely establish the possible relation between haemorrhagic complications related to local anaesthesia and needle diameter (25 G or 27 G), as two different local anaesthetic solutions (with or without vasoconstrictor) were used. Local anaesthetic solutions, one delivered by the manufacturer in ampoules, and another in disposable carpules, were used. Interestingly, one earlier study showed no significant difference in relation to aspiration of blood and needle diameter during IANB.¹⁵ Although the results of our research imply that IANB given with the thicker 25 G needle and local anaesthetic solution with vasoconstrictor is safe in patients taking oral anticoagulants, we suggest that smaller needles (27 G), which are less likely to damage soft tissue, are used.

Our results indicate that IANB in patients with INR within therapeutic range is safe. Haemorrhagic complications after local anaesthesia, including the IANB (possibly even other nerve blocks), are not likely, and if they do happen they resolve uneventfully. Without doubt it is advisable to use intraligamentary or intraseptal techniques of local anaesthesia in these patients, as they are safer in that they are less likely to provoke haemorrhagic complications. To lessen the possibility of them happening with IANB, needles with smaller diameter should be used, and the needle should be advanced slowly as the anaesthetic solution is injected. The anaesthetic with vasoconstrictor should be used, together with the IANB technique with which the dentist is familiar.

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