

SURGICAL MANAGEMENT OF THE PRIMARY CARE DENTAL PATIENT ON WARFARIN

Warfarin does not need to be stopped before primary care dental surgical procedures

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Tranexamic acid mouthwash should not be used routinely in primary dental care

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SURGICAL MANAGEMENT OF THE PRIMARY CARE DENTAL PATIENT ON WARFARIN

Executive summary

Warfarin does not need to be stopped before primary care dental surgical procedures

- Patients requiring dental surgical procedures in primary care and who have an International Normalised Ratio (INR) below 4.0 should continue warfarin therapy without dose adjustment.
- Patients on warfarin might bleed more than normal but bleeding is easily treated with local measures.
- The risk of thromboembolism after withdrawal of warfarin therapy outweighs the risk of oral bleeding.

Are patients at risk of thromboembolic events if warfarin is stopped?

SUMMARY OF EVIDENCE

- Stopping warfarin for two days increases the risk of thromboembolic events
- This risk is difficult to estimate but is probably between 0.02% and 1%

It has been common in primary care dental practice to discontinue warfarin treatment for a few days prior to dental surgery in order to limit bleeding problems. It has been assumed that stopping warfarin for a short period presents a negligible risk to the patient. However, data from trials and published case reports do not support this conclusion.

Wahl reviewed¹ 542 documented cases involving 493 patients in whom anticoagulation was withdrawn prior to a variety of dental procedures. He reported that:

- 4 patients experienced fatal thromboembolic events (2 cerebral thromboses, 1 myocardial infarction, 1 embolus - type not specified).
- 1 patient experienced two non-fatal thromboembolic complications (1 cerebral embolus, 1 brachial artery embolus).
- the majority of patients had no adverse effects.

This gives an incidence of serious thromboembolic complications of 1%. There has been criticism of this finding as the length of time that the anticoagulant was stopped was either longer than normal practice (range 5-19 days) or unknown.² In addition, although the data suggest that stopping anticoagulant therapy caused the thromboembolic events, this cannot be assumed.

The risk of thromboembolic events associated with the perioperative withdrawal of oral anticoagulants is also relevant to non-dental procedures. One survey among American dermatologists calculated that following withdrawal of warfarin for between two and seven days, one thromboembolic event occurred for every 6219 cutaneous excisions (0.02%) conducted.³

A small prospective non-randomised study involving 40 patients undergoing 50 vascular or general surgical operations was undertaken to determine the risk of operating on patients taking warfarin compared to the risk in patients initially on, or converted to, heparin.⁴ There were no thromboembolic events in the 30 patients maintained on warfarin. However, five thromboembolic events (three clotted grafts, one stroke and one brachial artery embolism) occurred in the 15 patients in whom warfarin had been stopped, an incidence of 33%. Four of these events were in patients who were not started on heparin because their risk of thromboembolism was considered to be low, i.e. the same assumption often made in primary dental practice.⁴

A study looking at the risk of stroke in anticoagulated patients with atrial fibrillation undergoing endoscopy found that of 987 patients (1137 procedures) in whom the anticoagulant was adjusted, 12 patients suffered a stroke within 30 days of the procedure, 9 of these were within 7 days of the procedure. In 438 patients (457 procedures) in whom the anticoagulant was not adjusted none suffered a stroke. The authors calculated the risk of stroke as 0.79% in the 7 days after the procedure and 1.06% in the 30 days after the procedure. Patients with more complex procedures and those with co-morbid illnesses were at an increased risk.⁵

None of the above trials give an estimate of the excess risk of thromboembolism associated with withdrawal of oral anticoagulant therapy. This information can be estimated from a systematic review of peri-operative management of patients on long-term anticoagulant therapy that analysed data from 31 trials involving 1868 patients. Thromboembolic events occurred in 1 of 237 (0.4%) patients who continued their oral anticoagulant, 6 of 996 (0.6%) patients who stopped their oral anticoagulant and 1 of 372 (0.3%) patients who stopped their oral anticoagulant and were given peri-operative heparin/low molecular weight heparin. The management strategy was unspecified or unclear for 263 patients.⁶ This suggests that the incidence of thromboembolic events is increased by 0.2% in patients in whom oral anticoagulation is stopped before a surgical procedure.

Dodson also attempted to estimate excess risk associated with withdrawal of oral anticoagulants for a short period. He calculated the difference in the incidence of stroke over one year between patients with atrial fibrillation on warfarin (1.4%) and those who discontinued warfarin (5.0%), and divided this difference by 2/365 (for 2 days). On this basis, he calculated that the excess risk of stroke in patients with atrial fibrillation who discontinue warfarin for 2 days to be 1 in 5069 (0.02%). A similar calculation suggests that in patients taking warfarin for prosthetic valve replacement, the figure is 1 in 6083 cases (0.02%).⁷

The estimated risk of thromboembolic events if warfarin is discontinued prior to surgical procedures therefore varies considerably between studies. For minor procedures such as dental surgery, the risk appears to vary from 0.02% to 1%.

Hypercoagulable state

It has been suggested that stopping warfarin therapy can lead to a rebound hypercoagulable state.^{1,6,8,9,10,11} Biochemical evidence indicates that an immediate increase in clotting factors and thrombin activity occurs after withdrawal of warfarin. However, the clinical significance of this is unclear as a hypercoagulable state has yet to be demonstrated by clinical studies.

Are patients at increased risk of bleeding if warfarin continues?

Yes. Treatment with warfarin impairs clotting and consequently patients have an increased risk of bleeding during surgical procedures and post-operatively. Bleeding in the mouth can be excessive, even in non-anticoagulated patients. This is because the tooth support structures are highly vascular and, in addition, saliva contains constituents with a fibrinolytic action.

If warfarin is continued what is the incidence of postoperative bleeding and is it clinically significant?

SUMMARY OF EVIDENCE

- Continuing warfarin during dental surgical procedures will increase the risk of postoperative bleeding requiring intervention.
- Stopping warfarin is no guarantee that the risk of postoperative bleeding requiring intervention will be eliminated as serious bleeding can occur in non-anticoagulated patients.
- Most cases of postoperative bleeding can be managed by pressure or repacking and resuturing the socket.
- The incidence of postoperative bleeding not controlled by local measures varies from 0% to 3.5%.

Clinically significant postoperative bleeding has been defined¹² as that which;

1. Continues beyond 12 hours, or
2. Causes the patient to call or return to the dental practice or accident and emergency department, or

3. Results in the development of a large haematoma or ecchymosis within the oral soft tissues, or
4. Requires a blood transfusion.

Volume of blood

Few studies have investigated the volume of blood lost during dental surgical procedures, but those that have report losses varying from 9.7ml per tooth in anticoagulated patients to an average of 223ml per session in patients not taking anticoagulants.⁹ A small study found no difference in the blood loss between patients who continued warfarin and those who stopped it 72 to 96 hours before the procedure.¹⁰

Postoperative bleeding risk

Wahl estimated the incidence of serious bleeding problems in 950 patients receiving anticoagulation undergoing 2400 individual dental procedures.¹³ Only 12 patients (<1.3%) experienced bleeding uncontrolled by local measures and none of the patients were reported to have experienced serious harm. Of these 12 patients:

- 7 had higher than recommended anticoagulation levels
 - 3 of these were given a course of postoperative antibiotics, which may have interacted with the warfarin.
- 2 were started on a placebo mouthwash four times a day immediately after the procedure, which is contrary to standard advice to avoid rinsing for the first 24 hours.

Table 1 details the initial haemostatic management and the incidence and control of postoperative bleeding from a number of studies involving almost 1000 dental patients who continued anticoagulation during dental surgical procedures. Recent publications have focussed less on whether or not anticoagulation should be continued or stopped and more on effective ways to manage patients who have continued their anticoagulant therapy.

Of the patients detailed in Table1, 89 (9%) had delayed post-operative bleeding and in 35 cases (3.5%) this was classed as serious (not controlled by local measures). One patient required a transfusion to reverse the effects of the warfarin but no patients required vitamin K or fresh frozen plasma. Among 260 patients from these studies (data not in table) who had never taken an oral anticoagulant there were 3 serious bleeds (1.2%).^{10,14}

Interpretation of bleeding rates is difficult as rates for different procedures are not analysed separately and different definitions for serious bleeding are used. This may explain some of the divergence between the figures cited above and those from a systematic review that found an incidence of serious bleeding of between 0 and 2% in anticoagulated patients undergoing minor procedures including dental surgery.⁶

How do the risks of thromboembolic events and postoperative bleeding balance?

SUMMARY OF EVIDENCE

- Bleeding complications, while inconvenient, do not carry the same risks as thromboembolic complications.
- Patients whose INR results are within the acceptable therapeutic range are more at risk of permanent disability or death if they have their warfarin stopped prior to a surgical procedure than if they continue it.
- Published reviews of the available literature advise that oral anticoagulants should not be stopped prior to dental surgical procedures.

Increased postoperative bleeding must be balanced against the consequences of thromboembolism.

Thromboembolic events are associated with considerable morbidity and mortality. Permanent disability or death occur in:

- 70% to 75% of patients who experience an arterial thromboembolism (e.g. stroke, myocardial infarction, pulmonary embolism)
- 4% to 10% of patients who have a venous thromboembolism (e.g. Deep vein thrombosis)⁶

Table 1 Haemostatic management and postoperative bleeding incidence in dental surgical patients when oral anticoagulation was continued

Trial	No. pts*	Anticoagulant	INR range** (protocol INR range)	Mean INR	Haemostatic dressing used (number of patients)	Suture	Delayed post op bleeds (serious***)	Control of bleeding
Souto et al. ^{15‡} (RCT)	53	Acenocoumarol	1.5 – 5.2 (2 – 4)	3.1	None, antifibrinolytic mouthwash	None	7 (0)	Epinephrine**** instillation and compression with gauze soaked in antifibrinolytic
Devani et al. ^{11‡} (RCT)	33	Warfarin	2.2 – 3.9 (2 – 4)	2.7	Oxidised cellulose Surgicel (all)	Catgut	1 (1)	Saline irrigation, repack and suture
Campbell et al. ¹⁰ (CT)	12	Warfarin	1.2 - 2.9	2.0	None	None	0 (0)	
Blinder et al. ^{16‡} (CT)	150	'Coumarin'	1.5 – 4.0 (1.5 – 4)	2.2	Gelatin sponge + tranexamic acid mouthwash (50)	Silk	4 (2)	2 = pressure with tranexamic acid soaked gauze 2 = curettage, gelatin sponge, fibrin glue and suture
				2.7	Gelatin sponge + fibrin glue (50)	Silk	6 (2)	4 = pressure with tranexamic acid soaked gauze 2 = curettage, gelatin sponge, fibrin glue and suture
				2.4	Gelatin sponge (50)	Silk	3 (3)	3 = curettage, gelatin sponge, fibrin glue and suture
Blinder et al. ¹⁷ (case series)	249	'Coumarin'	1.5 - >3.5 (1.5 - >3.5)	2.5	Gelatin sponge	Silk	30 (17)	13 = pressure and tranexamic acid soaked gauze 17 = curettage, repack and suture
Halfpenny et al. ¹⁸ (RCT)	46	Warfarin	2 – 4.1 (2 – 4.5)	2.8	Oxidised cellulose (26) Fibrin glue (20)	Softgut	3 (3)	2 = repack and suture 1 = hospital admission
Evans et al. ¹⁹ (RCT)	57	Warfarin	1.2 – 4.7 (<4)	2.5	Oxidised cellulose	Synthetic absorbable	12 (2)	10 = pressure 2 = repack and suture, 1 requiring hospital admission
Barrero et al. ²⁰ (case series)	125 pts = 229 sessions	Acenocoumarol	2 – 3 (2 – 3)		Oxidised cellulose (167 sessions) Tranexamic acid soaked gauze compression and mouthwash (all sessions)	50 sessions only	19 patients bled for >5 mins (1)	1 required transfusion
Alexander et al. ²¹ (personal experience)	15	Warfarin	1.9 – 3.6 (2 – 4)	2.6	Surgicel (7) Gelfoam (3) None (5)	Yes – type not specified	0 (0)	
Zanon et al. ¹⁴ (case control series)	250	Warfarin	1.8 – 4 (1.8 – 4)		Oxidised cellulose, tranexamic acid soaked gauze	Silk	4 (4)	Gelatin sponge pack and suturing
Total no. patients =	990						89 (9.0%) delayed postoperative bleeds (35 (3.5%) serious***)	

* This column indicates the number of patients for whom oral anticoagulation was continued, some trials also included a group of patients for whom oral anticoagulation was stopped or a group of patients not taking an oral anticoagulant.

** Measured range for study participants

*** Serious = requiring repacking and resuturing

**** epinephrine = adrenaline

‡ = Studies included in Wahl's review¹³

RCT = randomised controlled trial

CT = controlled trial

In compiling this review no cases of permanent disability or death, reported as a consequence of postoperative bleeding associated with a dental surgical procedure in which the patient continued oral anticoagulation, were found.

The majority of publications that have considered the risks of stopping versus continuing oral anticoagulation for dental procedures have concluded that most dental patients can undergo procedures without alteration to their oral anticoagulant provided that local haemostatic measures are used to control bleeding.^{1,6-8,10-14,16-22}

Which patients taking warfarin should not undergo surgical procedures in primary care?

Patients who have an INR greater than 4.0 should not undergo any form of surgical procedure without consultation with the clinician who is responsible for maintaining their anticoagulation (this may be the GP or the hospital anticoagulant clinic haematologist). The warfarin dose will need to be adjusted prior to the procedure. Patients who are maintained with an INR >4.0 or who have very erratic control may need to be referred to a dental hospital or hospital based oral/maxillofacial surgeon.

The following medical problems may affect coagulation and clotting:^{11,22,23,24}

- liver impairment and/or alcoholism
- renal failure
- thrombocytopenia, haemophilia or other disorder of haemostasis
- those currently receiving a course of cytotoxic medication.

Patients with any of these conditions who also take warfarin should not be treated in primary care but referred to a dental hospital or hospital based dental clinic.

Patients requiring major surgery are unlikely to be treated in the primary care setting.

What is the normal INR range?

The activity of warfarin is expressed using the international normalised ratio (INR). For an individual not taking warfarin a normal coagulation profile is an INR of 1.0.

UK guidelines²⁵ recommend the following target INRs:

Indication	UK INR target	Acceptable range
Pulmonary embolus (PE)	2.5	2.0-3.0
Deep vein thrombosis (DVT)	2.5	2.0-3.0
Atrial fibrillation	2.5	2.0-3.0
Recurrence of embolism - no longer on warfarin	2.5	2.0-3.0
Recurrence of embolism on warfarin	3.5	3.0-4.0
Mechanical prosthetic heart valves	3.5	3.0-4.0
Antiphospholipid syndrome	3.5	3.0-4.0

In theory all patients will have an INR below 4.0.

Up to what INR value can dental procedures be carried out in primary care?

SUMMARY OF EVIDENCE

- Published trial data suggests that minor dental surgical procedures can be safely carried out on patients with an INR ≤4.0.
- The consensus from reviews on the management of dental patients taking warfarin is that minor dental surgical procedures should be carried out without alteration to the patient's warfarin therapy if the INR is within the therapeutic range (INR 2.0 – 4.0).
- Dentists from general and community dental practice have reported no problems in carrying out minor dental surgical procedures on patients with an INR within the therapeutic range.

Of the 10 trials/case series listed in Table 1, one stated that minor dental surgical procedures could be carried out with the INR ≤ 4.5 ,¹⁸ six limited the INR to ≤ 4.0 ,^{11,14-16,19,21} one just stated ≥ 3.5 (23 patients included with INRs ≥ 3.5),¹⁷ one limited the INR to ≤ 3.0 ²⁰ and one trial stated no limits but included patients with INRs up to 3.0.¹⁰ Results suggest that limiting the INR to ≤ 4.0 enables procedures to be carried out safely without excessive postoperative bleeding.

Reviews discussing the continuation of oral anticoagulation during minor dental surgical procedures have advocated that procedures can safely be carried out with the INR within the therapeutic range (2.0 – 4.0) when local haemostatic measures are used to control bleeding.^{1,6-8,13,26} Others have advocated upper limits of 3.5^{22,27,28,29} or 3.0.³⁰

A series of letters in the *British Dental Journal* in 2002/2003^{31,32,33,34,35,36,37,38,39,40} highlight the lack of consensus, but a gradual change in practice, around the management of dental patients who take warfarin. The series includes letters from practitioners in general dental practice³³ and community dental practice^{34,36} reporting that they routinely carry out dental procedures without any problems in patients whose INR is within the therapeutic range.

When should the INR be measured before a dental procedure?

The INR must be measured prior to dental procedures, ideally this should be done within 24 hours before the procedure.^{14,16,17,18,19,20,21,22,23,27,28} However, this is difficult to achieve in primary care dental practice. For patients who have a stable INR, an INR measured within 72 hours before the procedure is acceptable. Patients will need either to co-ordinate their dental treatment with their next planned INR measurement or have an extra INR measurement within 72 hours of their planned dental treatment.

N.B. The INR is valid only for patients who have stable anticoagulant therapy. Patients presenting with an INR much higher than their normal value, even if it is less than 4.0, should have their procedure postponed and should be referred back to the clinician maintaining their anticoagulant therapy.

Should the primary care dentist ever advise an alteration to the warfarin regimen?

No. The GP or the anticoagulant clinic must do this.

For what procedures can warfarin be continued safely?

Minor surgical procedures can be safely carried out without altering the warfarin dose. Those likely to be carried out in primary care will be classified as minor e.g. simple extraction of up to 3 teeth, gingival surgery, crown and bridge procedures, dental scaling and the surgical removal of teeth.^{8,12,21,24}

When more than 3 teeth need to be extracted then multiple visits will be required. The extractions may be planned to remove 2-3 teeth at a time, by quadrants, or singly at separate visits.^{7,21,23}

Scaling and root planning should initially be restricted to a limited area to assess if the bleeding is problematic.

How should the risk of bleeding be managed?

Timing

Think about the timing of the surgery. Planned surgery should ideally be:

- At the beginning of the day - this allows more time to deal with immediate re-bleeding problems.
- Early in the week- this allows for delayed re-bleeding episodes occurring after 24–48 hours to be dealt with during the working week. A Tuesday morning procedure allows the patient to have their INR measured on Monday.²⁸

Local anaesthetic

A local anaesthetic containing a vasoconstrictor should be administered by infiltration or by intraligamentary injection wherever practical.¹² Regional nerve blocks should be avoided when possible. However, if there is no alternative, local anaesthetic should be administered cautiously using an aspirating syringe.^{12,17,23,24,28} Local vasoconstriction may be encouraged by infiltrating a small amount of local anaesthetic containing adrenaline (epinephrine) close to the site of surgery.³⁰

Local haemostasis

Sockets should be gently packed with an absorbable haemostatic dressing^{8,12,23,24,28} e.g. oxidised cellulose (Surgicel[®]), collagen sponge (Haemocollagen[®]) or resorbable gelatin sponge (Spongostan[®]), then carefully sutured. Trials in patients who have continued anticoagulant therapy throughout the perioperative period have used resorbable (catgut or synthetic – Vicryl polyglactin) or non-resorbable (silk, polyamide, polypropylene) sutures. Resorbable sutures are preferable as they attract less plaque.²⁸ If non-resorbable sutures are used they should be removed after 4-7 days.²⁸ Following closure, pressure should be applied to the socket(s) by using a gauze pad that the patient bites down on for 20 minutes.

Efforts should be made to make the procedure as atraumatic as possible and any bleeding should be managed using local measures.

The use of tranexamic acid mouthwash, which acts as a local antifibrinolytic agent, has been investigated but is not recommended routinely in primary care (see page 10).

Post operative management

Patients should be given clear instructions on the management of the clot in the postoperative period and advised:⁴¹

- to look after the initial clot by resting while the local anaesthetic wears off and the clot fully forms (2-3 hours)
- to avoid rinsing the mouth for 24 hours
- not to suck hard or disturb the socket with the tongue or any foreign object
- to avoid hot liquids and hard foods for the rest of the day
- to avoid chewing on the affected side until it is clear that a stable clot has formed. Care should then be taken to avoid dislodging the clot
- if bleeding continues or restarts to apply pressure over the socket using a folded clean handkerchief or gauze pad. Place the pad over the socket and bite down firmly for 20 minutes. If bleeding does not stop, the dentist should be contacted; repacking and resuturing of the socket may be required
- who to contact if they have excessive or prolonged postoperative bleeding. The surgery and out of hours/on call dentist's name/number should be provided. There should be a facility for the patient to be reviewed and treated immediately by a dentist if a bleeding problem occurs. If it is not possible for the patient to be seen immediately by a dentist then the patient should be referred to their local Accident and Emergency department
- on pain control – see below.

How should postoperative pain control be managed?

Patients should follow the advice of their anticoagulant clinic with regard to the choice of analgesia for short term mild to moderate pain. Generally paracetamol is considered the safest simple analgesic for patients taking warfarin and it may be taken in normal doses if pain control is needed and no contraindication exists. Patients should be advised **not** to take aspirin, aspirin containing compound analgesic preparations or non-steroidal anti-inflammatory drugs (NSAIDs) e.g. ibuprofen, which are considered less safe than paracetamol, in patients taking warfarin.

If prescribed analgesia is to be provided additional options include;

- **Rofecoxib** – a cyclo-oxygenase-2 (COX-2) inhibitor. The COX-2 inhibitors are as effective as standard NSAIDs and have a similar side effect profile, however, the risk of gastro-intestinal bleeding is lower (see potential interaction on page 9).

- **Dihydrocodeine** – an opioid analgesic with similar analgesic efficacy to codeine. It is suitable for mild to moderate pain. It has no anti-inflammatory activity and is of limited value in pain of dental origin.

Are there any drug interactions that are relevant to this patient group undergoing dental surgical procedures?

Amoxicillin - There are anecdotal reports that amoxicillin interacts with warfarin causing increased prothrombin time and/or bleeding but documented cases of an interaction are relatively rare.^{42,43} However, a single 3 gram dose given for endocarditis prophylaxis has not been shown to produce a clinically relevant interaction. Prophylactic antibiotics do not appear to affect the bleeding risk postoperatively.¹⁹ Patients requiring a course of amoxicillin should be advised to be vigilant for any signs of increased bleeding.

Clindamycin - Clindamycin does not interact with warfarin when given as a single dose for endocarditis prophylaxis. Prophylactic antibiotics do not appear to affect the bleeding risk postoperatively.¹⁹ Clindamycin is restricted to specialist use for treatment and should not be used routinely for dental infections due to its serious side effects.²³ There is a single case report of an interaction between warfarin and a course of clindamycin.^{42,43}

Metronidazole - *CAUTION* metronidazole interacts with warfarin and should be avoided wherever possible. If it cannot be avoided the warfarin dose may need to be reduced by a third to a half by the GP or anticoagulant clinic.^{42,43}

Erythromycin - Erythromycin interacts with warfarin unpredictably by only affecting certain individuals. Most are unlikely to develop a clinically important interaction. Patients should be advised to be vigilant for any signs of increased bleeding.^{42,43}

Paracetamol – The anticoagulant effect of warfarin is normally not affected, or only increased by a small amount, by occasional doses of paracetamol.⁴² Paracetamol is considered to be safer than aspirin as an analgesic in patients taking warfarin and is the analgesic advised by anticoagulant clinics and the patient held 'Anticoagulant therapy booklet'. The anticoagulant effect of warfarin may be enhanced by prolonged regular use of paracetamol.

Aspirin – *AVOID* use as an analgesic and anti-inflammatory agent. Concurrent aspirin increases the likelihood of bleeding by 3-5 times, increases the bleeding time and may damage the stomach lining.⁴² The interaction is well documented and clinically important.

Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) - *AVOID* NSAIDs e.g. ibuprofen, diclofenac. Care should be taken when using NSAIDs in patients on anticoagulant therapy due to the increased risk of bleeding from the gastro-intestinal tract.⁴²

Rofecoxib (COX-2 inhibitor) – Patients should be closely monitored if rofecoxib is used. In patients on chronic warfarin therapy treatment with rofecoxib has been associated with an increase in INR values. Although rofecoxib can increase the risk of gastro-intestinal bleeding, this risk is less than with standard NSAIDs and rofecoxib may be considered a safer option. Close monitoring is important in the first few days of rofecoxib therapy and patients should be advised to be vigilant for signs of increased bleeding.^{44,45}

Executive summary

Tranexamic acid mouthwash should not be used routinely in primary dental care

- Tranexamic acid mouthwash in primary dental practice is expensive, difficult to obtain and of no more benefit than other local haemostatic measures.

What is tranexamic acid?

Tranexamic acid is an antifibrinolytic agent that inhibits the breakdown of fibrin clots. Its primary action is to block the binding of plasminogen and plasmin to fibrin therefore preventing fibrinolysis.⁴⁶ It has been used in anticoagulated dental patients as a local haemostatic agent in the form of a mouthwash.

What is the evidence of benefit for tranexamic acid mouthwash?

SUMMARY OF EVIDENCE

- When used alone with no local haemostatic dressing, tranexamic acid mouthwash reduces postoperative bleeding compared to placebo mouthwash.
- When used in combination with local haemostatic measures and suturing, tranexamic acid mouthwash does not provide any significant additional reduction in postoperative bleeding.

Two studies^{47,48} have compared a 4.8% tranexamic acid mouthwash with placebo mouthwash in a total of 128 anticoagulated patients undergoing oral surgery. Patients were instructed to rinse 10ml of the solution around the mouth for two minutes then expectorate four times a day for seven days. Both studies used the same protocol. No other local haemostatic agents or procedures were used, although all extraction sites were sutured. Patients using tranexamic acid mouthwash experienced fewer bleeding episodes requiring treatment postoperatively than those using placebo mouthwash (1.5% vs. 26.9% respectively, $p \leq 0.01$).

A more recent study¹⁶ compared three local haemostatic measures following tooth extraction in 150 anticoagulated patients (INR range 1.5-4.0). All patients had resorbable gelatin sponges inserted into the socket(s), followed by suturing and, in addition, either:

- nothing, or
- tranexamic acid 500mg in a mouthwash used for two minutes four times a day for four days, or
- fibrin glue prior to suturing.

Patients receiving only gelatin sponges and suturing had fewer episodes of postoperative bleeding (3) than those using additional tranexamic acid (6) or fibrin glue (4). However, the differences among the three groups were small and not significant ($p=0.54$).

Other studies^{14,15,20} have employed tranexamic acid with or without local haemostatic measures in anticoagulated patients.

250 patients had compression applied with a tranexamic acid soaked gauze pad in addition to local haemostatic dressing and suturing; 1.6% had serious postoperative bleeding.¹⁴

125 patients (229 sessions) used tranexamic acid as a mouthwash for two days postoperatively, but in less than half the sessions a haemostatic dressing and suturing was used; bleeding lasting longer than 5 minutes occurred after 7.8% of sessions and after one session (0.4%) the patient required a transfusion.²⁰

40 patients who received tranexamic acid mouthwash for two days postoperatively had no haemostatic dressing or suturing. Four patients (10%) experienced bleeding requiring local intervention.¹⁵

These rates compare to a serious postoperative bleeding rate of 6.0% when results were pooled from studies where local haemostatic measures and suturing were used without tranexamic acid.^{11,17,18,19}

What are the practical issues associated with the use of tranexamic acid in primary care?

Tranexamic acid mouthwash is not available commercially. An unlicensed preparation can be obtained by special order from a limited number of commercial or NHS 'special-order' manufacturers.²³

Tranexamic acid cannot be prescribed to NHS dental patients on an FP10D prescription but can be prescribed privately. Community pharmacists can obtain the unlicensed mouthwash from the 'special-order' manufacturer to fill a prescription. Alternatively, the dental practice can order supplies directly from the manufacturer. However, special order supplies have a limited shelf life (1-3 months) and are expensive (up to £115 for a 7 day course). If tranexamic acid mouthwash is supplied by the dentist directly to the patient it must comply fully with the 'labelling of dispensed medicinal products' requirements (Medicines Act 1968).^{49,50} This requires that the container must be labelled with:

1. the name of the product
2. directions for use
3. any precautions relating to the use of the medicinal product
4. the name of the person to whom the medicine is to be administered
5. the date of dispensing
6. the name and address of the dentist supplying the medicinal product
7. the words "Keep out of reach of children" or words with a similar meaning.

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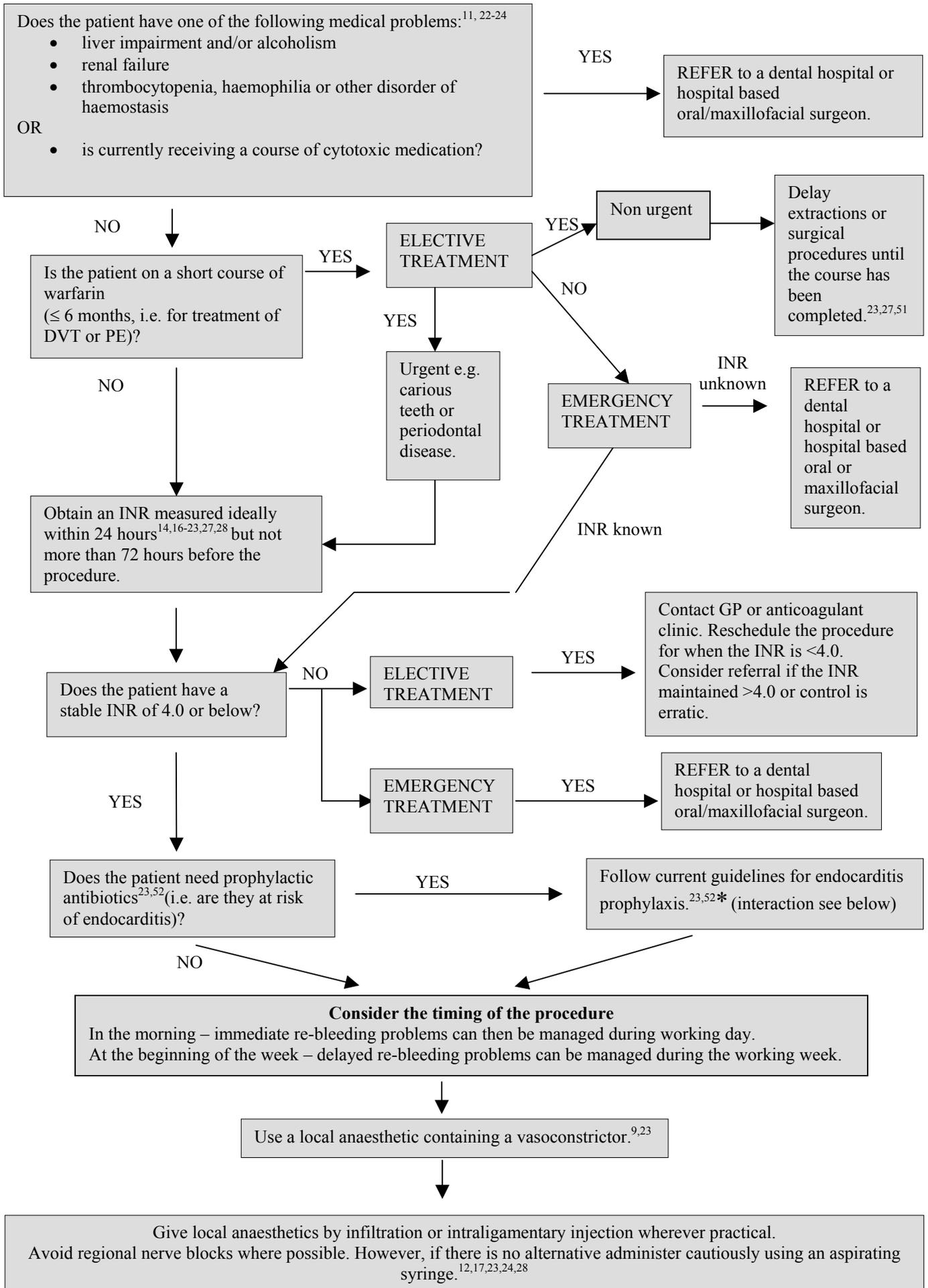
The following were invited to comment on this document; British Association of Oral and Maxillofacial Surgeons, British Dental Association, British Heart Foundation, British Society for Haematology, Faculty of General Dental Practitioners (UK) plus individuals with expertise in primary dental care, secondary dental care, oral medicine, community dental services, PCTs (dental advisors), maxillofacial surgery, haematology, clinical pharmacology, pharmacy. Thank you to all who commented.

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Management of dental patients on warfarin undergoing surgical procedures in primary care



Gently pack the socket with an absorbable haemostatic dressing (e.g. Surgicel[®], Heamacollagen[®], Spongostan[®]).^{8,12,23,24,28}

Carefully suture the socket.^{8,12,23,24,28}

There is no indication for routinely prescribing antibiotics following the above procedures in this group of patients. ** (interactions see below)

Does the patient require post-operative analgesia?

YES

Paracetamol is the analgesic of choice. AVOID non-steroidal anti-inflammatory drugs (NSAIDs) e.g. ibuprofen, aspirin, diclofenac. *** (interactions see below) Rofecoxib and dihydrocodeine are available on prescription.

NO

Patients should be given clear instructions on the management of the clot in the postoperative period

Patients should be advised:⁴¹

- to look after the initial clot by resting while the local anaesthetic wears off and the clot fully forms (2-3hours)
- to avoid rinsing the mouth for 24 hours
- not to suck hard or disturb the socket with the tongue or any foreign object
- to avoid hot liquids and hard foods for the rest of the day
- to avoid chewing on the affected side until it is clear that a stable clot has formed. Care should then be taken to avoid dislodging the clot
- if bleeding continues or restarts, to apply pressure over the socket using a folded clean handkerchief or gauze pad. Place the pad over the socket and bite down firmly for 20 minutes. If bleeding does not stop the dentist should be contacted; repacking and resuturing of the socket may be required
- who to contact if they have excessive or prolonged postoperative bleeding. The surgery and out of hours/on call dentist's name/number should be provided. There should be a facility for the patient to be reviewed and treated immediately by a dentist if a bleeding problem occurs. If it is not possible for the patient to be seen immediately by a dentist then the patient should be referred to their local Accident and Emergency department.
- to avoid taking non-steroidal anti-inflammatory drugs (NSAIDs) e.g. ibuprofen or aspirin for pain control immediately postoperatively. Paracetamol may be taken if pain control is needed and no contraindication exists.

INTERACTIONS

* There are anecdotal reports that **amoxicillin** interacts with warfarin causing increased prothrombin time and/or bleeding but documented cases of an interaction are relatively rare.^{42,43} However, a single 3 gram dose given for endocarditis prophylaxis has not been shown to produce a clinically relevant interaction. Patients requiring a course of amoxicillin should be advised to be vigilant for any signs of increased bleeding. **Clindamycin** does not interact with warfarin when given as a single dose for endocarditis prophylaxis. Clindamycin is restricted to specialist use for treatment and should not be used routinely for dental infections due to its serious side effects.²³ There is a single case report of an interaction between warfarin and a course of clindamycin.^{42,43}

** CAUTION **metronidazole** interacts with warfarin and should be avoided wherever possible. If it cannot be avoided the warfarin dose may need to be reduced by a third to a half. Consult the GP or anticoagulant clinic. **Erythromycin** interacts with warfarin unpredictably only in certain individuals. Patients should be advised to be vigilant for any signs of increased bleeding.^{42,43}

*** Care should be taken when using NSAIDs in patients on anticoagulant therapy due to the increased risk of bleeding from the gastro-intestinal tract.⁴² Close monitoring is important in the first few days of rofecoxib therapy and patients should be advised to be vigilant for signs of increased bleeding.^{44,45} The anticoagulant effect of warfarin is normally not affected, or only increased by a small amount, by occasional doses of paracetamol.⁴² Paracetamol is considered to be safer than aspirin as an analgesic in patients taking warfarin and is the analgesic advised by anticoagulant clinics and the patient held 'Anticoagulant therapy booklet'.

Appendix 1

Will I be paid if I use a haemostatic dressing and sutures?

Where a dentist wishes to make a claim for treatment, which is necessary to secure and maintain oral health, and which is not included elsewhere in the fee scale, the Dental Practice Board (DPB) may allow a fee for the treatment provided under Item 4001 (any other treatment). Each case is considered individually and the DPB require details of the clinical circumstances and the treatment provided.⁵³

Claiming for packing and suturing an extraction socket in a patient on warfarin

The DPB must be informed that the patient is taking warfarin and requires regular monitoring of their INR and that a haemostatic dressing and suturing have been provided. In this case a fee would normally be allowed under Item 4001, in addition to scale fees payable under Item 21 (extractions). The fee paid is normally equivalent to the scale fee for treatment under Item 2301 (treatment for arrest of abnormal haemorrhage).

Claiming for suturing only in a patient on warfarin

The DPB must be informed that the patient is taking warfarin and requires regular monitoring of their INR. The number of sockets sutured should be stated. In this case a fee would normally be allowed under Item 4001, in addition to scale fees payable under Item 21 (extractions).

Claiming for treatment of delayed bleeding of a socket

If delayed bleeding occurs and further visits are required then treatment under Item 2301 (treatment for arrest of abnormal haemorrhage) can be claimed in accordance with the Statement of Dental Remuneration.

Although the overall management, including the actual treatment, of a patient on warfarin may take longer than for a patient not on warfarin, the payment of additional patient management fees for patients taking warfarin would not normally be considered appropriate.

Appendix 2

Will I be at risk of litigation if the patient bleeds?

We live in an increasingly litigious society and there will always be the possibility that a patient may pursue a legal claim. Adherence to clinical practice guidelines is one way to limit potential liability.

Dental defence societies assess each case individually but take the following general view:^{54,55}

- Practitioners should be aware of and abide by best evidence-based medicine, current teaching and guidance from a responsible body of opinion.
- If contrary advice is received from another medical practitioner a discussion around the differing opinions is advised with this practitioner. It is important that the patient is not compromised in any way.

When defence societies assess cases involving patients who take warfarin they consider that:^{54,55}

- Practitioners should be aware of guidance which assesses the risk versus benefit of stopping or continuing warfarin and concludes that the potential risk of stopping therapy is greater than the risk from bleeding following simple dental extraction.
- If practitioners adhere to guidance advising that warfarin is not stopped prior to minor surgical procedures in primary dental care, especially with respect to local haemostasis and suturing, then the practitioner could be defended should problems arise.

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