



Christine Randall

# Surgical Management of the Primary Care Dental Patient on Warfarin

**Abstract:** The management of anti-coagulated dental patients in primary care has changed over the last decade. There is now considerable evidence that many patients can safely be managed without stopping or altering their warfarin. This paper summarizes the evidence and provides guidance for the dentist on identifying which patients can be managed in primary care. Generally, such patients are those with a stable INR within the therapeutic range, between 2.0 and 4.0, undergoing simple extractions, scaling and minor surgical procedures, for whom local haemostatic measures are used, including packing with a haemostatic dressing, suturing and application of local pressure. Management advice is presented in the form of an algorithm providing additional information on postoperative care.

**Clinical Relevance:** Dental practitioners in primary care treat an increasing number of patients taking warfarin, so identification of patients who may be treated is of importance.

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Over the last decade there has been a shift towards the acceptance of evidence-based practice – the conscientious, explicit and judicious use of current best evidence in making decisions for the care of individual patients.<sup>1</sup> Patients expect, and deserve, to be treated with medicines and procedures that are evidence-based. It is no longer acceptable to carry out procedures in a particular way 'because that's how they've always been done' and take no account of emerging scientific data from robust clinical research. Such emerging evidence has changed the management of dental patients who take anticoagulant therapy, as there is now a greater awareness of the

risk of thrombo-embolic events associated with altering or stopping anticoagulant therapy and of the risk of bleeding associated with continuing it.

The North West Medicines Information Centre (NWMIC), part of the NHS UK Medicines Information network, provides medicines information to dentists working in the UK. In recent years, it has become apparent that one of the most controversial questions is 'How should a patient who takes warfarin and needs a tooth extraction be managed?' The controversy stems from changing professional views and emerging scientific evidence. To address this question the NWMIC conducted an extensive literature search in order to answer the following questions based on current evidence; 'Is it safe to extract a tooth in a patient on warfarin without reducing the INR?'; 'Is it safe temporarily to reduce a patient's INR?' and ultimately, 'Is the intervention safe?' In 2001, based on published evidence,

together with input from many individuals and organizations, the document *Surgical Management of the Primary Care Dental Patient taking Warfarin* was produced and substantially updated in 2004. The document is accessible to dentists via the British Dental Association <http://www.bda-dentistry.org.uk/> and Tuith Online <http://www.tuith.co.uk/> websites and has been well received in both primary and secondary care. This paper summarizes the 2004 document, a full copy can be found at [www.ukmi.nhs.uk/med\\_info/documents/Dental\\_Patient\\_on\\_Warfarin.pdf](http://www.ukmi.nhs.uk/med_info/documents/Dental_Patient_on_Warfarin.pdf)

## Are patients at risk of thrombo-embolic events if warfarin is stopped?

Summary of evidence

- Stopping warfarin for two days increases the risk of thrombo-embolic events.
- This risk is difficult to estimate but is

**Christine Randall**, BPharm, MRPharmS, Senior Medicines Information Pharmacist, North West Regional Medicines Information Centre, 70 Pembroke Place, Liverpool L69 3GF.

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.

#### Dental procedures

Wahl<sup>2</sup> reviewed 542 documented cases involving 493 patients in whom anticoagulation was withdrawn prior to a variety of dental procedures. He reported that:

- Four patients experienced fatal thrombo-embolic events;
- One patient experienced two non-fatal thrombo-embolic complications;
- The majority of patients had no adverse effects;
- The risk of serious thrombo-embolic complications was 1%.

The risk of thrombo-embolic events associated with the peri-operative withdrawal of oral anticoagulants for other minor surgical procedures is also relevant.

#### Dermatological surgery

Following withdrawal of warfarin for between two and seven days prior to dermatological surgery:<sup>3</sup>

- One thrombo-embolic event occurred for every 6219 cutaneous excisions conducted;
- The risk of serious thrombo-embolic complications was 0.02%.

#### Vascular/general surgery

A small prospective non-randomized 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 those initially on, or converted to, heparin. This found:<sup>4</sup>

- Five thrombo-embolic events in 15 patients who stopped warfarin. (Four of these patients were not started on heparin because their risk of thrombo-embolism was considered to be low; the same assumption is often made in primary care

dental practice);

- No thrombo-embolic events in 30 patients maintained on warfarin;
- The risk of serious thrombo-embolic complications was 33%.

#### Endoscopic procedures

A study which examined the risk of stroke in anticoagulated patients undergoing endoscopy found:<sup>5</sup>

- There were 12 strokes within 30 days of the procedure when the anticoagulant was adjusted (nine of these were within seven days of the procedure) (987 patients undergoing 1137 procedures);
- No patients suffered a stroke when the anticoagulant was not adjusted (438 patients, 457 procedures);

#### Systematic review

None of the above trials give an estimate of the excess risk of thrombo-embolism associated with withdrawal of oral anticoagulant therapy. A systematic review of peri-operative management of patients on long-term anticoagulant therapy analysed data from 31 trials involving 1868 patients.<sup>6</sup> Thrombo-embolic events occurred in:

- One of 237 (0.4%) patients who continued their oral anticoagulant;
- Six of 996 (0.6%) patients who stopped their oral anticoagulant;
- One of 372 (0.3%) patients who stopped their oral anticoagulant and were given peri-operative heparin/low molecular weight heparin.
- Risk increased by 0.2% in patients in whom oral anticoagulation was stopped before a surgical procedure. The management strategy was unspecified or unclear for 263 patients.

### Are patients at increased risk of bleeding if warfarin continues?

Treatment with warfarin impairs clotting and patients consequently have an increased risk of bleeding during surgical procedures and postoperatively. 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 fibrinolytics.

### 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.
- Bleeding can occur in non-anticoagulated patients; stopping warfarin is no guarantee that the risk of postoperative bleeding requiring intervention will be eliminated.
- 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 defined<sup>7</sup> as that which:
  - Continues beyond 12 hours;
  - Causes the patient to call or return to the dental practice or accident and emergency department;
  - Results in the development of a large haematoma or ecchymosis within the oral soft tissues; or
  - Requires a blood transfusion.

#### Postoperative bleeding risk

A recent review estimated the incidence of serious bleeding problems in 950 patients receiving anticoagulation undergoing 2400 individual dental procedures.<sup>8</sup> Only 12 patients (<1.3%) experienced bleeding uncontrolled by local measures and none was reported to have experienced serious harm. Of these 12 patients:

- Seven had higher than recommended anticoagulation levels (three of these were given a course of postoperative antibiotics, which may have interacted with the warfarin);
- Two 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.

Analysis of ten papers,<sup>9-18</sup> describing the haemostatic management and postoperative bleeding incidence in almost 1000 dental surgical patients in whom oral anticoagulation was

continued, found that 89 (9%) had delayed postoperative 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 warfarin but no patients required vitamin K or fresh frozen plasma. Also described were 260 patients who had never taken an oral anticoagulant, three of whom experienced serious bleeds (1.2%).<sup>10,11</sup>

Interpretation of bleeding rates is difficult as rates for different procedures were not analysed separately and different definitions for serious bleeding were 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.<sup>6</sup>

### How do the risks of thrombo-embolic events and postoperative bleeding balance?

Summary of evidence

- Bleeding complications, while inconvenient, do not carry the same risks as thrombo-embolic complications.
- Patients whose INR values 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 thrombo-embolism.

Thrombo-embolic events are associated with considerable morbidity and mortality. Permanent disability or death occur in:<sup>6</sup>

- 70–75% of patients who experience an arterial thrombo-embolism (eg stroke, myocardial infarction, pulmonary embolism);
- 4–10% of patients who have a venous thrombo-embolism (eg deep vein thrombosis).

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.<sup>6-21</sup>

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

The following patients should not be treated in primary care but referred to a dental hospital or hospital-based dental clinic:

- Patients with additional medical problems that may affect coagulation and clotting:<sup>18,19,22,23</sup>
- Liver impairment and/or alcoholism;
- Renal failure;
- Thrombocytopenia, haemophilia or other disorder of haemostasis;
- Those currently receiving a course of cytotoxic medication;
- Patients with erratic or unstable INR control;
- Patients maintained with an INR >4.0;
- Patients who have an INR measured as >4.0. Consultation with the clinician who is responsible for maintaining their anticoagulation is required. This may be the GP or the hospital haematologist.

### What is the normal INR range?

The activity of warfarin is expressed using the international normalized ratio (INR). For an individual not taking warfarin, a normal coagulation profile is an INR of 1.0. In theory, all patients on oral anticoagulants will have an INR below 4.0 (Table 1).

### 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.

In ten papers previously cited<sup>9-18</sup> which described the haemostatic management and postoperative bleeding in dental surgical patients, the INR limits between which minor dental surgical procedures could be carried out varied:

- One limited INRs to ≤4.5;<sup>14</sup>
- Six limited the INR to ≤4.0;<sup>9,11,12,15,17,18</sup>
- One stated no upper limit but included 23 patients with INRs ≤3.5;<sup>13</sup>
- One limited the INR to ≤3.0;<sup>16</sup>
- One stated no limits but included

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 after warfarin stopped	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

Table 1. UK guidelines<sup>24</sup> for target INRs.

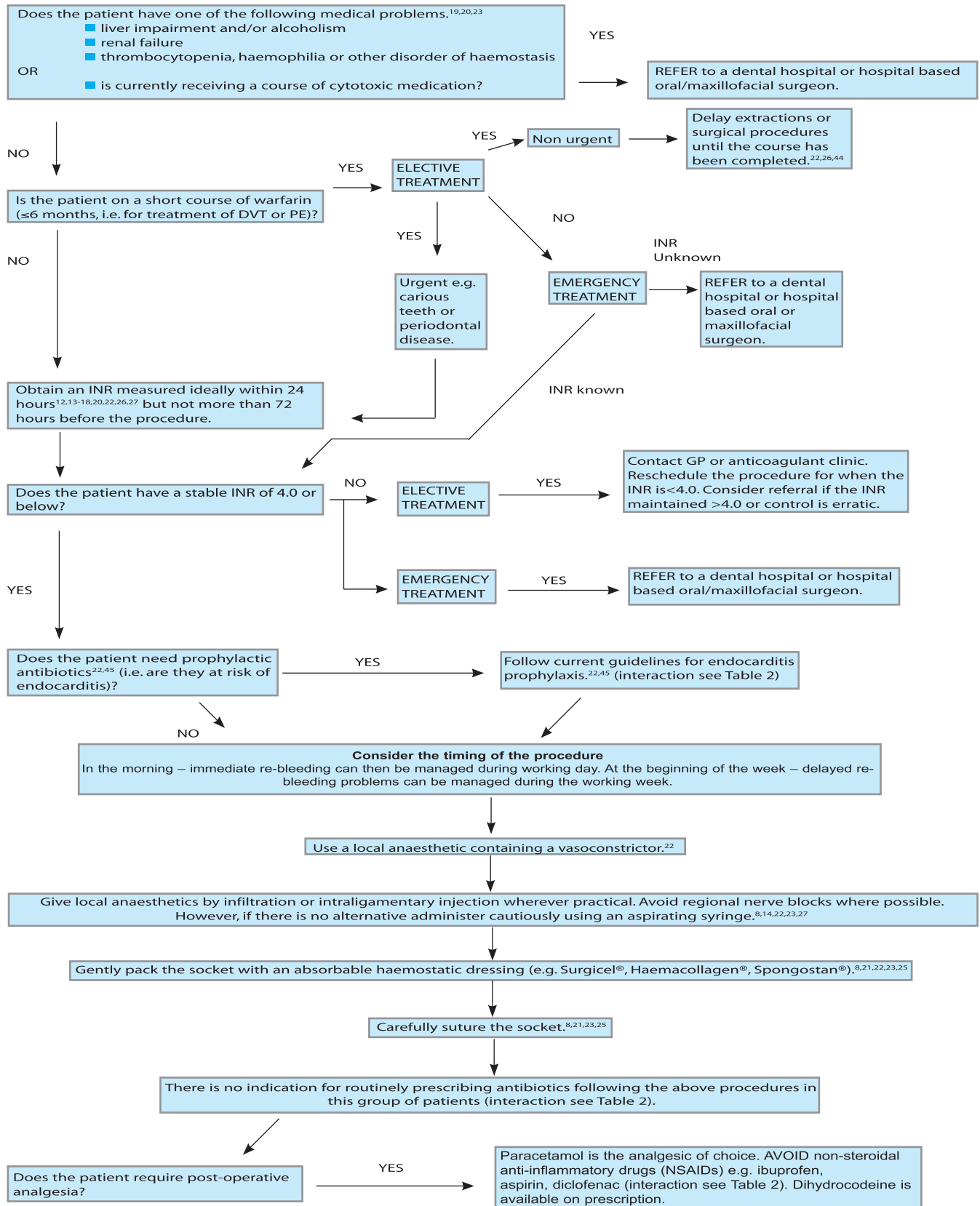


Figure 1. Management of dental patients on warfarin undergoing surgical procedures in primary care.

Drug	OK to use?	Comment
<b>Amoxicillin (Amoxil®)</b>	YES	There are anecdotal reports that amoxicillin interacts with warfarin causing increased prothrombin time and/or bleeding but documented cases of interaction are relatively rare. <sup>42,43</sup> A single three gram dose given for endocarditis prophylaxis has not been shown to produce a clinically relevant interaction and prophylactic antibiotics do not appear to affect the bleeding risk postoperatively. <sup>15</sup> Patients requiring a course of amoxicillin should be advised to be vigilant for any signs of increased bleeding.
<b>Clindamycin (Dalacin C®)</b>	YES	Clindamycin does not interact with warfarin when given as a single dose for endocarditis prophylaxis. There is a single case report of an interaction between warfarin and a course of clindamycin. <sup>42,43</sup> However, clindamycin is restricted to specialist use due to its serious side effects. <sup>22</sup>
<b>Azithromycin (Zithromax®)</b>	YES, but advise vigilance	Azithromycin does not usually interact with warfarin. Occasionally unpredictably raised INRs and bleeding have been seen. <sup>42</sup> Patients should be advised to be vigilant for any signs of increased bleeding.
<b>Metronidazole (Flagyl®)</b>	AVOID Unless a clinical necessity	Metronidazole interacts with warfarin and concomitant use 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 clinician managing the anticoagulation. <sup>42,43</sup>
<b>Erythromycin (Erythrocin® Erythroped®)</b>	YES, but advise vigilance	Erythromycin interacts with warfarin unpredictably 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. <sup>42,43</sup>
<b>Paracetamol</b>	YES	The anticoagulant effect of warfarin is not normally affected by occasional doses of paracetamol. <sup>42</sup> Paracetamol is the analgesic of choice for patients taking warfarin as advised by anticoagulant clinics and the patient-held 'Anticoagulant therapy booklet'. Prolonged, regular use of paracetamol may enhance the anticoagulant effect of warfarin.
<b>Aspirin</b>	AVOID	Avoid use as an analgesic and anti-inflammatory agent. Concurrent aspirin increases the likelihood of bleeding by three-five times, increases the bleeding time and may damage the stomach lining. <sup>42</sup> The interaction is well documented and clinically important.
<b>NSAIDs</b>	CAUTION Advise vigilance	Care should be taken when using NSAIDS e.g. ibuprofen, diclofenac, in patients on anticoagulant therapy due to the increased risk of bleeding from the gastro-intestinal tract. <sup>42</sup>

**Table 2.** Drug interactions relevant to anticoagulated patients undergoing dental surgical procedures.

patients with INRs up to 3.0.<sup>10</sup>

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 when local haemostatic measures are used to control bleeding.<sup>2,6,8,21,25</sup> Others have advocated upper limits of 3.5<sup>19,26-28</sup> or 3.0.<sup>29</sup>

A series of letters in the *British Dental Journal* in 2002/2003<sup>30-39</sup> highlight the lack of consensus, but indicate a gradual change in practice in the management of dental patients who take warfarin. The series includes letters from practitioners in general dental practice<sup>32</sup> and community dental practice<sup>33,35</sup> 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 the 24 hours before the procedure.<sup>11-17,19,22,26,27</sup> However, this is sometimes difficult to achieve in primary care dental practice. In practical terms, haematology opinion is that 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.

As 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 be referred back to the clinician maintaining their anticoagulant therapy.

### For what procedures can warfarin be continued safely?

Most minor surgical procedures carried out in primary care.<sup>7,17,21,23</sup>



**Patients should be advised:**<sup>40</sup>

- 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.
- 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 contra-indication exists.

**Table 3.** Clear instructions given to patients on the management of the clot in the postoperative period.

- Simple extraction of up to three teeth;
- Gingival surgery;
- Crown and bridge procedures;
- Scaling and root planing – should initially be restricted to a limited area to assess if the bleeding is problematic;
- Surgical removal of teeth;
- Extraction of more than three teeth – multiple visits will be required. The extractions may be planned to remove two–three teeth at a time, by quadrants, or singly at separate visits.<sup>17,19,22</sup>

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

Yes. These are summarized in

Table 2.

### How should the risk of bleeding be managed?

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.<sup>27</sup>
- A local anaesthetic

containing a vasoconstrictor should be administered by infiltration or by intraligamentary injection wherever practical.<sup>7</sup> Regional nerve blocks should be avoided when possible. However, if there is no alternative, local anaesthetic should be administered cautiously using an aspirating syringe.<sup>7,13,22,23,27</sup> Local vasoconstriction may be encouraged by infiltrating a small amount of local anaesthetic containing adrenaline (epinephrine) close to the site of surgery.<sup>29</sup>

To promote local haemostasis sockets should be gently packed with an absorbable haemostatic dressing,<sup>7,21-23,27</sup> eg oxidized 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.<sup>27</sup> If non-resorbable sutures are used they should be removed after four–seven days.<sup>27</sup> 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 as it is expensive, difficult to obtain and of no more benefit than other local haemostatic measures.

Patients should be given clear instructions on postoperative management of the clot in the postoperative period (Table 3).<sup>40</sup>

### 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 contra-indication exists. Patients should be advised not to take aspirin, aspirin-containing compound analgesic preparations or non-steroidal anti-inflammatory drugs (NSAIDs) eg ibuprofen, which are considered less safe than paracetamol in patients taking warfarin.

If analgesia is to be prescribed an additional option is dihydrocodeine (DF118®) – an opioid analgesic with similar analgesic efficacy to codeine. It has no anti-inflammatory activity and studies suggest it is of limited value in pain of dental origin.<sup>41</sup>

## Summary

Research on the management of anticoagulated dental patients that has been published over the last decade is changing clinical practice. There is now evidence that many anticoagulated patients treated in primary care can be safely managed without altering their warfarin dose. Generally, such patients are those with a stable INR within the therapeutic range, between 2.0 and 4.0, undergoing simple extractions, scaling and minor surgical procedures, providing local haemostatic measures are used including packing with a haemostatic dressing, suturing and application of local pressure (Figure 1).

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## Book Review

**Salivary and Oral Health** 3rd edition. By Michael Edgar, Colin Dawes and Denis O'Mullane. BDJ Books, London, 2004 (64pp., £24.95p/b). ISBN 0-904588-87-4.

The 3rd edition of this well-known book now has six contributors and includes new material and illustrations.

Although the preface indicates that the book is aimed at the 'progressive and inquisitive practitioner', both undergraduate and postgraduate students will also find the contents of its eight chapters useful.

The introductory chapter, on anatomy and physiology of the salivary glands, sets the scene effectively with a general overview of these topics, and additionally discusses the importance of saliva, its functions and the consequences of its deficiency. In common with other chapters, it has helpful tables and schematic diagrams which are pleasingly designed but can be difficult to interpret owing to the use of very fine, discontinuous, non-contrasting pointers linking legends to the diagram. Most of the figures do, however, satisfactorily serve their intended purpose.

Chapter 2 addresses the mechanisms of salivary secretion. Although this is a complex topic, it is made accessible even for the reader who is a non-scientist. However, enhanced explanation of some of the jargon is required. It seemed anomalous that there was no explanation as to 'seven membrane spanning domain G protein linking receptor superfamily' when the term 'ligand' was defined. The chapter concludes with a brief discussion on mucarinic

agonists, including that of *Cevimeline*, a drug that is currently unavailable in the UK.

The following chapter discusses salivary flow rate and composition, whilst chapter 4 addresses the aetiology, diagnosis, management and clinical implications of xerostomia. This chapter opens by citing infection as a causative factor of xerostomia, and further implies that dry mouth may also be due to tumours, salivary calculi and mucocoeles. However, it is most unlikely that such pathologies will cause xerostomia directly, and I felt that the aetiological aspects were potentially misleading. Similarly, the information on diagnostic tests was somewhat theoretical in its approach and of limited practical help. For example, the unwary reader may believe that patients with suspected Sjogren's syndrome should be HLA tested when this is inappropriate.

Chapter 5 deals with salivary clearance and effects on oral health and chapter 6 addresses saliva and its influence on plaque pH. Perhaps chapter 7, on protective functions of saliva, may have been better placed earlier in the book, where it would have given the reader more insight into the potential sequelae of xerostomia.

The final chapter deals with mineral equilibrium and two photographs, indicating arrested and active carious lesions in this chapter of the book, are difficult to interpret.

Most chapters conclude with a section entitled 'Clinical

Highlights', which constitutes a list of bulleted points of clinical relevance to dentistry. This is most useful and will be appreciated particularly by a clinical readership.

In summary, notwithstanding the above minor concerns, this is a very useful guide to the subject matter, being both well explained and generally well illustrated. Undoubtedly, this book will appeal to both dental undergraduates and postgraduates, particularly those in Oral Biology.

**John Hamburger**  
Birmingham Dental School

