Surgery for Patients Undergoing Anticoagulant Therapy

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Abstract: Dental surgeries in patients under anticoagulant therapy are considered crucial and are done after careful monitoring of the patient’s medical history and blood reports. This is due to the uncontrolled bleeding that is possible to occur following invasive treatment in such patients. Perioperative management of chronically anticoagulated patients and/or patients treated with antiplatelet therapy is a complex medical problem. More than half of all hematologists, oral surgeons, and maxillofacial surgeons surveyed in Ontario in 2005 routinely interrupted anticoagulation therapy for tooth extractions. Surveys from other countries report that many dental professionals are unaware of their patients’ coagulation status, and still discontinue antiplatelet therapy unnecessarily. Thus, in 1954, the American Heart Association recommended a therapeutic range for oral anticoagulant therapy of a prothrombin time ratio (PTR) of 2 – 2.5 using human brain reagents. This article deals with the various methods available to avoid the uncontrolled bleeding following dental treatments in anticoagulated patients.

Keywords: anticoagulants, antiplatelet drugs, preoperative management

1. Introduction

Anticoagulants are a type of drug that reduces the body's ability to form clots in the blood (5). These drugs act by inhibiting one or more clotting factors that are essential for the clot formation. Although they are sometimes called blood thinners, they do not actually thin the blood. This type of medicine will not dissolve clots that already have formed, although it will help to stop an existing clot from getting larger (5).

Anticoagulant drugs are commonly prescribed for patients who have undergone cardiac surgeries or patients under the risk of ischemic stroke, myocardial infarction, atrial fibrillation, pulmonary embolism, deep vein thrombosis, venous thromboembolism, congestive heart failure, stroke, myocardial infarction, and genetic or acquired hypercoagulability. A side effect of all anticoagulants is the risk of excessive bleeding (haemorrhages). This is because these medicines increase the time it takes blood clots to form (6).

The gums and their supporting structures are highly vascular and prone to bleeding when damaged (7). While visible bleeding in the mouth is not considered as dangerous as “silent” bleeding that occurs internally or at non-compressible sites, oral bleeding can be distressing for the patient and potentially life threatening (8). Invasive procedures such as local infiltration, scaling below the gums, root planning, biopsies, tooth extractions, minor periodontal surgery, cavity filling, endodontic procedures (root canals), and prosthodontic procedures (crowns, bridges, and implants) are also unlikely to cause significant bleeding. Significant bleeding is more likely to occur with more invasive procedures such as extraction of impacted teeth and use of periodontal flaps (9) (10)(11)(12).

Hence a proper knowledge on the on the type of drug the patient consumes, duration, dosage of the drug and the estimation of blood for the level of clotting factors are necessary to reduce the risk and effective management of such patients.

Commonly used anticoagulants and their mechanism of action:

Heparin:
Heparin, used primarily in hospitalized patients, is a mixture of mucopolysaccharides that promote the activity of antithrombin III, a blood plasma protein that inactivates thrombin (an enzyme that promotes clotting). Because it is not well absorbed from the gastrointestinal tract, heparin is given intravenously to inhibit coagulation immediately, or it is given subcutaneously. The major side effect associated with heparin is hemorrhage; thrombocytopenia (reduced number of circulating platelets) and hypersensitivity reactions also may occur. When oral anticoagulants are given with heparin, additional anticoagulant effects occur (13).

Coumarin:
The coumarin derivatives resemble vitamin K, an important element in the synthesis of a number of clotting factors. Interference in the metabolism of vitamin K in the liver by coumarin derivatives gives rise to clotting factors that are defective and incapable of binding calcium ions (another important element in the activation of coagulation factors at several steps in the coagulation cascade). Warfarin, a coumarin derivative and the most commonly used oral anticoagulant, is rapidly and almost completely absorbed orally. Haemorrhage is the principal toxic effect during oral anticoagulant therapy (13).

Anti-platelet drugs:
- Platelets provide the initial haemostatic plug at the site of a vascular injury. They are also involved in pathological processes and are an important contributor to arterial thrombosis leading to myocardial infarction and ischaemic stroke.
- Available antiplatelet medications include:
  - Low-dose aspirin (75mg-300mg daily). Used for the secondary prevention of thrombotic cardiovascular or cerebrovascular disease and following coronary artery bypass surgery.
  - Clopidogrel (Plavix®). Licensed as monotherapy for the prevention of atherothrombotic events in patients.
established. Used in each laboratory, a normalization ratio was
variations in the methodology, reagents, and instruments
factor activation to fibrin coagulum formation. Due to
(PT). This test measures the time for clot formation from VII
therapy monitored by measuring
Patients who use OAC
an INR <3.0.
should be given cautiously, using an aspirating syringe, with
haematoma and airway compromise. If needed, an IANB
The INR should also be checked if performing an inferior
procedures although scaling subgingivally will require an
INR check.

Tests to assess the patients fitness prior dental surgery:

INR values before treatment:
It stands for International Normalised Ratio (INR) and is a
measure of how much longer it takes the blood to clot when
oral anticoagulation is used

In patients receiving long-term anticoagulant therapy and
who are stably anticoagulated on warfarin an INR check 72
hours prior to surgery is recommended. This allows
sufficient time for dose modification if necessary to ensure a
safe INR (2-4) on the day of dental surgery.

There is no need to check the INR for non-invasive dental
procedures although scaling subgingivally will require an
INR check.

The INR should also be checked if performing an inferior
alveolar nerve block (IANB) as there is an anecdotal risk of
haematoma and airway compromise. If needed, an IANB
should be given cautiously, using an aspirating syringe, with
an INR <3.0.

Prothrombin time:
Patients who use OAC( oral anti-coagulant) have their
therapy monitored by measuring the Prothrombin Time (PT). This test measures the time for clot formation from VII
factor activation to fibrin coagulum formation. Due to
variations in the methodology, reagents, and instruments
used in each laboratory, a normalization ratio was
established for PT measurements (INR)

Normal Values and Critical Limits: 8.8 - 11.6 seconds.
Heparin at therapeutic doses usually does not interfere with the
PT, but PT prolongation can result in patients receiving higher doses of Heparin. In fact, due to variability in the
sensitivities of different thromboplastins to heparin, a falsely
prolonged PT can occur during initiation of warfarin
treatment when the patient is simultaneously receiving
heparin therapy.

Dental treatment and anticoagulant drug management:

Local measures:
Tranexamic acid binds to plasminogen and inhibits
subsequent lysis of fibrin. Orally administered tranexamic
acid does not appear in saliva at detectable levels (16) but as
a mouthwash, the concentration of tranexamic acid remains
sufficiently high to inhibit fibrinolysis for hours but
insignificant levels are detected in the plasma.

The use of gelatin sponges and sutures provided adequate
haemostasis for dental extraction without interruption of
anticoagulants. Tranexamic acid mouthwashes or fibrin glue
offered no benefit over resorbable gelatin sponges plus
sutting. In over 99% of cases the use of resorbable gelatin
sponges plus sutures at the time of dental surgery was
sufficient to achieve haemostasis and only 1 case of severe
bleeding was observed. However, all patients received
tranexamic acid mouthwashes every 6 hours for 2 days. In
group receiving oral anticoagulants, local haemostasis
was secured with oxidised cellulose and silk sutures plus
local application of a tranexamic acid saturated gauze swab
for 30-60 minutes following surgery. There was no
difference in bleeding complications.(17)

Other local methods:
• local pressure (biting on gauze or tea bags)
• electrocautery
• topical thrombin
• mouth rinse(s)
* cold water o aminocaproic acid 5% mouth rinse (5 grams
in 100ml of sterile water)

Note: this solution may be difficult to obtain from a
pharmacy unless prior arrangement have been made
* hold 10ml in mouth for 2 min 1/2 hour pre-procedure then
repeat q2h for 6-10 doses prn
• avoid additional bleeding risks (hot liquids, other mouth
washes, and hard foods) for at least 24 hrs

Stoppage of drugs before dental procedure:

| Dental procedure                      | Presumed Bleeding Risk | Peri-procedural recommendations* |
|---------------------------------------|------------------------|----------------------------------|
| Supragingival scaling                  | low                    | Continue therapeutic anticoagulation |
| Simple restorations                   |                        |                                  |
| Local anesthetic injections           | medium                  | Continue therapeutic anticoagulation |
| Subgingival scaling                   |                        |                                  |
| Subgingival preparation restoration   |                        |                                  |
| Standard root canal                   |                        |                                  |
| Simple extractions                    |                        |                                  |
| Regional anesthetic injections        |                        |                                  |
| Extensive surgery                     |                        | Consider reducing anticoagulation |
| Apicoectomy (root removal)            |                        |                                  |
| Alevolar surgery (bone removal)       |                        |                                  |

(18)
When extensive surgery is necessary and it is has been determined to lower the level of anticoagulation, the following can be considered as a guide in the pre-procedural period:

**Warfarin**
- Withholding warfarin 2 to 7 days prior to procedure depending on the indication for and goal of anticoagulation. Longer holds should be considered for patients with either advanced age, systolic heart failure, or requiring low (<3mg/day) dosing.
- Possibly initiate a parenteral anticoagulant peri-procedure [heparin or low molecular weight heparin (LMWH)]
- Warfarin and the parenteral anticoagulant (if necessary) should be restarted when deemed appropriate and safe after the procedure, and the parenteral anticoagulant can be discontinued when the INR is within therapeutic range

**Apixaban**
- Hold apixaban 1-2 days prior to procedure if CrCL > 50 mL/min
- Hold apixaban 1-4 days prior to procedure if CrCl 30 - 50 mL/min • Hold apixaban 2-4 days prior to procedure if CrCl < 30 mL/min
- Restart apixaban when deemed appropriate and safe after procedure.

The ACCP 2008 guidelines for antithrombotic and thrombolytic therapy recommend In patients who require a minor dental procedure, we suggest continuing VKAs with an oral prohemostatic agent or stopping VKAs (warfarin) 2 to 3 days before the procedure instead of alternative strategies (Grade 2C).

2. Conclusion

Dental surgery in anticoagulated patients is common and historically their management has been controversial following early reports of major bleeding in such individuals. Many of the early reports of haemorrhage associated with dental surgery during this period predated the standardisation of oral anticoagulant control by means of the INR. In 1954, the American Heart Association recommended a therapeutic range for oral anticoagulant therapy of a prothrombin time ratio (PTR) of 2-2.5 using human brain reagents (21). Later, the use of less sensitive commercial thromboplastins was not accompanied by a change in the target PTR ratio. Clinicians, therefore, administered larger doses of oral anticoagulants to achieve the target ratio, resulting in an increased incidence of haemorrhage. There is no definite protocol or method that is used for the management of bleeding in anticoagulated patients. The management depends on the nature, dosage, duration of drug and the INR levels of the patient.

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