Haematology 3: Platelets and Coagulation (Bleeding Disorders)

2026 DMD3 DENT5311

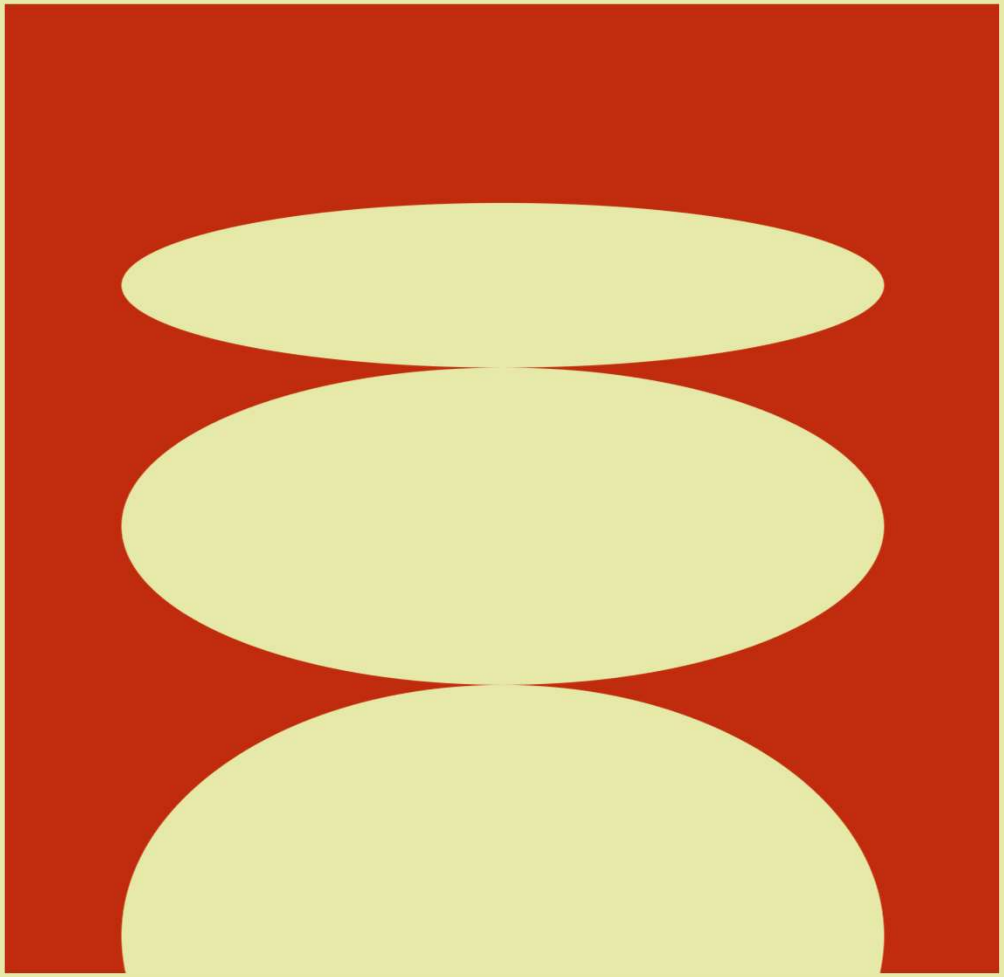
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Lecture Outline

1. Physiology of haemostasis
2. Clinical red flags
3. Disorders of haemostasis
4. Investigations and general management
5. Dental implications



Lecture Outcomes

1. Understand the role of platelets and the coagulation cascade in haemostasis
2. Understand the congenital, acquired and drug-induced disorders of haemostasis that affect platelet count, platelet function, and clotting mechanisms
3. Assess and manage periprocedural bleeding risk in dental practice
4. Consider the implications of congenital bleeding disorders, thrombocytopenia and acquired medical conditions impairing haemostasis, and the treatment modifications required, when planning dental procedures
5. Manage patients taking antithrombotic drugs who are undergoing dental procedures
6. Basic management of bleeding during or after oral surgery

Setting the scene...

You've just performed a scale and clean, but your patient is continuing to ooze...

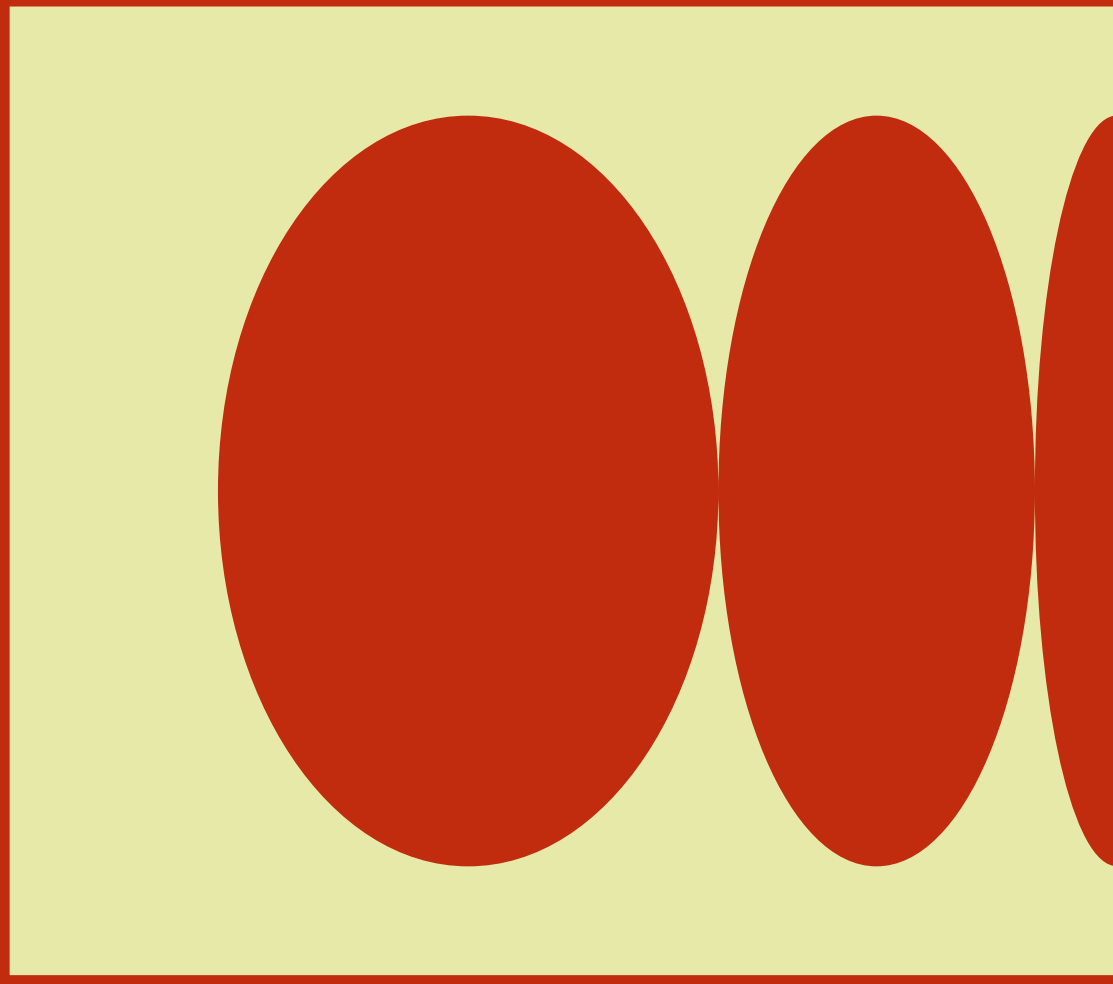
I didn't think the gingivitis was that bad!

I didn't think I was any more traumatic than usual!

... what could be wrong?



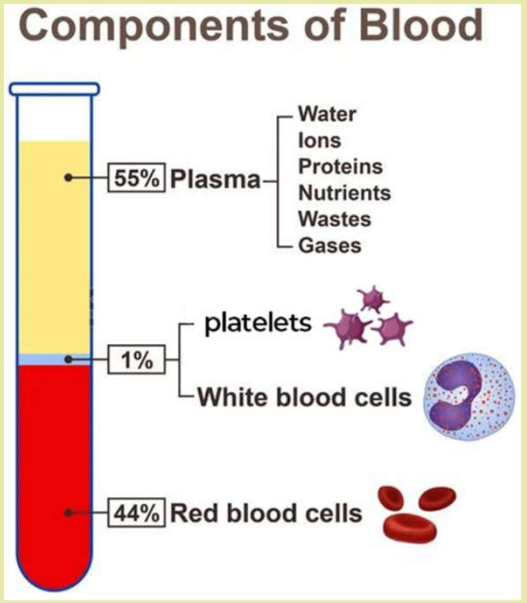
Physiology of haemostasis



Blood

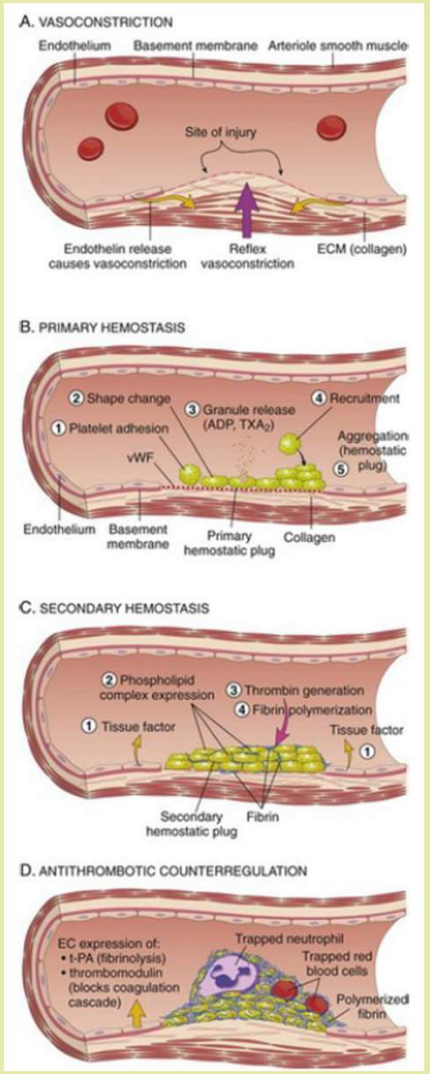
4 main components:

1. Plasma
2. Red blood cells
3. White blood cells
4. Platelets



Haemostasis

1. Vasoconstriction = Vessel wall contraction
2. Platelet aggregation (primary haemostasis) = Formation of platelet plug
3. Coagulation (secondary haemostasis) = Formation of fibrin clot
4. Antithrombotic counter-regulation = Limit haemostatic process to site of injury



Kumar V, Abbas AK, Aster JC, Robbins SL, Perkins JA, ProQuest. Robbins basic pathology. 9th ed. Philadelphia: Elsevier/Saunders; 2013.

1. Vasoconstriction

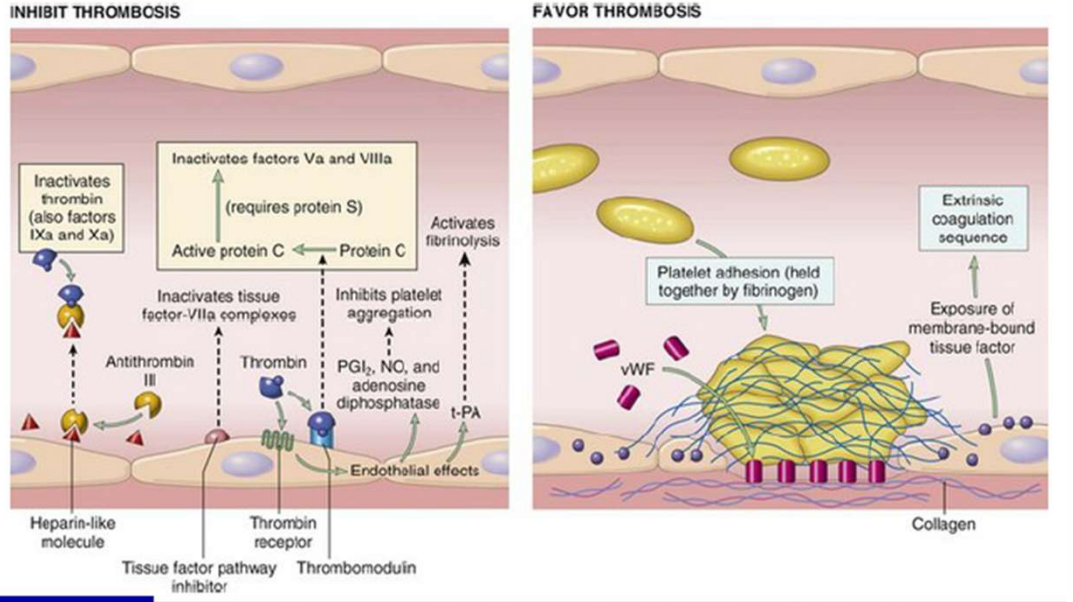


Figure 3–6 Anticoagulant properties of normal endothelium *(left)* and procoagulant properties of injured or activated endothelium *(right)*. NO, nitric oxide; PGI_2, prostaglandin I_2 (prostacyclin); t-PA, tissue plasminogen activator; vWF, von Willebrand factor. Thrombin receptors are also called protease-activated receptors (PARs).

2. Primary haemostasis: Platelets

1. Platelet adhesion
2. Platelet activation
3. Platelet aggregation

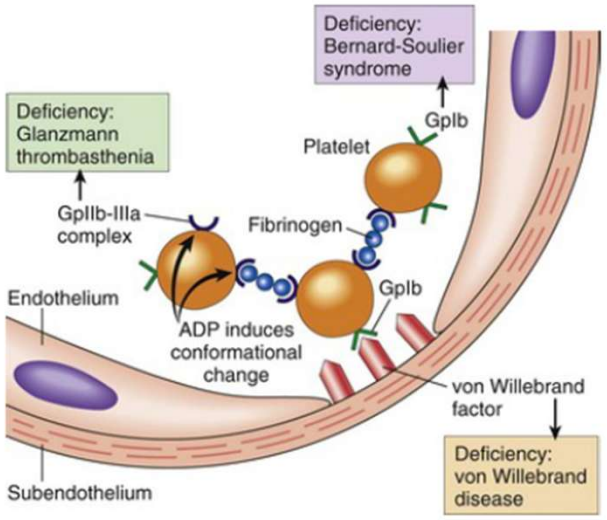


Figure 3–7 Platelet adhesion and aggregation. Von Willebrand factor functions as an *adhesion* bridge between subendothelial collagen and the glycoprotein Ib (GpIb) platelet receptor. Platelet *aggregation* is accomplished by fibrinogen binding to platelet GpIIb-IIIa receptors on different platelets. Congenital deficiencies in the various receptors or bridging molecules lead to the diseases indicated in the *colored boxes*. ADP, adenosine diphosphate.

3. Secondary haemostasis: Coagulation

Coagulation cascade

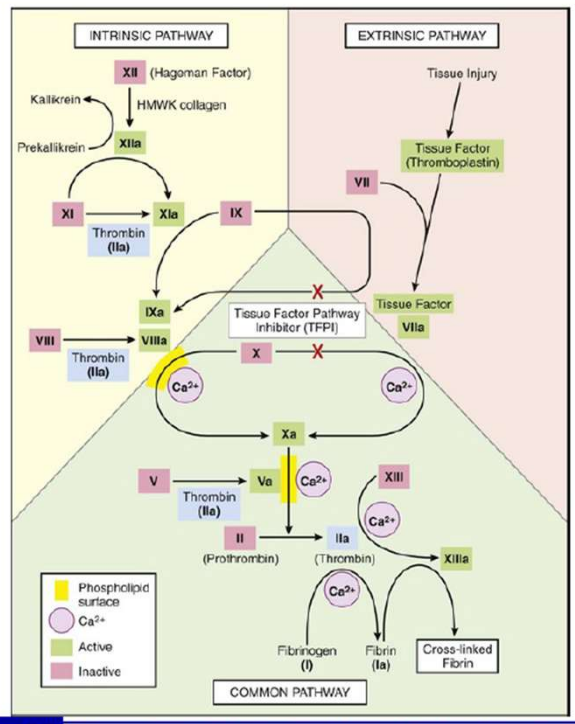
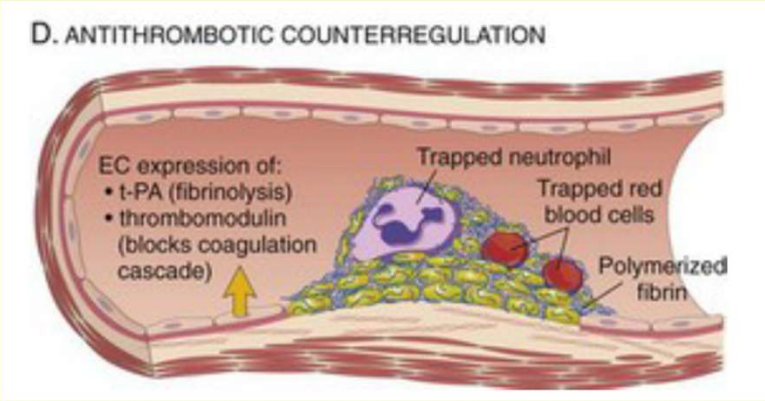
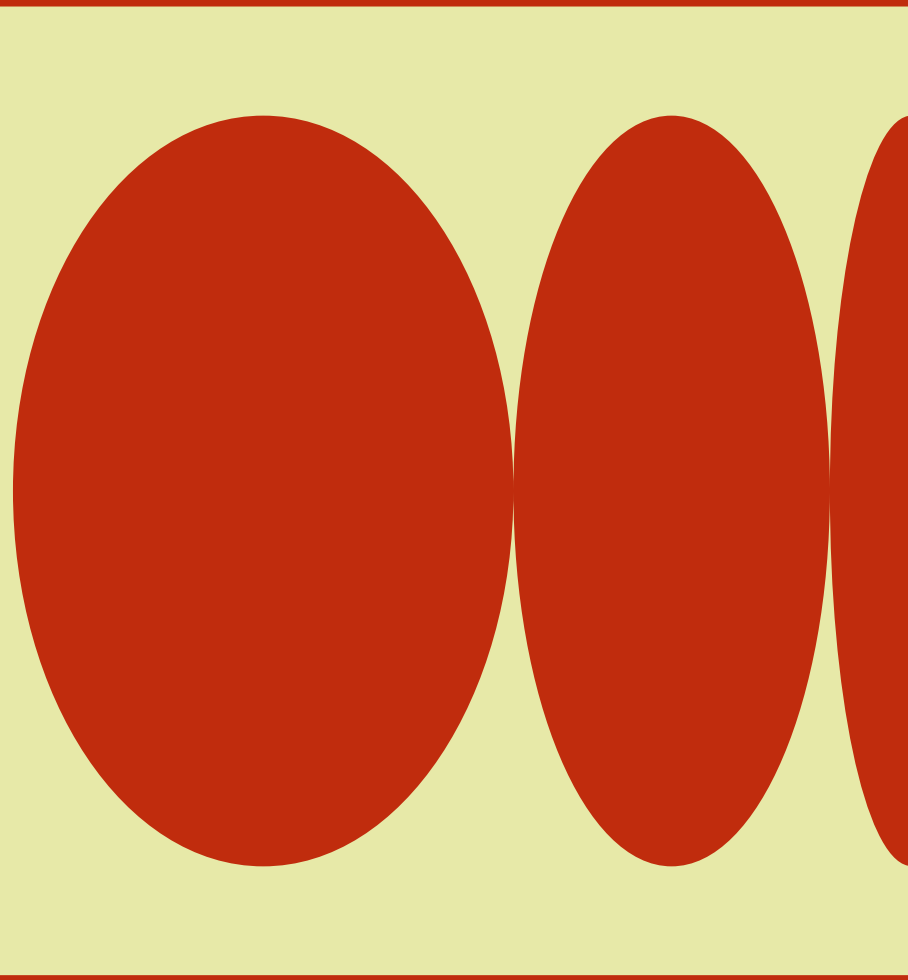


Figure 3–8 The coagulation cascade. Factor IX can be activated by either factor XIa or factor VIIa. In laboratory tests, activation is predominantly dependent on factor XIa, whereas in vivo, factor VIIa appears to be the predominant activator of factor IX. Factors in *red boxes* represent inactive molecules; activated factors, indicated with a lowercase *a*, are in *green boxes*. Note that thrombin (factor IIa) (in *light blue boxes*) contributes to coagulation through multiple positive feedback loops. The *red X's* denote points at which tissue factor pathway inhibitor (TFPI) inhibits activation of factor X and factor IX by factor VIIa. HMWK, high-molecular-weight kininogen; PL, phospholipid.

4. Antithrombotic counter-regulation



Clinical red flags

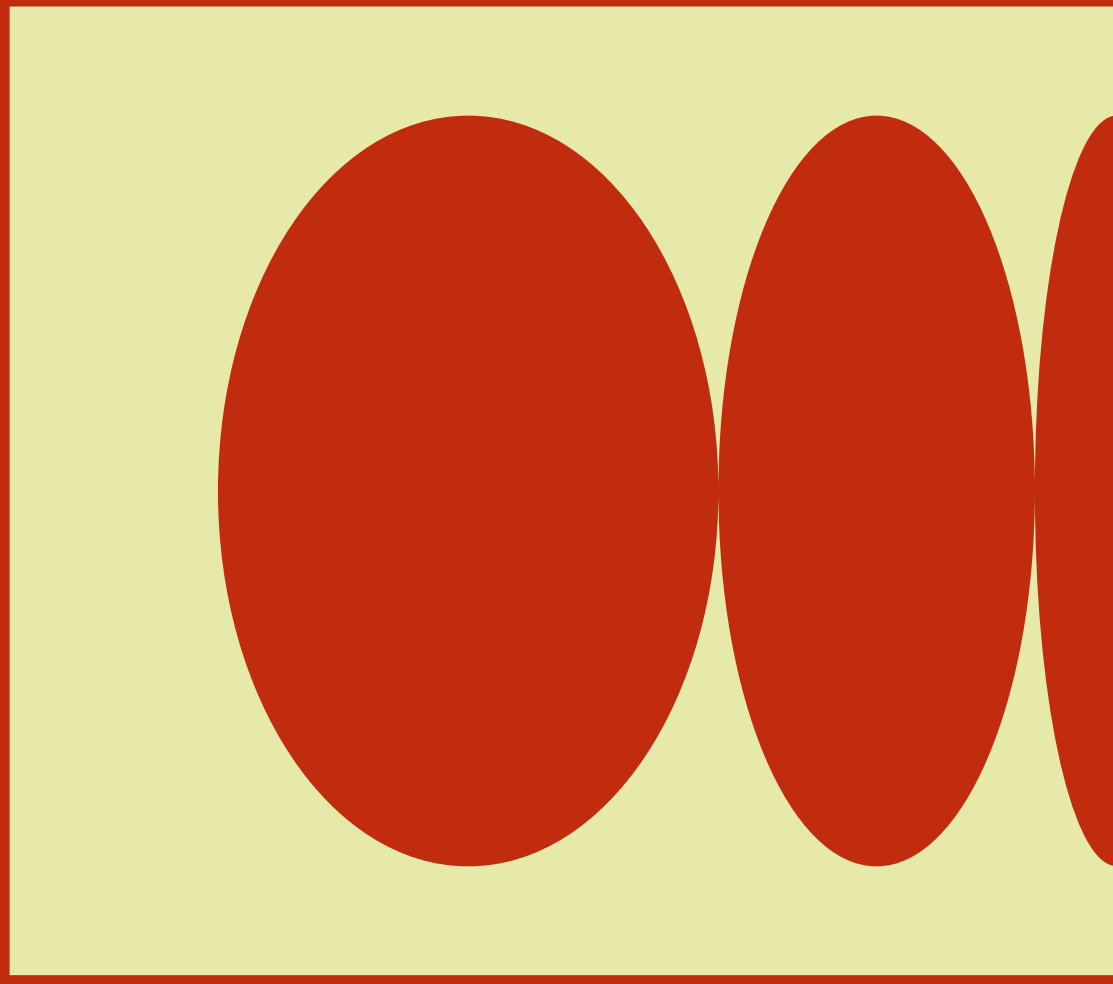


Red flags (clinical manifestations)

- Medical history – any disorders of haemostasis listed?
- Medications
- Family history
- Easy bruising, large superficial bruises
- Prolonged bleeding from cuts or surgery
- Frequent nosebleeds (epistaxis)
- Heavy periods (menorrhagia)
- Blood in stool or urine (GI bleed, haematuria)
- Internal bleeding (joints, muscles)



Disorders of haemostasis

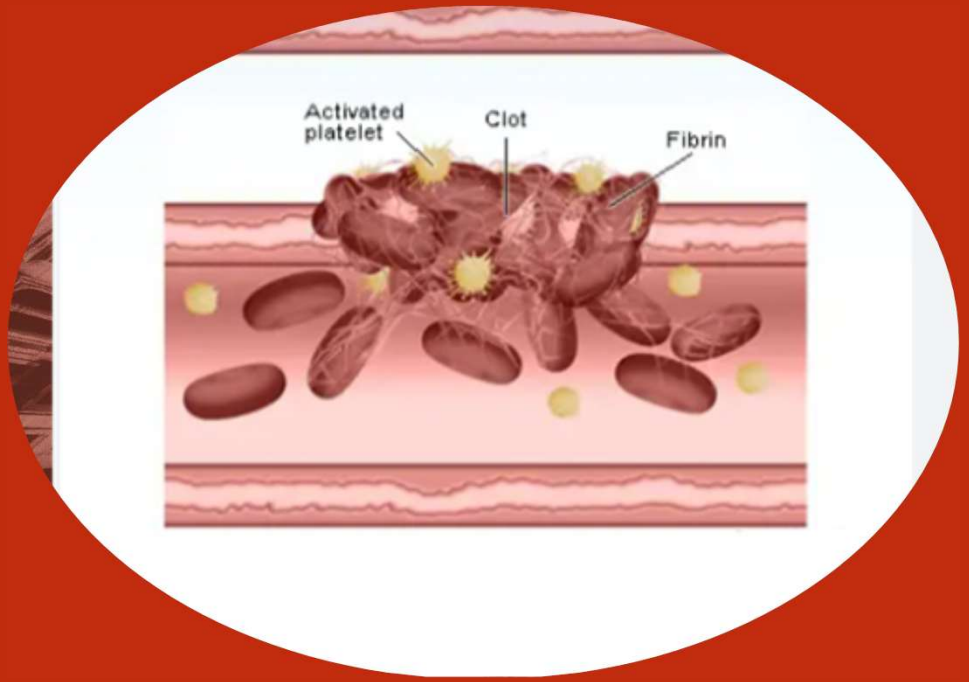


Disorders of haemostasis

1. Abnormal platelet count or function (bleeding)
   - Congenital
   - Acquired disease
   - Drugs

2. Abnormal clotting mechanism (coagulation)
   - Congenital
   - Acquired disease
   - Drugs

3. Vascular disease



Just recognize names

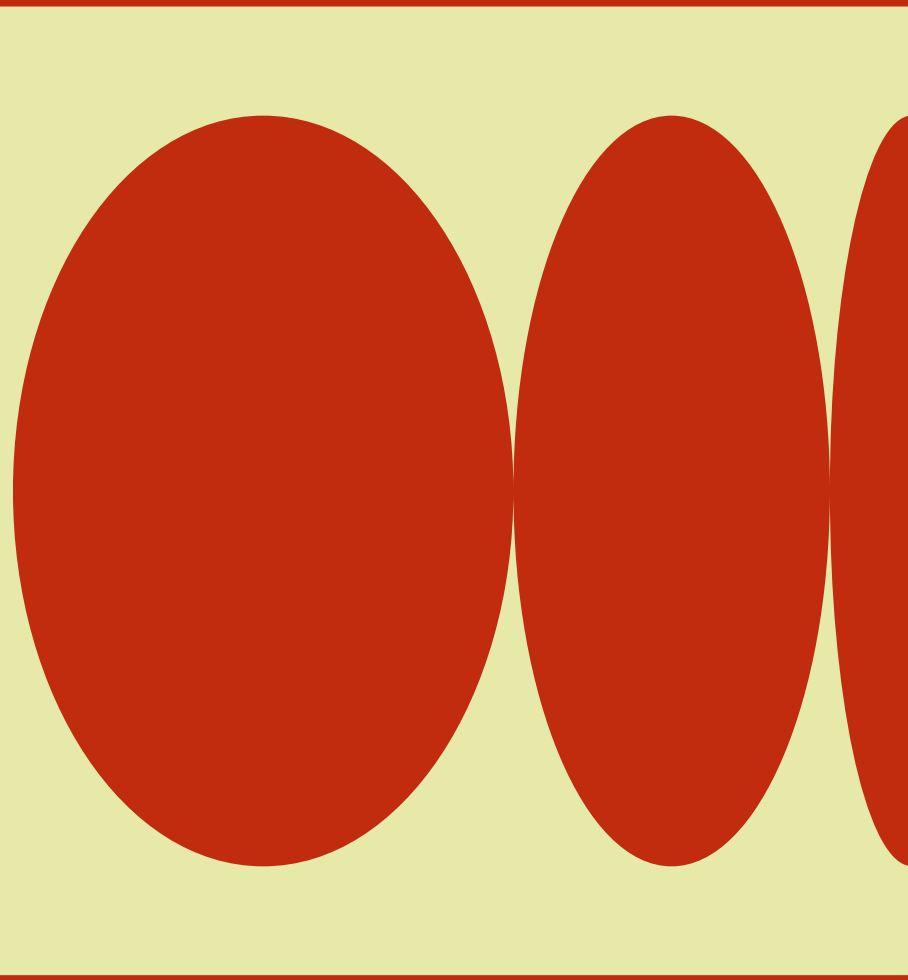
Abnormal platelet function	Abnormal coagulation	Vascular disease
Congenital: • vWD *(vWF facilitates platelet adhesion)* • Idiopathic thrombocytopenic purpura (ITP) • Haemolytic uraemic syndrome (HUS) • Thrombotic Thrombocytopenic purpura (TTP) • Glanzmann Disease (Glanzmann Thrombasthenia) • Bernard-Soulier Syndrome Acquired: • Renal failure • Bone marrow disease: aplastic anaemia, metastatic disease, myeloproliferative disease, myelodysplastic syndromes, haematological oncology (multiple myeloma / leukaemia / lymphoma), transiently after BMT. • Viral infection: HIV, CMV, rubella, parvovirus B19, EBV • Autoimmune: systemic lupus erythematosus, Felty syndrome, antiphospholipid syndrome Drugs: • Aspirin, clopidogrel, ticagrelor, prasugrel, etc • Chemotherapy • Drugs affecting CNS (carbamazepine, SSRIs)	Congenital: • vWD *(vWF binds FVIII)* • Haemophilia A, B, C + Factor Deficiencies • Fibrinogen disorders Acquired: • Liver disease • Vitamin K Deficiency and Malabsorption • Acquired Haemophilia • Disseminated Intravascular Coagulation (DIC) Drugs: • Heparin • Vitamin K Antagonists • DOACs	• Marfan Syndrome • Vascular Ehlers-Danlos Syndrome • Osler-Weber-Rendu Syndrome (Hereditary Haemorrhagic Telangiectasia - HHT)

Platelet disorders...

↓ megakaryocyte production / maturation	↑ platelet destruction	Sequestration of platelets	Abnormal platelet function	Abnormal platelet distribution
• Viruses: HIV, CMV, rubella, parvovirus B19, EBV • Cytotoxic drugs • BM infiltration of leukaemia, myeloma, carcinoma • Vit B_{12} and folate deficiency	• Idiopathic thrombocytopenic purpura (ITP) • Haemolytic uraemic syndrome (HUS) • Thrombotic Thrombocytopenic purpura (TTP) • Disseminated Intravascular Coagulation (DIC)	Splenomegaly is usually responsible for platelet sequestration. This may be caused by: • Portal hypertension: cirrhosis • Haematological disorders: myeloproliferative diseases • Infections: malaria, leishmaniasis, EBV • Storage disorders: Gaucher disease, Niemann-Pick disease • Inflammatory disorders: SLE, Felty syndrome	• Glanzmann disease • Dysproteinaemias • Thrombocytosis	• Splenomegaly • Transfusion of stored blood

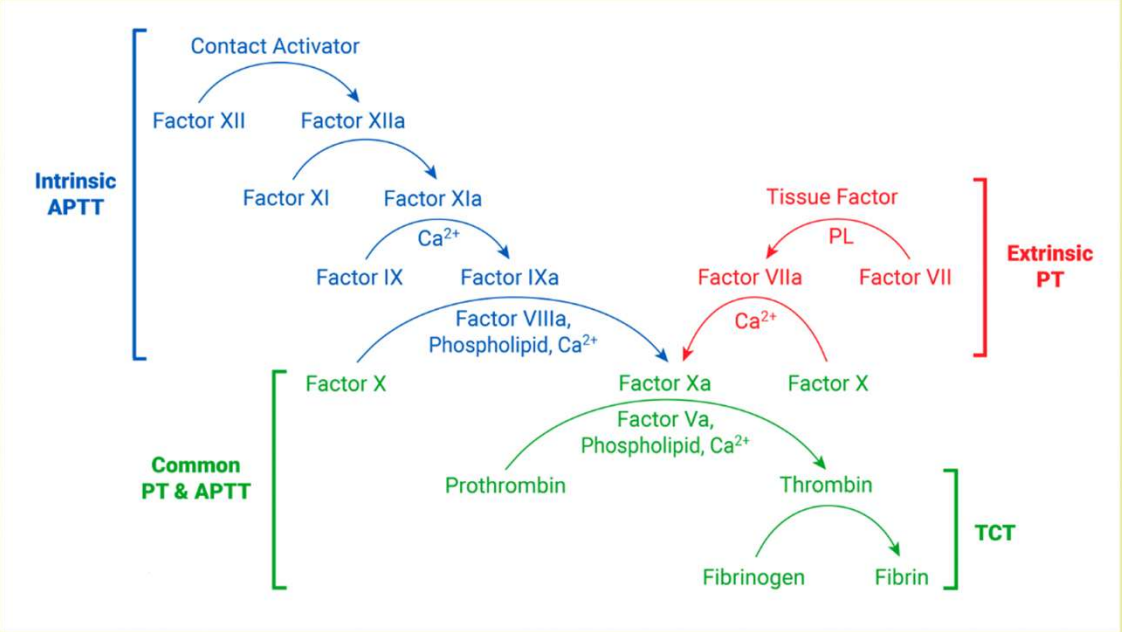
↳ Acquired = #
↳ Inherited = function

Investigations and general management



Clinical lab tests

- **Full blood count** (platelet count c.f. function)
- **Activated partial thromboplastin time (APTT):** estimates activity of the intrinsic pathway proteins (factors XII, XI, IX, VIII, X, V, II and fibrinogen)
- **Prothrombin time (PT):** estimates activity of the extrinsic pathway proteins (factors VII, X, V, II and fibrinogen)
- **Thrombin time (TT) / Thrombin Clotting Time (TCT):** evaluates the final stage of the coagulation pathway – conversion of fibrinogen to fibrin via thrombin



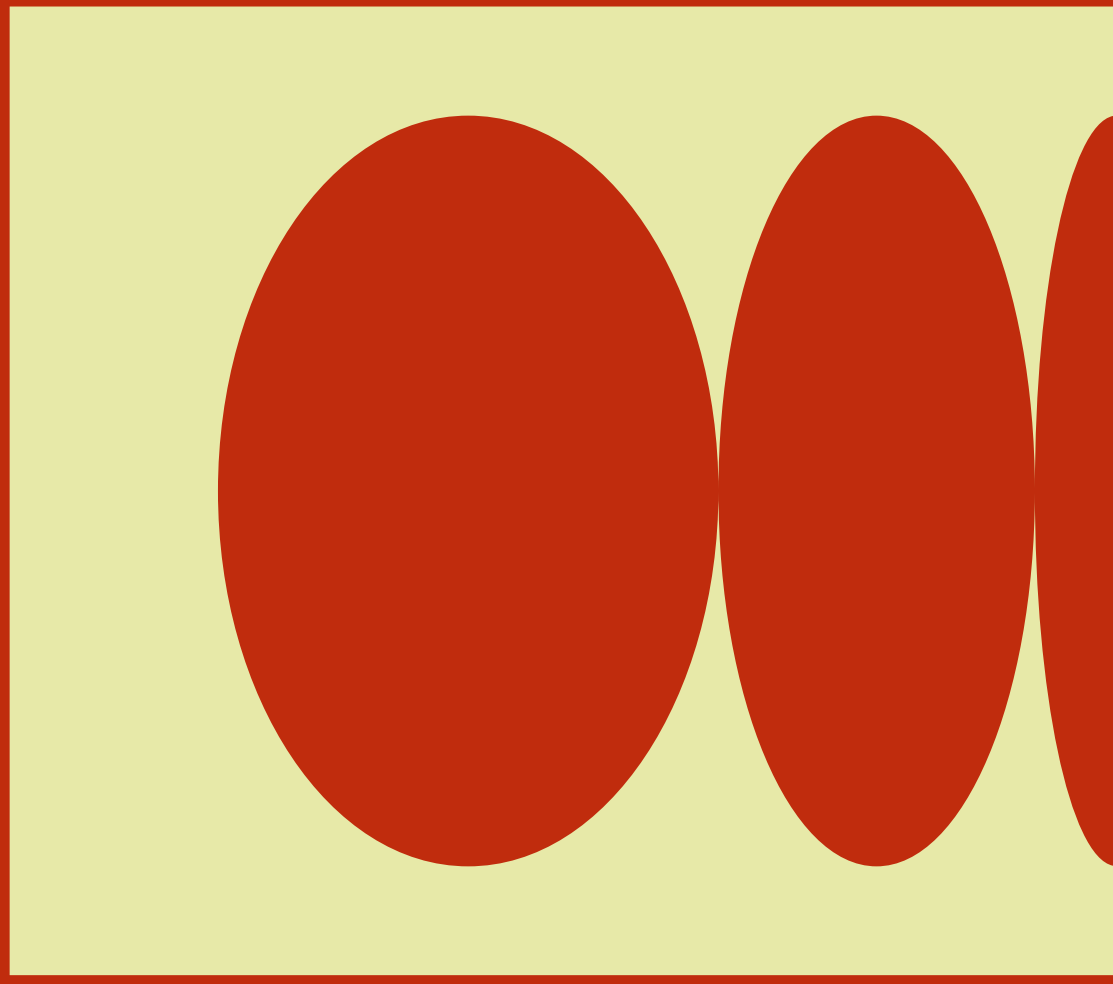
Platelet vs Coagulation disorders

	Platelet	Coagulation
Gender	Mainly female	Male
Family history	Rare	Usually positive
Bleeding after trauma	Immediate	Delayed
Effect of local pressure	May stop	Bleed recurs
Spontaneous bleeding from minor injury	Common	Uncommon
Deep haemorrhage	Rare	Common
Bleeding time	Prolonged	Normal
Platelet count	Often low	Normal
Clotting function	Normal	Abnormal

General Management

- Routine blood tests for monitoring
- Drugs: corticosteroids, immunosuppressants, monoclonal antibodies,
- Management of splenic, renal or hepatic underlying cause
- Thrombopoietin therapy
- Coagulation factor replacement therapy, desmopressin (DDAVP), tranexamic acid, emicizumab
- Platelet transfusions
- Chemotherapy
- Haematopoietic stem cell transplant / bone marrow transplant

Dental implications and treatment considerations



Assessing peri-procedural bleeding risk

- Many patients can receive most of their dental treatment in a general dental practice after careful assessment of periprocedural bleeding risk, and planning.

- Referral to dental specialist
  - Higher-risk procedure planned for patients with impaired haemostasis
  - Higher severity of the patient's condition impairing haemostasis
  - Clinician does not feel comfortable administering the haemostatic measures required

Assessing peri-procedural bleeding risk

Considerations:

- the practitioner's ability to achieve haemostasis (control of bleeding)
- the likelihood of the procedure causing prolonged bleeding (procedural and patient factors)
- the clinical consequence of bleeding, should it occur

Goals of consultation: to determine

1. appropriate investigations
2. additional haemostasis measures required
3. most appropriate setting for treatment

Assess risk: (1) Procedure, (2) Patient

Assessing peri-procedural bleeding risk: Dental Procedural Factors

Scottish Dental Clinical Effectiveness Programme – 2nd Ed March 2022

https://www.sdcep.org.uk/published-guidance/anticoagulants-and-antiplatelets/

- Unlikely to cause prolonged bleeding

- Likely to cause prolonged bleeding
  - Lower-risk invasive procedures
  - Higher-risk invasive procedures



Assessing peri-procedural bleeding risk: Dental Procedural Factors

Table 1 Bleeding risks for dental procedures

Dental procedures that are **unlikely to cause bleeding**	Dental procedures that are **likely to cause bleeding**	
	Low risk of post-operative bleeding complications	**Higher risk** of post-operative bleeding complications
Local anaesthesia by infiltration, intraligamentary or mental nerve block[a] Local anaesthesia by inferior dental block or other regional nerve blocks[a,b] Basic periodontal examination (BPE)[c] Supragingival removal of plaque, calculus and stain Direct or indirect restorations with supragingival margins Endodontics - orthograde Impressions and other prosthetics procedures Fitting and adjustment of orthodontic appliances	Simple extractions[d] (1-3 teeth, with restricted wound size) Incision and drainage of intra-oral swellings Detailed six-point full periodontal examination Root surface debridement (RSD) Direct or indirect restorations with subgingival margins	Complex extractions,[e] adjacent extractions that will cause a large wound or more than 3 extractions at once Flap raising procedures[f] including: • Elective surgical extractions • Periodontal surgery • Preprosthetic surgery • Periradicular surgery • Crown lengthening • Dental implant surgery Gingival recontouring[f] Biopsies[f]

[a] Local anaesthesia should be delivered using an aspirating syringe and should include a vasoconstrictor, unless contraindicated. Note that other methods of local anaesthetic delivery are preferred over regional nerve blocks, whether the patient is taking an anticoagulant or not.

[b] There is no evidence to suggest that an inferior dental block performed on an anticoagulated patient poses a significant risk of bleeding. However, for patients taking warfarin, if there are any indications that the patient has an unstable INR (see Section 6), or other signs of excessive anticoagulation, an INR should be requested before the procedure to ensure <4 before proceeding.

[c] Although a BPE can result in some bleeding from gingival margins, this is considered extremely unlikely to lead to complications.

[d] Simple extractions refers to those that are expected to be straightforward without surgical complications.

[e] Complex extractions refers to those that may be likely to have surgical complications.

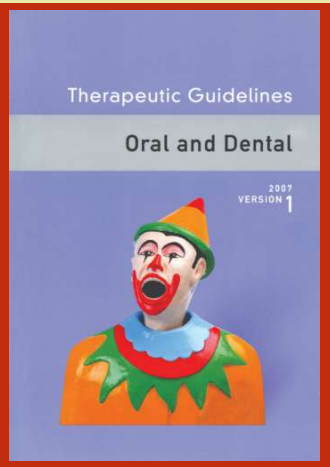
[f] Consideration should be given to the extent and invasiveness of the individual procedure. Some may be less invasive and could be treated as low risk.

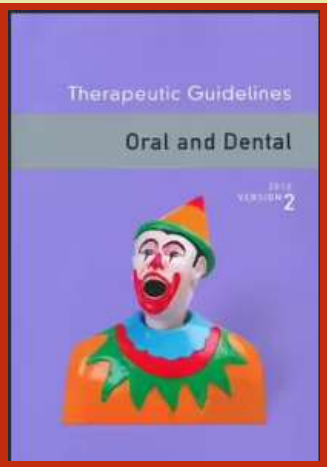
Assessing peri-procedural bleeding risk: Dental Procedural Factors

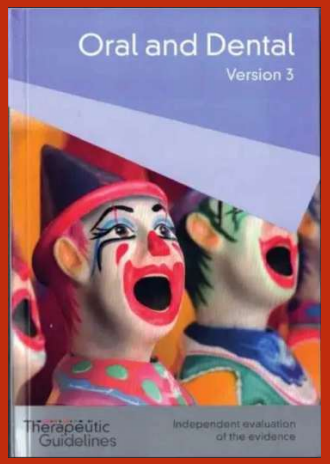
Therapeutic Guidelines v4 [retrieved April 2026] – Table 13.30

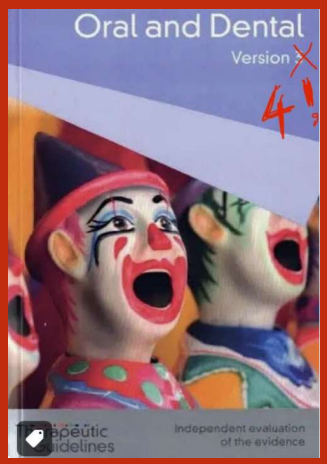
- Unlikely to cause prolonged bleeding
  - Non-invasive procedures
  - Minimally invasive procedures

- Likely to cause prolonged bleeding
  - Lower-risk invasive procedures
  - Higher-risk invasive procedures









Assessing peri-procedural bleeding risk: Dental Procedural Factors

Table 13.30 Risk of and implications for managing prolonged periprocedural bleeding in dental practice

Therapeutic Guidelines: Oral & Dental v4

unlikely to cause prolonged bleeding: noninvasive procedures	
examples of procedures	oral examinations (including periodontal probing) X-rays, dental impressions, small supragingival restorations not requiring local anaesthetic, fluoride treatment, placing and tightening orthodontic brackets
implications for management of bleeding risk	the procedure can be managed by a general dentist before periodontal probing in a patient with gingivitis, assess whether the patient has a congenital or inherited bleeding disorder; if present, consider limiting probing

unlikely to cause prolonged bleeding: minimally invasive procedures	
examples of procedures	restorations requiring local anaesthetic or closed root canal therapy (excluding procedures requiring an inferior alveolar nerve block in specific patient groups [NB2]) gingival retraction cord placement of matrix band (below gum margins) rubber dam clamps stainless steel crowns supragingival debridement
implications for management of bleeding risk	the procedure can be managed by a general dentist minimise gingival trauma as much as possible before supragingival debridement: • assess for medical conditions and medications affecting bleeding risk and manage as in Figure 13.73; if gingivitis is present, consider whether the extent influences bleeding risk • in a patient with a congenital or inherited bleeding disorder, consult with a haematologist or haemophilia treatment centre before debridement • in patients with severe thrombocytopenia, involve a medical practitioner and/or a dental specialist in formulating a management plan

Assessing peri-procedural bleeding risk: Dental Procedural Factors

Table 13.30 Risk of and implications for managing prolonged periprocedural bleeding in dental practice

Therapeutic Guidelines: Oral & Dental v4

likely to cause prolonged bleeding: lower-risk invasive procedures	
examples of procedures	nonsurgical periodontal procedures (eg subgingival debridement) incision and drainage of swellings limited or small soft-tissue biopsies
implications for management of bleeding risk	most procedures can be managed by general dentists, but specialist advice may be required to create a management plan, including choice of treatment setting assess for medical conditions and medications affecting bleeding risk and manage as in Figure 13.73; in patients undergoing subgingival debridement, consider whether the extent of gingivitis influences bleeding risk for patients with congenital or inherited bleeding disorders contact a haemophilia treatment centre or the patient's haematologist for advice for patients with severe thrombocytopenia or acquired medical conditions impairing haemostasis, involve a medical practitioner and/or a dental specialist in formulating a management plan for patients taking one or more antithrombotic drugs, see Table 13.34 for advice on consultation and referral

likely to cause prolonged bleeding: higher-risk invasive procedures	
examples of procedures	dental extractions (regardless of number of teeth) [NB3] any procedure where a mucoperiosteal flap is used (eg surgical extractions, implant placement, periapical surgery, periodontal surgery) extensive soft-tissue biopsies hard-tissue biopsies inferior alveolar nerve blocks for patients with: • clotting factor deficiencies (eg haemophilia) • a recent platelet count (in the last 24 hours) less than 30×10^9/L
implications for management of bleeding risk	assess for medical conditions and medications affecting bleeding risk and manage as in Figure 13.73 for patients with a congenital or inherited bleeding disorder or thrombocytopenia, referral to a hospital-based specialist dental team is recommended for patients with acquired medical conditions impairing haemostasis, consider referral to a hospital-based specialist dental team consider referral to either a community-based dental specialist or a hospital-based specialist dental team for: • patients taking a combination of an anticoagulant and an antiplatelet drug (as outlined in Table 13.34) • situations in which a practitioner is not comfortable to undertake the haemostatic procedures required

Assessing peri-procedural bleeding risk: Patient Factors

- Assess the patient's capacity to provide an accurate medical history and adhere to post-op requirements

- Specific points re: haemostasis when history taking
  - Conditions and medications (including herbal, OTC)
  - Previous bleeding episodes following dental procedures, and management required
  - Family history of prolonged bleeding or bleeding disorders
  - Extent of any recent excessive bleeding (esp if jaundice, purpura)



https://dermnetnz.org/topics/purpura

Assessing peri-procedural bleeding risk: Patient Factors

- Confirm history with patient's medical practitioner
- If possible, address any patient risk factors before elective dental procedures
- Bleeding risk if dynamic! Reassess before each procedure

Assessing peri-procedural bleeding risk: Patient Factors *Medical Conditions*

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https://www.sdcep.org.uk/published-guidance/anticoagulants-and-antiplatelets/

Table 2 Main medical conditions associated with increased bleeding risk

Medical condition	Increased bleeding risk due to:
Chronic **renal failure**	Associated platelet dysfunction
Liver disease (e.g. caused by alcohol dependence, chronic viral hepatitis, autoimmune hepatitis, primary biliary cholangitis)	Reduced production of coagulation factors Reduction in platelet number and function due to splenomegaly Alcohol excess can also result in direct bone marrow toxicity and reduced platelet numbers
Haematological malignancy or myelodysplastic disorder	Impaired coagulation or platelet function (even in remission)
Recent or current **chemotherapy** or **radiotherapy**[a]	Pancytopenia including reduced platelet numbers
Advanced **heart failure**	Resulting liver failure
Inherited **coagulation disorders** including all types of haemophilia and von Willebrand's disease	Defective or reduced levels of coagulation factors
Acquired or inherited **platelet disorders** including immune thrombocytopenia (ITP)	Reduced platelet numbers or abnormal platelet function
Connective tissue disorders including Ehlers Danlos Syndrome (EDS)	Vascular fragility (particularly in the vascular subtype) and platelet function abnormalities in some patients

[a] Have received chemotherapy less than three months ago, or total body irradiation less than six months ago.

Assessing peri-procedural bleeding risk: Patient Factors
Medical Conditions

Table 13.31 Examples of medical conditions that impair haemostasis and require further evaluation before a dental procedure

[10]

Congenital or inherited medical conditions [NB1]
clotting factor deficiencies (eg haemophilia, von Willebrand disease) [NB2]
connective tissue disorders causing blood vessel fragility (eg Ehlers-Danlos syndrome, Marfan syndrome)
platelet function disorders (eg Bernard-Soulier syndrome, Glanzmann thrombasthenia)
Acquired medical conditions
liver disease (cirrhosis or evidence of liver disease on blood tests) [NB3]
kidney disease requiring dialysis or transplant, or a serum creatinine more than 200 micromol/L [4] [8]
low platelet count [NB4] caused by:
• bone marrow failure (eg aplastic anaemia, myelodysplasias)
• haematological malignancy (leukaemias, lymphomas, myelomas)
• solid tumour infiltrating bone marrow
• total body irradiation
• chemotherapy
• excessive chronic alcohol use
• immune thrombocytopenia (ITP) [NB5]
• hypersplenism [NB6]

Assessing peri-procedural bleeding risk: Patient Factors *Medications*

Table 3 Main drug groups associated with increased bleeding risk

Drug group	Effect
Other **anticoagulants** or **antiplatelet drugs**[a] See Appendix 2 for listings	Patients can be on dual, multiple or combined antiplatelet or anticoagulant therapies. These patients are likely to have a higher risk of bleeding complications than those on single drug regimes.
Cytotoxic drugs or drugs associated with bone marrow suppression[b] e.g. leflunamide, hydroxychloroquine, sulfasalazine, penicillamine, gold, methotrexate, azathioprine, mycophenolate	These can reduce platelet numbers and/or impair liver function affecting production of coagulation factors.
Biologic immunosuppression therapies[b] e.g. infliximab, adalimumab, etanercept, tocilizumab, certolizumab, abatacept, anakinra	These can cause thrombocytopenia and/or impair liver function.
Non-steroidal anti-inflammatory drugs (NSAIDs) e.g. aspirin, ibuprofen, diclofenac and naproxen	Impair platelet function to various extents.
Drugs affecting the nervous system Selective serotonin reuptake inhibitors (SSRIs) Serotonin and noradrenaline reuptake inhibitors (SNRIs) Carbamazepine	SSRIs and SNRIs have the potential to impair platelet aggregation and, although unlikely to be clinically significant in isolation, may in combination with other antiplatelet drugs, increase the bleeding time. Carbamazepine can affect both liver function and bone marrow production of platelets. Patients most at risk are those recently started on this medication or following dose adjustment.

[a] Be aware that patients may also be taking non-prescribed aspirin, and this antiplatelet agent can in effect convert a prescribed monotherapy into a dual therapy.

[b] Patients with inflammatory bowel disease or autoimmune/rheumatological conditions are commonly prescribed these drugs.

Assessing peri-procedural bleeding risk: Patient Factors
Medications

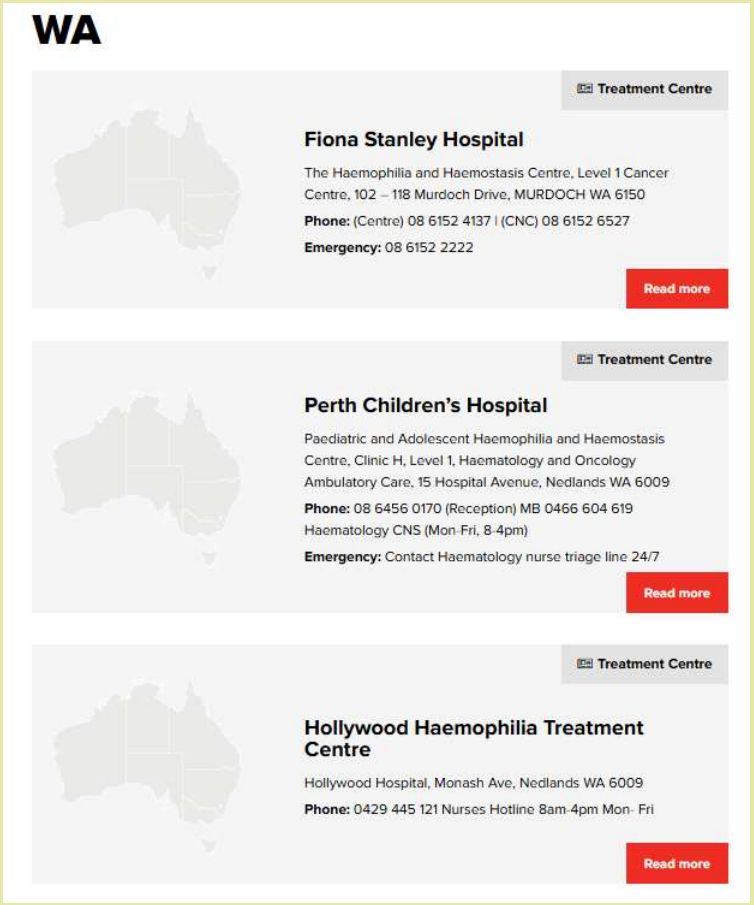
Table 13.32 Medications that impair coagulation or platelet function

antithrombotics
anticoagulants such as direct-acting anticoagulants (DOACs) (eg apixaban, rivaroxaban, dabigatran), heparin, enoxaparin, warfar
antiplatelets such as aspirin, clopidogrel, prasugrel and ticagrelor
other medications that may impair platelet function
nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen and naproxen
serotonin noradrenaline reuptake inhibitors (SNRIs) such as venlafaxine [1]
selective serotonin reuptake inhibitors (SSRIs) such as fluoxetine, paroxetine or sertraline [1]
Bruton tyrosine kinase inhibitors (BTKis) such as acalabrutinib, ibrutinib and zanubrutinib (used to treat lymphomas and chronic lymphocytic leukaemia)
supplements or complementary medicines such as gingko biloba, garlic and curcumin

Specific conditions: congenital or inherited bleeding disorders

- Australian Bleeding Disorders Registry (ABDR) – wallet card

- Haemophilia treatment centres
  - Can provide support to GDPs to provide timely dental care
  - https://www.haemophilia.org.au/support-services/find-a-treatment-centre/

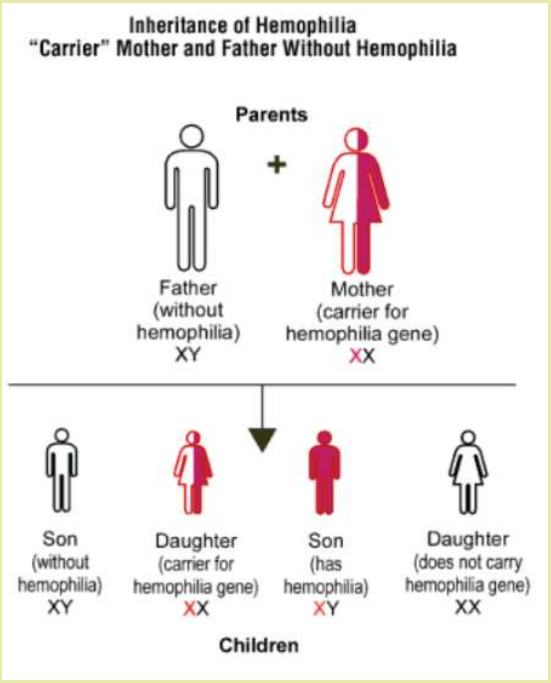


… Haemophilia

- Haemophilia A (Factor VIII Deficiency)
- Haemophilia B (Factor IX Deficiency, Christmas Disease)
- Haemophilia C (Factor XI Deficiency)

Table 8.11 *Blood coagulation factor defects in descending order of frequency*

Factor deficient	Inheritance	Incidence (1 in)
VIII	X-linked	10 000
IX	X-linked	60 000
VII	Autosomal recessive	500 000
V	Autosomal recessive	1 million
X	Autosomal recessive	1 million
XI	Autosomal recessive	1 million
XIII	Autosomal recessive	1 million
Fibrinogen	Autosomal recessive	1 million
Prothrombin	Autosomal recessive	2 million



Scully C, *Medical Problems in Dentistry* (Churchill Livingstone, 7th ed., 2015)

… Haemophilia

Clinical Manifestations

SEVERITY	CLOTTING FACTOR LEVEL	BLEEDING EPISODES
Severe	< 1 IU/dl (< 0.01 IU/ml) or < 1 % of normal	Spontaneous bleeding into joints or muscles, predominantly in the absence of identifiable hemostatic challenge
Moderate	1-5 IU/dl (0.01-0.05 IU/ml) or 1-5% of normal	Occasional spontaneous bleeding; prolonged bleeding with minor trauma or surgery
Mild	5-40 IU/dl (0.05-0.40 IU/ml) or 5-<40% of normal	Severe bleeding with major trauma or surgery. Spontaneous bleeding is rare.

TABLE 1-2: SITES OF BLEEDING IN HEMOPHILIA [63]

Serious	Joints (hemarthrosis)
	Muscles, especially deep compartments (iliopsoas, calf, and forearm)
	Mucous membranes in the mouth, gums, nose, and genitourinary tract
Life-threatening	Intracranial
	Neck/throat
	Gastrointestinal

TABLE 1-3: APPROXIMATE FREQUENCY OF BLEEDING AT DIFFERENT SITES

SITE OF BLEEDING	APPROXIMATE FREQUENCY
Hemarthrosis ▪ more common into hinged joints: ankles, knees, and elbows ▪ less common into multi-axial joints: shoulders, wrists, hips	70%–80%
Muscle	10%–20%
Other major bleeds	5%–10%
Central nervous system (CNS)	<5%

… Haemophilia

APPROACH

- Prophylaxis = to prevent bleeds
  - Continuous prophylaxis
  - Intermittent “periodic” prophylaxis
- Episodic (“on-demand”) treatment



MANAGEMENT

- Coagulation factor replacement therapy
  - Recombinant FVIII and FIX (rFVIII, rFIX)
  - Plasma-derived Factor
  - Recombinant porcine Factor
  - Prothrombin complex concentrates (PCC)
  - Historically: fresh plasma, frozen plasma, cryoprecipitate, fractionated human factor concentrate from pooled blood sources (BBVs/CJD risk prior to screening)
- Release of endogenous factor stores
  - Desmopressin (DDAVP)
- Antifibrinolytics (improve clot stability)
  - Tranexamic acid
- Future
  - Gene and stem cell therapy
  - Rebalancing agents: anti-TFPI monoclonal antibodies (Concizumab), Fitusiran (ALN-AT3)

… Haemophilia - *Inhibitors*

INHIBITORS:

- neutralising allo-antibodies directed against either factor VIII or IX
- created following factor replacement therapy as an immunological reaction
- attach to FVIII or FIX to inhibit their ability to stop bleeding → prevent replacement therapy from working
- affect 30-35% of individuals with haemophilia A, 1-3% of haemophilia B
- detected using Bethesda inhibitor assay (blood test).
  - Amount of antibody = number of **Bethesda units (BU).**

MANAGEMENT

- Immune tolerance induction (ITI) therapy
- Bypassing agents
  - Recombinant FVII
  - Prothrombin complex concentrates (PCC)
    - 3-factor PCC (II, IX, X)
    - 4-factor PCC (II, VII, IX, X)
    - Activated prothrombin complex concentrates (aPCC) e.g. FVIII inhibitor bypassing agent (FEIBA)
- Antifibrinolytics, e.g. TXA
- Plasmapheresis
- High-dose factor concentrates
- Emicizumab, rebalancing agents

… Von Willebrand's Disease

- vWD: Bleeding disorder resulting from inherited deficiency of von Willebrand factor (vWF)
- vWF: involved in platelet aggregation, and it the carrier for Factor VIIIc

- Features more similar to bleeding (c.f. coagulation) disorders.
- Common pattern of bleeding from the mucous membranes → menorrhagia, GI bleeding, epistaxis, and purpura of mucous membranes and skin.

- Most common inherited bleeding disorder:
  - up to 1% of the general population
  - ~1 in 1000 people have a form of vWD requiring medical treatment (severe form is rare)

... Von Willebrand's Disease

↳ don't have to know!

- Classification

Type	Type of vWD defect	Percentage of cases	Comments	Factor VIIIc levels	Benefit from factor VIII replacement	Desmopressin (DDAVP)
1	Partial quantitative	80	Autosomal dominant inheritance. Disease is mild and characterized by bleeding from mucous membranes – nosebleeds, gingival haemorrhage and gastrointestinal blood loss	May be normal	–	Used as nasal spray
2A	Qualitative	15		Reduced	+	Used as nasal spray
2B	Qualitative	Rare		Reduced	+	Contraindicated
2C	Qualitative	Rare		Reduced	+	Used as nasal spray
2M	Qualitative	Rare		Reduced	+	Contraindicated
2N	Qualitative	Rare		Reduced	+	Used as nasal spray
3	Complete lack of vWF	5	Bleeding is more severe than in types 1 and 2 but joint and muscle bleeds characteristic of haemophilia are rare	Reduced	+	Contraindicated

Type 2A	Multimerization anomalies *(vWF fails to bind platelets, reducing platelet aggregation)*	Mucocutaneous manifestations (menorrhagia, epistaxis, GI bleed, etc)
Type 2B	↑ vWF affinity for platelets *(platelets aggregate prematurely in bloodstream rather than site of BV injury)*	
Type 2M	↓ vWF affinity for platelets *(decreased vWF activity and failure to interact with platelets)*	
Type 2N	↓ vWF affinity for FVIII. (*Failure of vWF to transport FVIII to site of injury and reduced levels of FVIII in blood. Can resemble mild form of haemophilia A)*	Interactions between platelets and the vessel walls are often normal and FVIII deficiency usually only moderate, hence spontaneous abnormal bleeding is less frequent than other forms

Scully C, *Medical Problems in Dentistry* (Churchill Livingstone, 7th ed., 2015)

… Von Willebrand's Disease

Management

- Desmopressin: nasal spray or IV
- vWF plasma replacement
- Recombinant forms of vWF
- Antifibrinolytic drugs
- Fibrin glue
- Hormonal contraceptives





Specific conditions: congenital or inherited bleeding disorders

Many dental procedures for patients with a congenital or inherited bleeding disorder can be done safely in general practice

- Many dental procedures are unlikely to cause prolonged bleeding
- Some procedures require advice from specialists
- Stratify the risk of prolonged bleeding associated with procedures *(slides: Assessing peri-procedural bleeding risk: Dental Procedural Factors)*
- *Inferior alveolar nerve blocks – risk of haematoma into pharyngeal space)
- Work closely with patient's haematologist re: haemostasis management plan

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Haemophilia WFH WILEY

ORIGINAL ARTICLE

Clinical haemophilia

Dentistry for patients with haemophilia: Trialling a safe and economical change in management

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Abstract

Introduction: While the dental management of patients with haemophilia has changed considerably in the last decade, haemophiliacs in Western Australia have continued to receive pre-operative factor support for dentistry regardless of the type of dental procedure.

Aim: To review the efficacy and safety of established dental protocols that reduce factor use in the dental management of patients with haemophilia and to estimate cost savings.

Methods: Records of 11 patients with haemophilia that were seen in the pilot programme period were reviewed. These were cross-referenced with previous dental and haematology notes that stated the amount and type of pre-operative factor used. Cost savings were estimated using the Australian National Blood Authority's Product List.

Results: All study participants were male, and included those with haemophilia A ($n = 9$), and B ($n = 2$). Mean age was 45 years (range 22–80). A variety of dental treatments were undertaken, and no pre-operative factor was used. Patients on prophylaxis ($n = 6$) received dental treatment the same day as their regular factor administration. It was estimated AUD$26,314 was saved by not using pre-operative factor. One patient had bleeding post-extraction and was seen the following day to achieve haemostasis using local measures. The remaining patients had no complaints of post-operative bleeding, and did not require any further haemostatic measures.

Conclusion: This pilot programme supports data that haemophiliacs can safely receive a variety of dental treatments without the need for pre-operative factor, and the significant cost savings of doing so. Further data is required to support this protocol for invasive dental procedures.

KEYWORDS
cost, dentistry, public health

Currently only the SND unit at Fiona Stanley Hospital provides dental care for patients with congenital bleeding disorders in Western Australia. Results of this present study suggest that given PWH does not routinely require FRT for dental procedures, some dental care can be safely provided/transitioned to General Dental Practitioners (GDPs) in the community. One of the concerns GDPs have with managing PWH is the increased bleeding risk in this group.[16] However, the results of this study show that non-invasive procedures can be a managed safely by practitioners with additional training or understanding of bleeding risk and management, but not necessarily specialist training.

Specific conditions: Thrombocytopenia

- Decisions for dental management, including the setting, should be made with medical and/or specialist dental advice
- Routine fillings under LA and debridement generally considered safe
  - However consider other blood counts/function that may be affected by the underlying condition and/or its treatment
- Threshold platelet counts for common dental procedures

Table 13.33 Threshold platelet counts for common dental procedures in patients with thrombocytopenia

Dental procedure	Threshold platelet count [NB1]
debridement	more than 20×10^9/L
regional nerve block (eg inferior alveolar nerve block)	more than 30×10^9/L
tooth extraction: simple	more than 30×10^9/L
tooth extraction: complex, surgical, molar	more than 50×10^9/L

NB1: Thresholds are sourced from the consensus guidelines for the management of immune thrombocytopenia from the Thrombosis and Haemostasis Society of Australia and New Zealand; they are considered applicable to thrombocytopenia arising from other causes.

Specific conditions: Acquired medical conditions impairing haemostasis

- Include (but not limited to): kidney, liver and bone marrow disorders
- Multiple factors may act synergistically to increase bleeding risk (coagulation, platelet count, platelet function)
- Risk is difficult to quantify through investigations → consult medical practitioner
- Most dental procedures can be safely completed in GDP setting
- If procedure is likely to cause prolonged bleeding:
  - consult with medical practitioner
  - consider consulting a hospital-based specialist dental team in formulating management plan
  - consider referring to hospital-based specialist dental team for higher-risk invasive procedures

Specific conditions: Antithrombotic drugs

ANTIPLATELET DRUGS

- COX-1 inhibitors: aspirin
- P2Y12 inhibitors: clopidogrel, prasugrel, ticagrelor

N.B.: Dual antiplatelet therapy usually prescribed for a specific duration

ANTICOAGULANT DRUGS

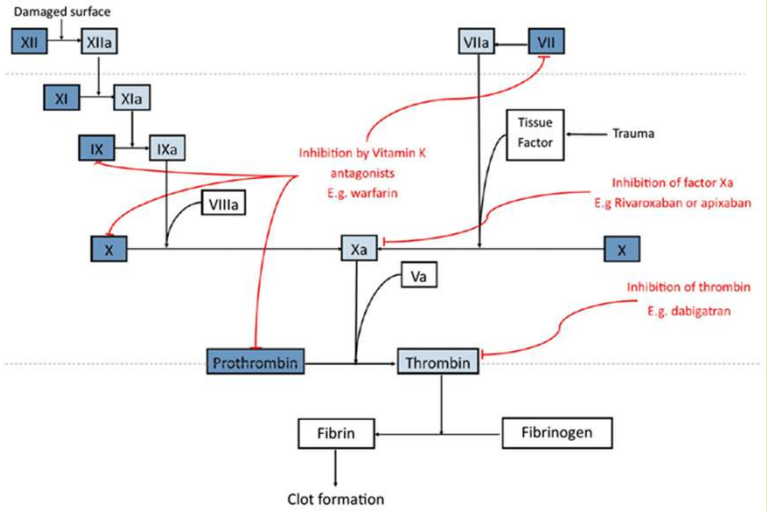
- Oral anticoagulants
  - Vitamin K antagonists: warfarin
  - Direct-acting oral anticoagulants (DOACS):
    - Factor Xa inhibitors: apixaban, rivaroxaban
    - Direct thrombin inhibitors: dabigatran
- Injectable anticoagulants
  - Heparin
  - Low molecular weight heparins (enoxaparin, dalteparin)

Specific conditions: Antithrombotic drugs

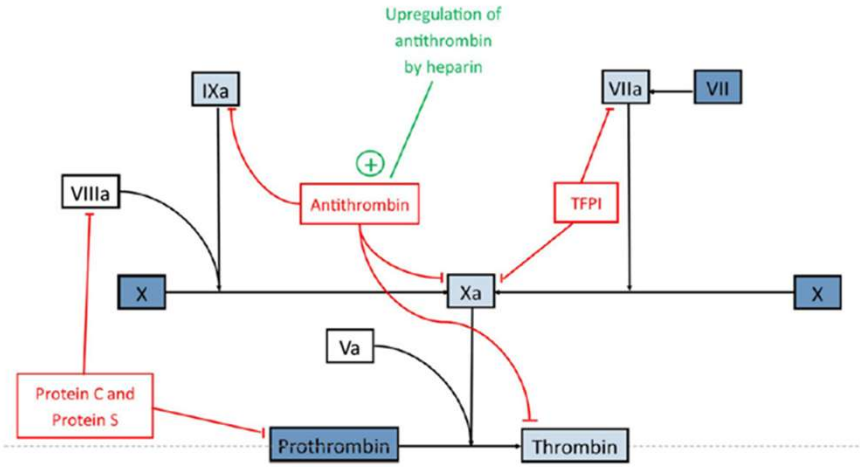
Drug	UK Trade name(s)	Other names (non-UK)
DOACs		
apixaban[a]	Eliquis	
dabigatran	Pradaxa	Pradax, Prazaxa
rivaroxaban[a]	Xarelto	Runaplax, Rivadia
edoxaban[a]	Lixiana	Savaysa, Roteas
Vitamin K Antagonists		
warfarin[a]	Marevan	Coumadin, Jantoven, Uniwarfin, Aldocumar (there are many other trade names used)
phenindione	Dindevan	Phenyline, Pindione
acenocoumarol	Sinthrome	Sintrom, Sinkumar, Syncumar
Injectable Anticoagulants		
dalteparin	Fragmin	Fragmine, Dalpin, Daltehep, Boxol
enoxaparin	Clexane, Inhixia, Arovi	Lovenox, Xaparin, Klexane
tinzaparin	Innohep	Logiparin
Antiplatelet Drugs		
aspirin[a] (acetylsalicylic acid, ASA)	Nu-Seals, Microprin, caprin Dual with dipyridamole: Molita Modified Release	There are numerous brand names for aspirin
clopidogrel[a]	Plavix, Grepid	Iscover (there are many other trade names used)
dipyridamole	Attia Modified Release, Ofcram PR. Dual with aspirin: Asasantin Retard, Molita Modified Release	
prasugrel	Efient	Effient, Prasita
ticagrelor	Brilique	Brilinta, Possia

Specific conditions: Antithrombotic drugs

Coagulation cascade and sites of effects of anticoagulants



Negative regulation of the coagulation cascade and the site of effect of heparin



Specific conditions: Antithrombotic drugs

- Indications for antithrombotic therapy

Medical condition	Commonly used treatments[a]	Treatment duration	Notes
Stroke or transient ischaemic attack (TIA) in the absence of atrial fibrillation (AF)	Single or dual antiplatelets (often clopidogrel)	Lifelong	Occasionally warfarin
Stroke prevention in patients with **Atrial fibrillation** (AF)	DOAC	Lifelong	Occasionally warfarin, rarely single or dual antiplatelets
Thromboembolic disease including, but not limited to **Deep Vein Thrombosis** (DVT) and **Pulmonary Embolism** (PE)	DOAC, warfarin or injectable anticoagulant	Treatment usually 6 weeks to 6 months Prophylaxis can be lifelong	Can be lifelong if there is recurrence or an ongoing untreatable risk factor (e.g. malignancy)
Recent significant **surgery**	Injectable anticoagulant, or DOAC with or without aspirin	Usually 2-6 weeks	
Any **heart surgery**, but especially prosthetic **replacement heart valve**	Warfarin (or other VKA) or single antiplatelet	Long term	Occasionally a DOAC Warfarin or similar for mechanical valves, aspirin for some tissue valves DOAC with or without aspirin if tissue valve and AF
Coronary Heart Disease: Stable Angina Unstable Angina Heart Attack (STEMI[b] and Non-STEMI)	Usually single antiplatelet Dual antiplatelet for 6-12 months following angioplasty and stent insertion or MI DOAC[c] with single or dual antiplatelet if recent MI and AF	Dual therapy for up to 12 months, single therapy with aspirin or clopidogrel thereafter DOAC monotherapy lifelong if AF	
Coronary stent	Single or dual antiplatelets	Dual therapy for up to 12 months, monotherapy lifelong	
Kidney failure requiring **dialysis**	Heparin or injectable anticoagulants	On day of dialysis	
Pregnancy with associated risk factors for venous thromboembolism (VTE)	Aspirin (or injectable anticoagulants in some high-risk cases)	Until delivery (or 6 weeks after for LMWH)	Risks include obesity
Treatment of **DVT** in **pregnancy**	Injectable anticoagulant	Until at least 6 weeks after delivery (or until at least 3 months of treatment in total)	
Peripheral Vascular Disease (PVD)/**Peripheral Arterial Disease** (PAD)	Single or dual antiplatelets, DOAC[c] with aspirin	Lifelong	
Apical/ventricular/mural thrombus	Warfarin	6-12 months (reviewed after echocardiography)	Often in combination with dual antiplatelets if recent heart attack Occasionally a DOAC

[a] Further combinations are possible if the patient has multiple indications.
[b] STEMI: ST segment elevation myocardial infarction
[c] Rivaroxaban is licensed for acute coronary syndrome (co-administered with aspirin alone or with aspirin plus clopidogrel or ticlopidine) and coronary artery disease or peripheral artery disease (co-administered with aspirin).

Specific conditions: Antithrombotic drugs

- Management depends on the type or combination of antithrombotic therapy
- Weigh up potential benefits vs harm of interrupting antithrombotic therapy
- In dental practice, the consequences of a thromboembolic event are usually more significant than the consequences of bleeding
  - Clinical judgement from both dentist and clinician managing the antithrombotic therapy
- Patients on antithrombotic drug + additional risk factors for bleeding + require higher-risk invasive procedure → consider referral to community- or hospital-based specialist (e.g. OMFS, SND)
- Prescribed for specified period: delay elective dental procedure

Specific conditions: Antithrombotic drugs

Therapeutic Guidelines v4 Guidance:

- Single antiplatelet therapy
- Dual antiplatelet therapy
- Direct-acting oral anticoagulant (DOAC)
- Injectable anticoagulant
- Warfarin
- Combination of anticoagulant + single or dual antiplatelet therapy

Specific conditions: Antithrombotic drugs

Table 13.34 Approach to managing patients taking antithrombotic drugs undergoing a dental procedure – *Therapeutic Guidelines Oral & Dental v4*

single antiplatelet therapy (eg aspirin, clopidogrel)	
assessment	consider consulting a medical practitioner if further advice is required (eg to exclude contraindications to elective dental treatment) [NB1]
interruption of antithrombotic therapy	interruption not required [9]
management	local haemostatic measures consider performing extensive procedures in stages
dual antiplatelet therapy (eg aspirin plus one of the following: clopidogrel, prasugrel or ticagrelor)	
assessment	consider consulting a medical practitioner if further advice is required (eg to exclude contraindications to elective dental treatment) [NB1]
interruption of antithrombotic therapy	interruption not required [9] if dual antiplatelet therapy is for a limited duration, delay elective procedures
management	local haemostatic measures consider performing extensive procedures in stages

NB1: Contraindications to elective dental procedures include these events in the previous 6 months: a myocardial infarction (heart attack), stent placement, coronary artery bypass surgery or valve procedure.

Specific conditions: Antithrombotic drugs

Table 13.34 Approach to managing patients taking antithrombotic drugs undergoing a dental procedure – *Therapeutic Guidelines Oral & Dental v4*

direct-acting oral anticoagulant (DOAC) (eg apixaban, dabigatran, rivaroxaban)	
interruption of antithrombotic therapy	for lower-risk procedures, interruption is not required for higher-risk procedures, consult a medical practitioner: • if needed to establish the planned duration of DOAC therapy (to decide whether to delay an elective procedure) • to assess safety and timing if considering any interruption to DOAC therapy (risks vary according to the indication for DOAC therapy) [NB2] [NB3]
management	local haemostatic measures consider performing extensive procedures in stages
injectable anticoagulant (eg heparin, enoxaparin)	
interruption of antithrombotic therapy	for lower-risk procedures, interruption of anticoagulation is not required for higher-risk procedures, consult a medical practitioner: • if needed to establish the planned duration of injectable anticoagulant therapy (to decide whether to delay an elective procedure) • to assess safety and timing if considering any interruption to anticoagulant therapy (risks vary according to the indication for anticoagulant therapy)
management	local haemostatic measures consider performing extensive procedures in stages
warfarin	
assessment	check INR within 24 hours before the procedure
interruption of antithrombotic therapy	if warfarin therapy is for a limited duration, delay elective procedures if INR is less than 4, provide dental treatment without interrupting warfarin [9] if INR is 4 or more, urgently refer to the patient's medical practitioner to manage the INR. Do not proceed with the dental treatment; refer to a hospital-based specialist for emergency dental care
management	local haemostatic measures consider performing extensive procedures in stages

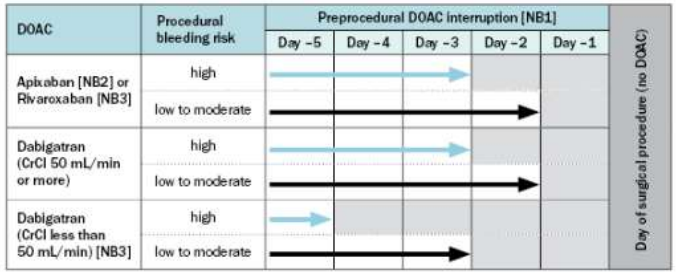
Specific conditions: Antithrombotic drugs - *DOACs*

Therapeutic Guidelines: Cardiovascular – Interruption of DOACs

Figure 3.14 Timing of preprocedural interruption of direct-acting oral anticoagulant (DOAC) therapy

Printable figure

[1] [6]



DOAC	Procedural bleeding risk	Preprocedural DOAC interruption [NB1]					
		Day −5	Day −4	Day −3	Day −2	Day −1	Day of surgical procedure (no DOAC)
Apixaban [NB2] or Rivaroxaban [NB3]	high	→	→	→			
	low to moderate	→	→	→	→	→	
Dabigatran (CrCl 50 mL/min or more)	high	→	→	→			
	low to moderate	→	→	→	→	→	
Dabigatran (CrCl less than 50 mL/min) [NB3]	high	→					
	low to moderate	→	→	→			

CrCl = calculated creatinine clearance; DOAC = direct-acting oral anticoagulant

NB1: Although these timings are based on patients with atrial fibrillation taking a DOAC at doses recommended for stroke prevention, these recommendations can be applied regardless of the indication. The arrows indicate continuation of DOAC therapy, while the grey cells indicate DOAC therapy is withheld.

NB2: For patients taking apixaban, seek specialist advice if CrCl is less than 25 mL/min—a longer duration of interruption to therapy may be required.

NB3: For patients taking rivaroxaban or dabigatran, seek specialist advice if CrCl is less than 30 mL/min—a longer duration of interruption to therapy may be required. Patients taking rivaroxaban with a CrCl of 15 to 29 mL/min were not included in the relevant study [1].

Dental procedures generally considered 'low to moderate risk'

For creatinine in µmol/L:

$$\frac{1.23 \times (140 - \text{age [years]}) \times \text{weight [kg]} \times (0.85 \text{ if female})}{\text{serum creatinine [µmol/L]}}$$

For creatinine in mg/dL:

$$\frac{(140 - \text{age [years]}) \times \text{weight [kg]} \times (0.85 \text{ if female})}{72 \times \text{serum creatinine [mg/dL]}}$$

The need to **interrupt DOAC therapy before a procedure** depends on the nature of the procedure and patient-related factors (eg kidney function).

If a patient taking a DOAC requires an **emergency procedure**, rapid reversal of anticoagulant therapy may be required. For information on reversal, see Bleeding and overanticoagulation with dabigatran, Bleeding and overanticoagulation with apixaban or Bleeding and overanticoagulation with rivaroxaban.

If a patient taking a DOAC is undergoing an **elective procedure,** assess the procedural bleeding risk to determine whether the procedure has a minimal, low to moderate, or high bleeding risk [6]—see Procedure-related factors affecting bleeding risk for more information.

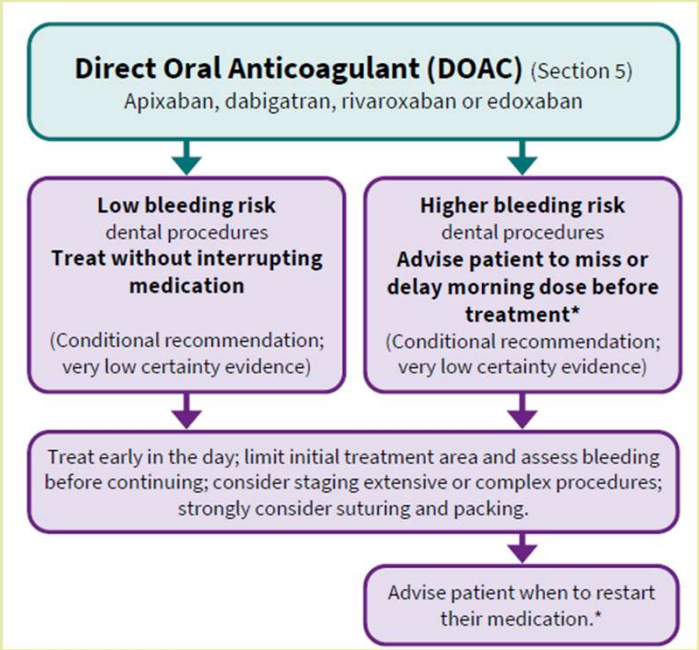
If the procedure has a minimal risk of bleeding (eg minor dental extractions, skin excisions of less than 1 cm, cataract procedures) interruption of DOAC therapy is usually not needed.

DOAC therapy does not usually need to be interrupted if the procedure has a minimal bleeding risk.

If the procedural bleeding risk is low to moderate, or high, temporary interruption of DOAC therapy is required. The timing of preprocedural interruption depends on the drug used and the patient's kidney function—see Figure 3.14. Also consider the patient-related risk factors for bleeding.

Specific conditions: Antithrombotic drugs - *DOACs*

Scottish Dental Clinical Excellence Programme (SDCEP)– Interruption of DOACs



***DOAC dose schedules for dental procedures with a higher risk of bleeding complications**

DOAC	Usual drug schedule	Morning dose (pre-treatment)	Post-treatment dose
Apixaban or Dabigatran	Twice a day	Miss morning dose	Usual time in evening‡
Rivaroxaban or Edoxaban	Once a day; morning	Delay morning dose	4 hours after haemostasis has been achieved
	Once a day; evening	Not applicable	Usual time in evening‡

‡ As long as no earlier than 4 hours after haemostasis has been achieved. The patient should continue with their usual drug schedule thereafter.

Do not interrupt anticoagulant or antiplatelet therapy for:

- patients with prosthetic metal heart valves or coronary stents;
- patients who have had a pulmonary embolism or deep vein thrombosis in the last three months;
- patients on anticoagulant therapy for cardioversion.

DOACs:

- Rapid onset of action: 1-4 hrs
- Short half-lives
  - Rivaroxaban 5-13hrs
  - Apixaban 12hrs
  - Dabigatran 13-18hrs
  - *depends on renal function and age

Specific conditions: Antithrombotic drugs - *DOACs*

Therapeutic Guidelines: Cardiovascular – Recommencement of DOACs

If DOAC therapy was interrupted, the timing to **restart DOAC therapy after the procedure** should be decided in consultation with the proceduralist. Bridging therapy with a parenteral anticoagulant is not recommended for patients restarting a DOAC, because DOACs achieve maximum anticoagulant effect within 1 to 3 hours of the first dose [6] [10].

Bridging therapy with a parenteral anticoagulant is not recommended for patients restarting a DOAC.

For patients who had a procedure with a low to moderate risk of bleeding, DOAC therapy can be restarted 24 hours or more after the procedure if haemostasis has been achieved [1] [6].

For patients who had a procedure with a high risk of bleeding, DOAC therapy can be restarted 2 to 3 days after the procedure if haemostasis has been achieved [1] [6].

If a prolonged period without DOAC therapy is required (eg no oral intake), consider postoperative VTE prophylaxis or therapeutic parenteral anticoagulation [10].

Dental procedures generally considered 'low to moderate risk

Specific conditions: Antithrombotic drugs - *DOACs*

- DOAC Reversal Agents
  - Idarucizumab (Praxbind) = dabigatran
  - Andexanet alfa (Andexxa) = apixaban, rivaroxaban

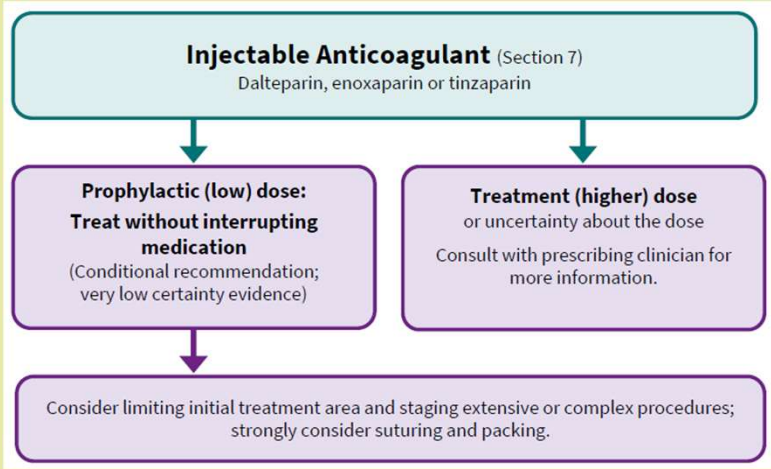
- For use in hospital settings for life-threatening or uncontrolled bleeding

Specific conditions: Antithrombotic drugs - *Heparin*

LMWH	Prophylactic (low) dose[a]	Treatment (higher) dose[a]
Dalteparin	2,500-5,000 units OD[44]	7,500-18,000 units OD[44] or 5,000-10,000 units BD[45] In a 70kg adult expect 15,000 units OD
Enoxaparin	2,000-4,000 units OD[46] (20-40mg)	150 units/kg (1.5 mg/kg) OD or 100 units/kg (1 mg/kg) BD[46] In a 70 kg adult expect 10,500 units (105 mg) OD or 7,000 units (70mg) BD
Tinzaparin	3,500-4,500 units OD[47]	175 units/kg OD[48] In a 70 kg adult expect 12,250 units OD

OD, once daily; BD, twice daily

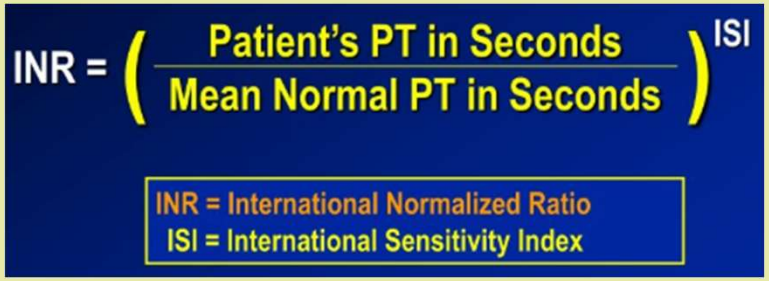
[a] Doses may be adjusted in patients with renal impairment, or body weight <50kg or >100kg.



For a patient who is taking a LMWH and requires dental treatment that is **likely to cause bleeding,** with either a **low or higher risk of bleeding complications** (see Table 1):

- Establish whether the patient is taking a prophylactic (low) dose or a treatment (higher) dose (see Table 4).
  - For patients with renal impairment, or body weight <50kg or >100kg, the dose of LMWH is likely to have been adjusted and consultation with the prescribing clinician (e.g. specialist or general medical practitioner) may be required to confirm whether the patient is taking a prophylactic or treatment dose.
- If the patient is taking a treatment (higher) dose, or there is uncertainty about the dose they are taking, consult with the prescribing clinician (e.g. specialist or general medical practitioner) in order to assess the likely impact on bleeding risk for the dental procedure.
- If the patient is taking a prophylactic (low) dose, treat according to the general advice for managing bleeding risk (see Section 4), without interrupting their LMWH.

Specific conditions: Antithrombotic drugs - *Warfarin*



INR 1 = level of coagulation equivalent to the average patient not taking warfarin
INR >1 = longer clotting / bleeding time

Target INR = typically 2.5 - 3.5 ± 0.5

Check INR within 24hrs of dental procedure → proceed if INR <4

Specific conditions: Antithrombotic drugs - *DOACs*

Table 13.34 Approach to managing patients taking antithrombotic drugs undergoing a dental procedure – *Therapeutic Guidelines Oral & Dental v4*

combination of anticoagulant + single or dual antiplatelet therapy	
interruption of antithrombotic therapy	if therapy is for a limited duration, delay elective procedures consult the patient's medical practitioner to evaluate impact of medical condition and medications on bleeding risk
management	consider specialist dental referral or management by experienced clinicians local haemostatic measures consider performing extensive procedures in stages

Specific conditions: Other non-antithrombotic drugs that can impair haemostasis

Drugs that can affect platelet function:

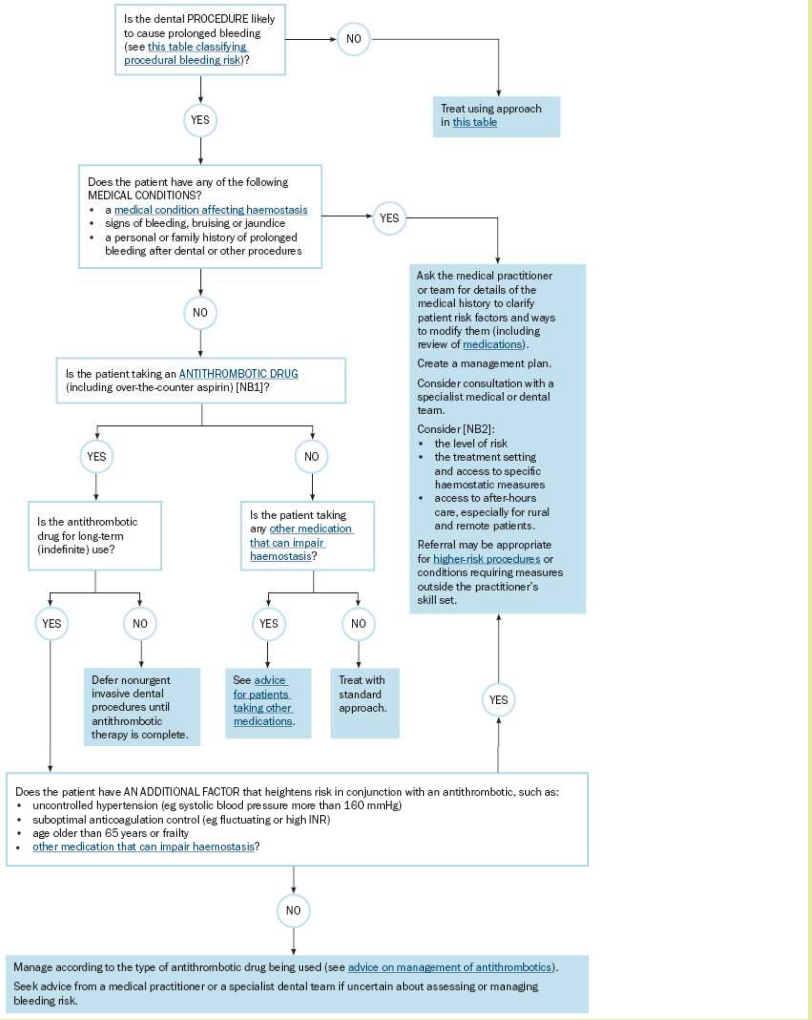
- NSAIDs: e.g. ibuprofen, naproxen
- Some antidepressants
  - Serotonin noradrenaline reuptake inhibitors (SNRIs) – e.g. venlafaxine
  - Selective serotonin reuptake inhibitors (SSRIs) – e.g. Fluoxetine, paroxetine, sertraline
- Lymphoma and chronic lymphocytic leukaemia treatments
  - Bruton tyrosine kinase inhibitors (BTKis) – e.g. acalabrutinib, ibrutinib, Zanubrutinib
- Supplements or complementary medicines
  - E.g. gingko biloba, garlic, curcumin

Specific conditions: Other non-antithrombotic drugs that can impair haemostasis

- **Listed drug + concurrent medical condition** = discuss bleeding risk with medical practitioner, create Mx plan
- **Listed drug + concurrent antithrombotic drug** = discuss bleeding risk with medical practitioner, create Mx plan
- **Non-selective NSAID only** (without concurrent medical condition or antithrombotic use) = local haemostatic measures
- **Antidepressant medication only** (without concurrent medical condition or antithrombotic use) = continue antidepressant
  - Risk of discontinuation syndrome
- **Supplements and complementary medicines** = depending on indication, consider stopping 1 week prior

Approach to managing bleeding risk in dental procedures

Figure 13.73 Approach to assessment and management of periprocedural bleeding risk in dental procedures



Approach to managing bleeding risk in dental procedures

Table 1 Bleeding risks for dental procedures

Dental procedures that are **unlikely to cause bleeding**	Dental procedures that are **likely to cause bleeding**	
	Low risk of post-operative bleeding complications	**Higher risk** of post-operative bleeding complications
Local anaesthesia by infiltration, intraligamentary or mental nerve block	Simple extractions (1-3 teeth, with restricted wound size)	Complex extractions, adjacent extractions that will cause a large wound or more than 3 extractions at once
Local anaesthesia by inferior dental block or other regional nerve blocks	Incision and drainage of intra-oral swellings	Flap raising procedures including: • Elective surgical extractions • Periodontal surgery • Preprosthetic surgery • Periradicular surgery • Crown lengthening • Dental implant surgery
Basic periodontal examination (BPE)	Detailed six-point full periodontal examination	Gingival recontouring
Supragingival removal of plaque, calculus and stain	Root surface debridement (RSD)	Biopsies
Direct or indirect restorations with supragingival margins	Direct or indirect restorations with subgingival margins	
Endodontics - orthograde		
Impressions and other prosthetics procedures		
Fitting and adjustment of orthodontic appliances		

Managing a dental patient taking an anticoagulant or antiplatelet drug(s)

Is dental treatment likely to cause bleeding? (Table 1)
- NO → Treat with caution using standard procedures, taking care to avoid causing bleeding.
- YES ↓

Is medication time-limited? (Sections 3.3 & 4.4)
- YES → Delay non-urgent invasive dental procedures where possible.
- NO ↓

Does patient have other relevant medical complications? (Sections 3.2.2 & 3.2.3)
- YES → Consult with prescribing clinician, specialist or general medical practitioner, if required.
- NO ↓

Which drug type is the patient taking?

General Advice (Section 4)

For **all patients taking anticoagulants or antiplatelet drugs** requiring dental treatment **likely to cause bleeding** (Table 1):
- plan treatment for early in the day and week;
- provide pre-treatment instructions;
- treat atraumatically, use appropriate local measures and only discharge the patient once haemostasis has been achieved;
- if travel time to emergency care is a concern, place particular emphasis on the use of measures to avoid complications;
- provide patient with post-treatment advice and emergency contact details.

Do not interrupt anticoagulant or antiplatelet therapy for:
- patients with prosthetic metal heart valves or coronary stents;
- patients who have had a pulmonary embolism or deep vein thrombosis in the last three months;
- patients on anticoagulant therapy for cardioversion.

Direct Oral Anticoagulant (DOAC) (Section 5)
Apixaban, dabigatran, rivaroxaban or edoxaban

Low bleeding risk dental procedures **Treat without interrupting medication** (Conditional recommendation; very low certainty evidence)

Higher bleeding risk dental procedures **Advise patient to miss or delay morning dose before treatment** (Conditional recommendation; very low certainty evidence)

Treat early in the day; limit initial treatment area and assess bleeding before continuing; consider staging extensive or complex procedures; strongly consider suturing and packing.

Advise patient when to restart their medication.

Vitamin K Antagonist (Section 6)
Warfarin, acenocoumarol or phenindione

Check INR, ideally no more than 24 hours before procedure (up to 72 hours if the patient is stably anticoagulated)

If INR is below 4:

Treat without interrupting medication (Strong recommendation; low certainty evidence)

Consider limiting initial treatment area and staging extensive or complex procedures; strongly consider suturing and packing.

If INR is 4 or above, delay invasive treatment or refer if urgent.

Injectable Anticoagulant (Section 7)
Dalteparin, enoxaparin or tinzaparin

Prophylactic (low) dose: Treat without interrupting medication (Conditional recommendation; very low certainty evidence)

Treatment (higher) dose or uncertainty about the dose

Consult with prescribing clinician for more information.

Consider limiting initial treatment area and staging extensive or complex procedures; strongly consider suturing and packing.

Antiplatelet drug(s) (Section 8)

Aspirin alone

Treat without interrupting medication (Strong recommendation; low certainty evidence)

Consider limiting initial treatment area and staging extensive or complex procedures; use local haemostatic measures.

Clopidogrel, dipyridamole, prasugrel or ticagrelor single or dual therapy (in combination with aspirin)

Treat without interrupting medication (Strong recommendation; low certainty evidence)

Expect prolonged bleeding; limit initial treatment area and consider staging extensive or complex procedures; strongly consider suturing and packing.

Anticoagulant/antiplatelet combination (Section 9)

Consult with the patient's prescribing clinician in order to assess the likely impact of the particular drug combination and the patient's medical condition on their bleeding risk.

General principles

- If on **time-limited course** of antithrombotic medication, delay non-urgent invasive dental procedures until medication discontinued, where possible
- **Extensive procedures, long duration** procedures
  - Stage treatment
  - Limit the initial treatment area (e.g. single extraction or debride 3 teeth, then assess bleeding, before continuing)
  - Consider hospital-based specialist dental team
- Book **early in the day and week**
- **Local haemostatic measures**
- Written post-procedural **instructions**
- **Emergency contact info** and advise to seek urgent medical attention (persistent ooze/bleed, bleeding restarts, bleeding of concern)
- Explain extensive **bruising** may occur
- Explain post-procedural **pain management** (caution: NSAIDs)
- **Follow-up** within 2 days

General principles

PROSTHODONTICS

- Avoid soft tissue trauma
- Care with matrix bands, suction tip (esp FOM)
- Rubber dam is useful, but take care with clamp
- Moisten cotton rolls
- Subgingival restorations: retraction cord + haemostatic agent with adrenaline
- Fissure seal preventively
- TXA mouthwash if required

ENDODONTICS / ORTHODONTICS

- Endo is a good alternative to extraction
- Avoid instrumenting past the apex
- Intracanal LA with adrenaline, or topically with paper point
- If pulp won't stop bleeding, consider systemic measures (e.g. Factor – haemophilia)
- Caution of sharp edges/fixtures

Tranexamic Acid Mouthwash

- Warfarin: reduces bleeding after dental procedures with similar efficacy to other haemostatic measures
- DOACs: more limited data to support use

- **TXA mouthwash is NOT commercially available:**
  - Compounding pharmacy $$$
  - Prescribe TXA tablets
  - Provide instructions for the label:
    - *500mg tablet to be crushed and mixed with 10mL water and swirled in the mouth for 1 to 2 minutes before spitting out*
    - *Use 6-hourly for up to 48 hours post-procedure*
    - *Do NOT swallow tablets or mouthwash*



Managing bleeding during or after oral surgery

If bleeding occurs during or after oral surgery...

1. Local haemostatic measures
2. Assess the site
3. Check for contributing factors

Managing bleeding during or after oral surgery

1. LOCAL HAEMOSTATIC MEASURES

- Do not send a patient home until bleeding after oral surgery has stopped

Table 13.13 Measures to control bleeding during oral surgery – *Therapeutic Guidelines Oral & Dental v4*

Local haemostatic measures during oral surgery
Apply pressure to the wound during the procedure; pressure is the most important factor in achieving haemostasis.
Minimise tissue trauma.
Use an absorbable haemostatic agent to pack the surgical wound. Haemostatic agents available include oxidised cellulose sheets, resorbable porcine skin gelatin sponges, and thrombin powders or solutions. Ribbon gauze is an alternative if a haemostatic agent is not available, but needs to be removed after 24 hrs.
Suture the socket with a resorbable suture. This compresses the soft tissues into the adjacent bone of the socket and supports the maturing blood clot within the extraction socket.
If pressure is insufficient to stop the bleeding, consider using a tranexamic acid rinse to stabilise an existing blood clot. This may be particularly useful in patients taking warfarin or other antithrombotics [NB1]. A 5% tranexamic rinse is prepared by crushing a 500 mg tablet of tranexamic acid in 10 mL of water. Either rinse the bleeding site or use a gauze pad soaked in the rinse to dress the bleeding site.
Intraoperative measures to manage bleeding not controlled with local measures
If bleeding is not controlled with local measures, use adequate lighting and suction to examine the bleeding site thoroughly. If a bleeding vessel is identified, apply thorough pressure, suture the vessel proximal to the bleeding point if accessible, pack the site tightly and arrange urgent transfer to the nearest hospital with an oral and maxillofacial surgery service.
Possible causes of bleeding persisting despite local measures include: • an arterial bleed from an aberrant vessel within the socket or other surgical site • an arteriovenous malformation (AVM) • systemic factors, such as an undiagnosed bleeding disorder or antithrombotic use.
Postoperative measures before discharge
Provide written information on postprocedural care to all patients, including contact information in an emergency.
Do not discharge a patient after oral surgery until bleeding has stopped.
For patients taking warfarin or a direct acting oral anticoagulant (eg apixaban, rivaroxaban, dabigatran), consider prescribing 5% tranexamic acid mouthwash as a postoperative measure [1] [2] [5] [7]. It is best prepared in a pharmacy [NB1].
Ensure that patients who have temporarily interrupted antithrombotic therapy understand when to restart their medication (see Table 13.34).

Managing bleeding during or after oral surgery

1. LOCAL HAEMOSTATIC MEASURES

Topical haemostatic agents:

- Gelatin sponge (Gelfoam)
- Oxidised regenerated cellulose (Surgicel)
- Microfibrillar collagen (Avitene Ultrafoam, Davol, Warwick, Surgicel fibrillar)
- Collagen plugs
- Topical thrombin
- Chitosan-based agents (e.g. HemCon) *(beware shellfish allergy)*
- Platelet-rich plasma gel
- Bone wax
- Tranexamic acid
- Fibrin glues, cyanoacrylate (consist of mainly fibrinogen or thrombin)

Table 8.14 *Topical haemostatic agents*

Agent	Main constituent	Source
Avitene	Collagen	Bovine
Beriplast	Fibrin	Various
CollaCote	Collagen	Bovine
Cyklokapron	Tranexamic acid	Synthetic
Gelfoam	Gelatin	Bovine
Helistat	Collagen	Bovine
Instat	Collagen	Bovine
Surgicel	Cellulose	Synthetic
Thrombinar	Thrombin	Bovine
Thrombogen	Thrombin	Bovine
Thrombostat	Thrombin	Bovine

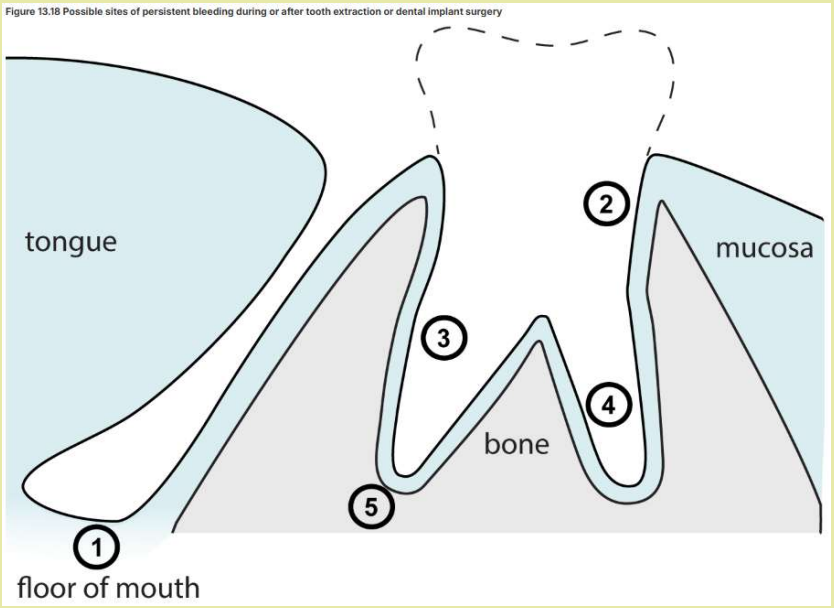
Managing bleeding during or after oral surgery

2. ASSESS THE SITE

Sites of bleeding during and after oral surgery

1. mucosa near the floor of the mouth
2. subgingival region in tooth socket
3. socket wall – uncommon bleeding site
4. apical region in tooth socket
5. neurovascular bundle

↳ implant surgery?



Managing bleeding during or after oral surgery

3. CHECK FOR CONTRIBUTING FACTORS

- Check medical and medication history
- Consider undiagnosed medical condition

Identifying factors →

- Gauge likelihood bleeding will be controlled with local measures
- Urgency for seeking advice or referring to ED
- Management

SUMMARY

- Many patients can receive most of their dental treatment in a general dental practice after careful assessment of periprocedural bleeding risk, consultation with medical physician, and planning.

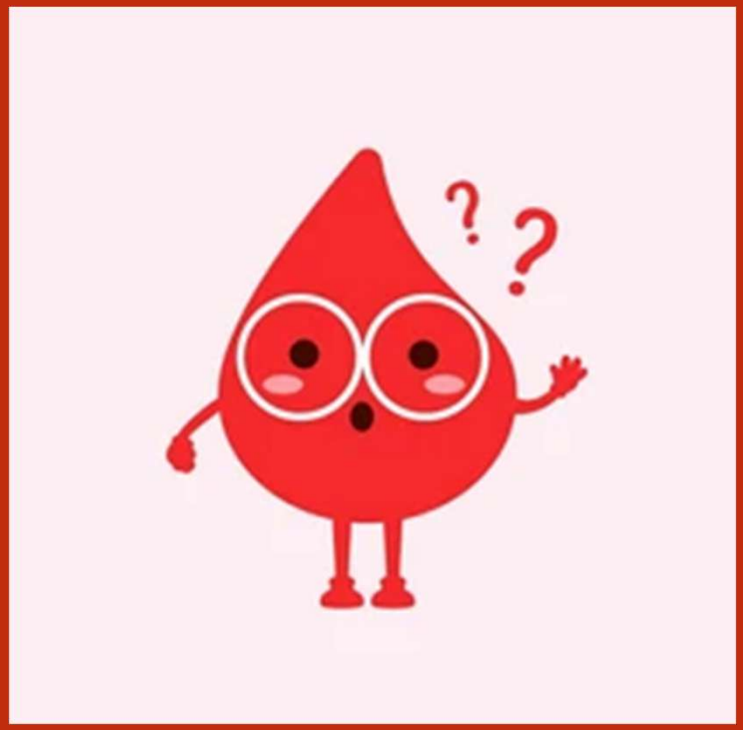
Assess risk: (1) Procedure, (2) Patient

- Consider referral to a hospital-based clinic / dental specialist:
  - Higher-risk procedure planned for patients with impaired haemostasis
  - Higher severity of the patient's condition impairing haemostasis
  - Clinician does not feel comfortable administering the haemostatic measures required

- Follow general principles (local haemostatic measures, stage extensive procedures, book early in day/week, specific post-op instructions, etc)

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Thank you! Questions?