International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

# Burden of Bleeding and Clotting Disorders in Dentistry

**Dr. Saraswathi Gopal. K[1], Dr. Kanimozhi. R[2]**

[1]Professor and Head of the Department, Department of Oral medicine and Radiology, Faculty of Dentistry, Meenakshi Ammal Dental College and Hospital, MAHER University, Chennai - 95.
Email id: *dr.saraswathik[at]yahoo.in*

[2]Post Graduate, Department of Oral Medicine and Radiology, Faculty of Dentistry, Meenakshi Ammal Dental College and Hospital, MAHER University, Chennai - 95.
Email id: *drkanimozhi15[at]gmail.com*

**Abstract:** ***Bleeding disorders are a group of disorders characterized by defensive hemostasis with abnormal bleeding. Dental practitioners should aware of the effects of bleeding disorders on the management of their patients. Because bleeding after dental treatment may cause severe or even fatal complications. The purpose of this article is to provide knowledge about identification of patient with bleeding disorder, causes and types of bleeding disorder, its oral complications and management procedure. Thus, it might be helpful for the oral physician in their daily dental practice.***

**Keywords:** Hemostasis, Bleeding disorders, management, complications, dental practitioners.

## 1. Introduction

Haemostasis is defined as the process by which bleeding is stopped after injury to blood vessels. It is a delicate multistep process which involves interactions of the blood vessels, platelets and coagulation factors [(1).] Bleeding Disorders are a group of disorders characterized by defensive hemostasis with abnormal bleeding. The likelihood to bleeding could be spontaneous in the form of small hemorrhages into the skin and mucous membranes (eg. Petechiae, purpura, ecchymoses). Instead of spontaneous appearance of petechiae and purpuras, coagulation defects manifest more often in the form of large ecchymoses, hematomas and bleeding into muscles, joints, body cavities, GIT and urinary tract [(2).] Dental practitioners shouldknow about the effects of bleeding disorders and its management. Proper dental and medical evaluation of patients is therefore necessary [(3).] The objectives of this review is to emphasize the importance of management of patients with bleeding and clotting disorders and to demonstrate the importance of routine laboratory screening procedures.

**Pathophysiology:**
There are three phases of haemostasis, which is responsible to control bleeding. They are vascular, platelet and coagulation phases. After coagulation phase, there is fibrinolytic phase that dissolves the clot [(4).]

**1) Vascular phase:**
Following tissue injury, there will be an immediate reflex vasoconstriction. The vasoactive products like serotonin, histamine, prostaglandins produce vasoconstriction at the injured site.

**2) Platelet phase:**
When circulating platelets are exposed to damaged vascular surface, they experience physical and chemical changes. Which causes the platelets to undergo aggregation and form primary vascular plug.

**3) Coagulation phase:**
Classically, coagulation cascade is separated into three pathways such as intrinsic, extrinsic and common pathway.

The extrinsic pathway is the main pathway for initiation of coagulation, which is initiated by the exposure of tissue factor (factor III), expressed by endothelial cells, subendothelial tissue and monocytes, with expression being upregulated by cytokines (TNF - alpha, interleukin - 6). It also contains the tissue factor and factor VII complex, which further activates factor X.

The intrinsic pathway is stimulated by thrombin, through activation of factor XI, and involves high - molecular - weight kininogen, prekallikrein, factors XII, XI and IX, and factor VIII, which acts as a cofactor (with calcium and platelet phospholipid) for the factor IX - mediated activation of factor X [(5).]

The common pathway involves the factor X, which generates thrombin from prothrombin. Once formed, thrombin converts fibrinogen, a soluble plasma protein, to insoluble fibrin [(2).]

**Types of Bleeding Disorders [(2, 6):]**
Bleeding disorders can be classified into four types. They are Vascular disorders, Platelet disorders, Coagulation disorders and Fibrinolytic disorders (Table I).

**Table 1**

| | |
|---|---|
| Vascular disorders | • Scurvy<br>• Cushing Syndrome<br>• Rendu - Osler - Weber syndrome<br>• Ehlers - Danlos syndrome |
| Platelet disorders | **Quantitative disorder (Thrombocytopenia)**<br>***Immune - mediated***<br>• Idiopathic |

| | |
|---|---|
| | • Drug - induced<br>• Collagen vascular disease<br>• Sarcoidosis<br>***Non - immune - mediated***<br>• Disseminated intravascular coagulation<br>• Microangiopathic hemolytic anemia<br>• Leukemia<br>• Myelofibrosis<br><br>**Qualitative disorder (Nonthrombocytopenia)**<br>***Congenital***<br>• Glanzmann thrombasthenia<br>• von Willebrand's disease<br>***Acquired***<br>• Drug - induced<br>• Liver disease<br>• Alcoholism |
| Coagulation disorders | ***Congenital***<br>• Hemophilia A and B<br>• von Willebrand's disease<br>• Other factor deficiencies (rare) ***Acquired***<br>• Liver disease<br>• Vitamin K deficiency,<br>• warfarin use<br>• Disseminated intravascular coagulation |
| Fibrinolytic disorder | • Streptokinase therapy<br>• Disseminated intravascular coagulation |

**Identification of Patient with a Bleeding Disorder**

- Review of the medical history
- Family history of bleeding problems
- Past dental history
- Identification of medications with hemostatic effect
- Identify medical conditions (e. g., liver disease, renal disease, hematologic malignancy, cancer patients on chemotherapy) that may predispose patients to bleeding problems
- History of heavy alcohol intake [2]

**Oral Complications and Manifestations**

- petechiae and ecchymoses are most commonly seen in patients with Platelet deficiency and vascular wall disorders. Due to extravasation of blood into connective and epithelial tissues of the skin and mucosa.
- spontaneous gingival bleeding is noted in patients with Platelet or coagulation disorders.
- spontaneous gingival bleeding with hyperplastic hyperemic gingival enlargements may be seen in leukemic patient.
- In patients with severe hemophilia, because of continuous oral bleeding over longer periods, a deposits of hemosiderin and other blood degradation products are most frequently seen on the tooth surfaces.
- Incidence of dental caries and periodontal diseases is higher in patients with bleeding disorders, because of lack of effective oral hygiene [2, 6].

**Laboratory Investigations**

Careful and thorough clinical assessment lead the way for appropriate laboratory investigation. The basic laboratory test for assessing hemostasis. They are complete blood count (CBC), prothrombin time (PT), activated partial thromboplastin time (APTT), a thrombin time, bleeding time or platelet function analysis (PFA). Recently developed analyzer named PFA - 100, which is to assess the global platelet response. This PFA - 100 is extremely sensitive to the presence of aspirin and may be used to monitor antiplatelet drug therapy. It is also used to screen patients for Von Willebrand disease as well as platelet function disorders [7 - 10]. The following laboratory paramaters are helpful in distinguishing a platelet disorder from a coagulation defect (Table II) [2, 11, 12].

**Table II**

| Test | Evaluate | Normal Values | Prolonged Conditions |
|---|---|---|---|
| Bleeding time (BT) | platelet and normal blood vessel functions | <7min (by simplate); 1 - 6min (modified Ivy's test) | Platelet disorders, vessel wall disorders, fibrinogen disorders and Von Willebrand's disease |
| Activated partial thromboplastin time (APTT) | Factor II, V, X | 25± 10 second | Heparin treatment, liver diseases, hemophilia, DIC, massive transfusion |
| Prothrombin time (PT) | Factors II, V, VII, X and fibrinogen | 12 - 15 seconds | Warfarin treatment, liver disease, vitamin k deficiency, DIC |

**Local Hemostatic Measures**

A hemostatic agent is a substance that promotes hemostasis (stops bleeding). Local hemostatic agents can be classified as: 1. Passive hemostatic agents 2. Active hemostatic agents. Some of the passive hemostatic agents are Collagen - based products such as Avitene, Helistat and Cellulose - based products such as Surgicel, Gelitacel. Some of the active hemostatic agents are Thrombin, Floseal. The commonly used hemostatic solutions are Styptics, Tannic acid and Tranexamic acid [13, 14].

**Dental Management**

Dental modifications required for these patients depends on the type and invasiveness of the dental procedure and the type and severity of the bleeding disorder [2]. If the dental procedure has limited invasiveness and the patient has a mild bleeding disorder, only slight or no modification will be required. In patients with severe bleeding disorders, preoperatively restore the hemostatic system. The patient should consult the physician before invasive treatment is proceed. In patients with drug - induced coagulopathies, drugs may be stopped or the doses may be modified. In case ofpatients with irreversible coagulopathies, if necessary missing factors can be replaced [6].

**Pain control:**

In patients with coagulopathies, nerve - block anesthetic injections are contraindicated because anesthetic solution is deposited in a highly vascularized area, which carries a risk of hematoma formation. But it can be given, when there is no better alternative and prophylaxis is provided [15, 16]. For commonly used blocks, the required minimum clotting factor levels is 20% to 30%.

Extravasation of blood in the oropharyngeal area by an inferior alveolar block can produce gross swelling, pain, dysphasia, respiratory obstruction and risk of death from asphyxia [17, 18].

In many cases, the potential alternatives to nerve block are infiltration and intraligamentary anesthesia. An anesthetic containing vasoconstrictor should be used whenever possible. Alternative techniques, such as sedation with diazepam or nitrous oxide–oxygen analgesia, can be employed to reduce or eliminate the need for anesthesia. Patients undergoing extensive treatment requiring factor replacement may be treated under general anesthesia in a hospital operating room [3].

**Preventative and periodontal therapies:**
Healthy periodontal tissue is essential to prevent bleeding and tooth loss [19]. Procedures such asPeriodontal probing, supragingival scaling and polishing should be done safely without the risk of bleeding. Mostly, factor replacement is not needed for subgingival scaling and root planing if these procedures are done carefully. Ultrasonic instrumentation may result in less chances of tissue trauma.

For severely inflamed tissues, initial treatment with chlorhexidine mouthwashes and gross debridement is recommended to reduce tissue inflammation before deep scaling [20]. Locally applied pressure and post treatment antifibrinolytic oral rinses are usually successful in controlling any protracted bleeding [2].

Any periodontal surgery or deep root surface debridement requires that the patient have a factor VIII level of at least 50% - 75% preoperatively [21].

**Restorative and Endodontic Procedures:**
General restorative procedures do not cause significant risk of bleeding. while placing rubber dam clamps, matrices and wedges, care should be taken to avoid injury to soft tissues [3]. Atraumatic restorative treatment including air abrasion, and chemomechanical caries removal agents also used for safer reasons.

Endodontic therapy should be preferred than extraction whenever it is possible in these patients. Usually Endodontic procedurecan be safely carried out without any significant risk of bleeding and so, it can be performed routinely [3]. For irrigation, Sodium hypochlorite should be used in all cases. Following calcium hydroxide paste should be used to control the bleeding. Formaldehyde - derived substances can be used in cases where there is continous bleeding or even before the pulpectomy [19].

Endodontic surgical procedures may require factor replacement therapy. For hemophilia patients, they requires factor VIII replacement up to 50–75% [22].

**Prosthodontic Procedures:**
Full and partial removable prostheses are considered as safe treatments [23]. These procedures usually do not involve a considerable risk of bleeding. Trauma must be minimized by careful post - insertion adjustments. In order to reduce the risk of ecchymosis in these patients, oral tissues should be handled at most care during the various clinical stages of prosthesis fabrication [6].

It is preferable to use a supragingival margin than subgingival one. The risk of bleeding associated with Crowns and fixed partial dentures are low and so, it can be done in a primary care setting [24]. Rafique et al [25] suggested the use of non - metallic trays during impression procedures to avoid soft tissue trauma. Covering the suction tip with gauze also might help reduce trauma to the oral mucosa [26].

**Pediatric dental therapy:**
These patients occasionally presents with prolonged oozing from exfoliating primary teeth. In that case, for patients comfort and hemorrhage control, administration of factor concentrates and extraction of the deciduous tooth with curettage may be necessary. Extraction of mobile primary teeth can be done using periodontal ligament anesthesia without factor replacement after two days of vigorous oral hygiene to reduce local inflammation. Hemorrhage control can be achieved with simple gauze pressure, and hemostasis is obtained within 12 hours. Pulpotomies can be done without excessive pulpal bleeding. Stainless steel crowns should be prepared to allow minimal removal of enamel at gingival areas [2].

**Orthodontic Therapy:**
Orthodontic treatment can be provided safely with little modification. Care must be given to avoid mucosal laceration by orthodontic bands, brackets, and wires. Instead of using removable functional appliances, properly managed fixed orthodontic appliances or use of transparent aligners are preferred for the patient with a high likelihood of bleeding from chronic tissue irritation. The use of extraoral force and shorter treatment duration further decrease the potential for bleeding complications [2].

**Oral Surgery [19]:**
For these patients, even a simple dental extraction, must be planned carefully to minimize the complications. The following steps can be carried out to prevent problems:

**1) Treatment plan**
The treatment plan should be formulated as per following guidelines:

- Conduct a thorough clinical and radiographic examination.
- Identify which treatment may require prophylactic cover. If multiple extractions are required, only one or two teeth should be extracted at the first appointment to ensure that hemostasis can be achieved.
- Observe all patients for a prolonged period after a dental extraction [27].
- For coagulopathies, transfusion of appropriate factors to 50% to 100% of normal levels is recommended [3].
- For patients taking warfarin, their international normalized ratio (INR) should be measured before a surgical procedure. The normal therapeutic range is 2.0 - 3.0.
- If INR values are greater than 3.0, physician referral is suggested [28].

- Arrange coagulation factor or desmopressin (DDAVP) and local hemostatic agent in the unit in case of emergency during the procedure.

**2) Pre - operative period**

- Before any surgical procedure, remove as much calculus and plaque as possible.
- Using an antifibrinolytic agent may be helpful before the surgery. Tranexamic acid (adult dose 1 g three times a day) and epsilon aminocaproic acid (EACA) (50 mg/kg four times a day) for 7 days.

**3) Peri - operative period**

- Before the administration of the local anesthetic, make the Patient rinse with chlorhexidine mouthwash for 2 minutes.
- Perform the extraction as atraumatically as possible.
- Place the suture if the gingival margins do not oppose well.
- Use local hemostatic measures if indicated.

**4) Post - operative period**

Postoperative instructions should be given to the patients:

- No mouth rinsing for 24 hours;
- No smoking for 24 hours;
- Soft diet for 24 hours;
- No strenuous activities for 24 hours;
- Prescribed medication must be taken as instructed;
- Salt - water mouthwashes should be used four times a day for 7 days [(29);]
- Antibacterial mouthwash may be used.

**Dental emergencies [(19):]**

Pain associated with caries and bleeding from the periodontal tissues are the most common dental problems. Initially, antibiotics or pulpectomy can be provided to reduce pain until the extraction is planned. Bleeding from the periodontal tissues can usually be controlled with antibiotics until scaling is arranged.

The management of dental trauma is more complex as it involves both the gingiva and the teeth. Local measures is usually used to control gingival bleeding and temporary splinting can be donetomanage the fractured or loose teeth.

**Choice of Medications**

Most medications prescribed in dental practice, especially Acetyl salicylic acid (ASA), may interfere with hemostasis. Moreover, interaction of several drugs with anticoagulants, which increases their potency and risk of bleeding. When used for prolonged periods, medications such as ASA and nonsteroidal anti - inflammatory drugs (NSAIDS) can increase the effect of warfarin. Penicillins, erythromycin, metronidazole, tetracyclines and miconazole also have potentiating effects on warfarin. Therefore, it should be considered while prescribing these drugs and it may be desirable to consult the patient's physician before planning the dose regimen [(3).]

## 2. Conclusion

Foremost importance is given for these patients in oral health care, because bleeding after dental treatment may cause severe or even fatal complications. In addition, maintenance of oral hygiene and prevention of dental diseases is of great significance to improve the quality of life. This article provides a Knowledge about causes of bleeding disorder, its oral complications and management procedure. Therefore, understanding this intricate reality is very important for a dentist to provide appropriate dental treatment and avoid undesirable consequences.

## References

[1] Bashawri LA, Ahmed MA. The approach to a patient with a bleeding disorder: for the primary care physician. Journal of family & community medicine.2007 May; 14 (2): 53.
[2] Glick M. Burket's oral medicine. PMPH USA; 2015.
[3] Ali M, Selimuzzaman M, Marzan S. Importance of bleeding disorder in the management of dental patients. Dhaka Shishu (Children) Hospital Journal.2018; 34 (1): 41 - 7.
[4] Goswami, Abhirup, et al. "Bleeding disorders in dental practice: A diagnostic overview. " *Journal of the International Clinical Dental Research Organization.6*.2 (2014).
[5] Scully C. Scully's Medical Problems in Dentistry E - Book. Elsevier Health Sciences; 2014 Jul 21.
[6] Anurag Gupta, B. D. S., Joel B. Epstein, and Robert J. Cabay. "Bleeding disorders of importance in dental care and related patient management. " (2007).
[7] Mammen EF, Comp PC, Gosselin R, et al. PFA - 100 system: a new method for assessment of platelet dysfunction. Semin Thromb Hemost.1998; 24: 195 - 202.
[8] Carcao MD, Blanchette VS, Dean JA, He L, Kern MA, Stain AM, et al. The platelet function analyzer (PFA - 100): A novel in Vitro system for evaluation of primary hemostasis in children. Br J Haematol 1998; 101: 70 - 3.
[9] Kottke - Marchant K, Powers JB, Brooke L, Kundu S, Christie DJ. The effect of antiplatelet drugs, heparin and preanalytical variables on platelet function detected by the platelet function analyzer (PFA - 100). Clin Appl Thromb Hemost 1999; 5: 1 - 10.
[10] Kundu SK, Heilmann EJ, Sio R, Garcia C, Davidson RM, Ostgaard RA. Description of an in Vitro platelet function analyzer – PFA - 100. Semin Thromb Hemost 1995; 21: 106 - 12.
[11] Patton LL. Bleeding and clotting disorders. In: Burket's oral medicine: diagnosis and treatment.10th ed. Hamilton (ON): BC Decker; 2003. p.454 - 77.4.
[12] Blinder MA. Bleeding disorders. [Web site of the Washington University School of Medicine]. Available from URL: http: //hematology. im. wustl. edu/ conferences/ presentations/ blinder080604. ppt
[13] Kamoh A, Swantek J. Hemostasis in oral surgery. Dent Clin North Am.2012; 56 (1): 17 - 23.
[14] Mani, Amit, et al. "Hemostatic agents in dentistry. " *Galore Int. J. Health Sci. Res* 3 (2018): 40 - 46.

[15] Flint SR, Keith O, Scully C. Hereditary hemorrhagic telangiectasia: family study and review. Oral Surgery Oral Med Oral Pathol 1988; 66: 440 - 44.
[16] Nazif M. Local anesthesia for patients with hemophilia. ASDC J Dent Child 1970; 37 (1): 79 - 84.
[17] Webster WP, Roberts HR, Penick GD. Dental care of patients with her - editary disorders of blood coagulation. In: Rantoff OD, editor. Treatment of hemorrhagic disorders. New York: Harper & Row; 1968. p.93 - 110.
[18] Leatherdale RA. Respiratiory obstruction in haemophilic patients. Br Med J 1960; 30 (5182): 1316 - 20.
[19] Brewer A, Correa ME. Guidelines for dental treatment of patients with inherited bleeding disorders. Haemophilia.2005; 11 (40): 504 - 9.
[20] Webster WP, Courtney RM. Diagnosis and treatment of periodontal disease in the hemophiliac. In: Proceedings, Dental Hemophilia Institute. New York: National Hemophilia Foundation; January 1968
[21] P, Kumar N. Special Care in Dentistry: Handbook of Oral Healthcare. Philadelphia: Churchill Livingstone Elsevier; 2007.
[22] Australian Haemophilia Centre Directors' Organisation. A Consensus Statement on the Dental Treatment of Patients with Inherited Bleeding Disorders. Australia: Australian Haemophilia Centre Directors' Organisation (AHCDO); 2010.
[23] Brewer A, Correa ME. Guidelines for Dental Treatment of Patients with Inherited Bleeding Disorders. Monograph No.40. Montreal: World Federation of Hemophilia; 2006. http: //www1. wfh. org/publication/files/pdf - 1190. pdf. Accessed September 12, 2017
[24] Anderson J, Brewer A, Creagh D, et al. Guidance on the dental management of patients with haemophilia and congenital bleeding disorders. Br Dent J.2013; 215 (10): 497 - 504
[25] Rafique S, Fiske J, Palmer G, Daly B. Special care dentistry, 1: dental management of patients with inherited bleeding disorders. Dent Update.2013; 40 (8): 613 - 616, 619 - 622, 625 - 626
[26] Robertson D, Nusstein J, Reader A, Beck M, McCartney M. The anesthetic efficacy of articaine in buccal infiltration of mandibular posterior teeth. J Am Dent Assoc.2007; 138 (8): 1104 - 1112
[27] Brewer AK; Roebuck EM; Donachie M et al. Dental management of adult patients with haemophilia and other congenital bleeding disorders. Haemophilia 2003; 9: 1 - 5
[28] Davis BR, Sandor GK. Use of fibrin glue in maxillofacial surgery. J Otolaryngol 1998; 27 (2): 107 - 12
[29] British National Formulary, March 2006 section 12.3.4. BMA publishing and RPS publishing, London