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# BLEEDING DISORDER AND PERIODONTAL HEALTH: A REVIEW

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## ABSTRACT

Bleeding disorders are a group of conditions in which there is a problem with the body's blood clotting process. These disorders can lead to heavy and prolonged bleeding after an injury or surgery. Bleeding can also begin on its own and may be difficult to stop. Bleeding disorders can be either inherited or acquired. Acquired bleeding disorders are more common than inherited bleeding disorders.[1] Periodontal disease is defined as an inflammatory condition of supporting tissue of teeth cause by specific microorganisms or group of specific microorganisms resulting in progressive destruction of periodontal ligament and alveolar bone with periodontal pocket formation, gingival recession or both.[2] Bleeding disorder may also increase the severity of the periodontal disease and due to the risk of uncontrolled haemorrhagic episodes, make the periodontal treatment challenging. The aim of this review is to compile the current knowledge of bleeding abnormalities and elaborate preoperative and intraoperative measures in the management of periodontal treatment in patients with bleeding disorder.

## Introduction

Bleeding disorders are a group of conditions in which there is a problem with the body's blood clotting process. These disorders can lead to heavy and prolonged bleeding after an injury or surgery. Bleeding disorders can be either inherited or acquired.[1] Periodontal disease is defined as an inflammatory condition of supporting tissue of teeth cause by specific microorganisms or group of specific microorganisms resulting in progressive destruction of periodontal ligament and alveolar bone with periodontal pocket formation, gingival recession or both.[2] Treatment for periodontal disease may involve surgery or nonsurgical measures, depending on the severity and scope of the condition. The root surfaces debridement and disinfection are the goals of both treatments. Patients receiving therapy for periodontal disease may be more likely to experience bleeding. Even though bleeding disorders are uncommon in the general population, a hemorrhagic episode that occurs during or after periodontal operations can have serious consequences and even endanger the patient's life.[3]

  

Blood clotting normally involves platelets, which are blood particles, and up to 20 distinct plasma proteins that coat the platelets. We refer to these proteins as coagulation factors or blood clotting factors. These elements combine with other substances to make fibrin, a molecule that halts bleeding. Issues may arise from low platelet counts, impaired platelet function, or low or absent coagulation factors. Bleeding problems can range from mild to severe.[3]Clinical evidence of deep periodontal and alveolar bone loss is linked to this illness.[4] Worldwide, between 20 and 50 percent of people have periodontitis. In India, the overall prevalence of periodontitis was 51%; for gingivitis, mild to moderate periodontitis, and severe periodontitis, the rates were 46.6%, 26.2%, and 19%, respectively. Furthermore, a number of risk variables, including age, gender, smoking, medication, and systemic illnesses, alter the risk of periodontal disease.[5] Periodontal disease displayed characteristic bleeding patterns when linked to hematogenic states such as anaemia, bleeding diseases (such as haemophilia, blood clots), or malignant situations (such as leukaemia).[6] Furthermore, periodontal disease is a condition that causes bone loss, and there is an unbreakable bond between blood and bone.[7]

The two main reasons for taking into account the modified treatment approach for periodontal therapy in patients who have bleeding issues are medical conditions that are widespread in the elderly population and polypharmacia.[8] It makes sense that periodontal health and blood issues are connected. Inflammatory and hyperaemic gingival tissues can induce bleeding, so maintaining good periodontal health is essential for people with bleeding disorders. Bleeding disorders can worsen periodontal disease and make therapy more difficult in addition to raising the risk of uncontrollable big hemorrhagic episodes. In-depth analyses, reviews, and reports on bleeding disorders and periodontal health abound in the literature, but few of them focus on the significance of bleeding disorders for periodontal disease management. Hence, the aim of this library dissertation is to compile the current knowledge of bleeding abnormalities and elaborate preoperative and intraoperative measures in the management of periodontal treatment in patients with bleeding disorder.

## Classification of Bleeding Disorders

Bleeding disorders can be **inherited**, or they can be **acquired**. Acquired bleeding disorders are more common than inherited bleeding disorders.[9]

### 1. Acquired bleeding disorders

Acquired bleeding disorders include:

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- Disseminated intravascular coagulation (DIC)
- Liver disease-associated bleeding
- Vitamin K deficiency bleeding
- Rarely, tangles of blood vessels, called arteriovenous malformations, which can form in the brain or elsewhere in the body and lead to bleeding before birth or later in life.

**2. Inherited bleeding disorders**

Inherited bleeding disorders include:

- **Combined deficiency of the vitamin K–dependent clotting factors (VKCFDs),** which is caused by a problem with clotting factors II, VII, IX, and X
- **Hemophilia A,** the most common type of hemophilia, which is caused by a lack of clotting factor VIII or low levels of clotting factor VIII
- **Hemophilia B,** which occurs when you are missing clotting factor IX or have low levels of clotting factor IX
- **Hemophilia C,** a rare condition also known as factor XI deficiency
- **Von Willebrand disease (VWD),** the most common inherited bleeding disorder, which has different types that are numbered based on how common the condition is and how severe the symptoms are
- **Other inherited bleeding disorders,** which includes rare bleeding disorders, such as I, II, V, V + VIII, VII, X, XI, or XIII deficiencies, that are named by the clotting factor causing the problem other factor deficiencies
- **Hereditary hemorrhagic telangiectasia,** a rare inherited condition caused by tangled blood vessels in different parts of the body, which can lead to bleeding.[9]

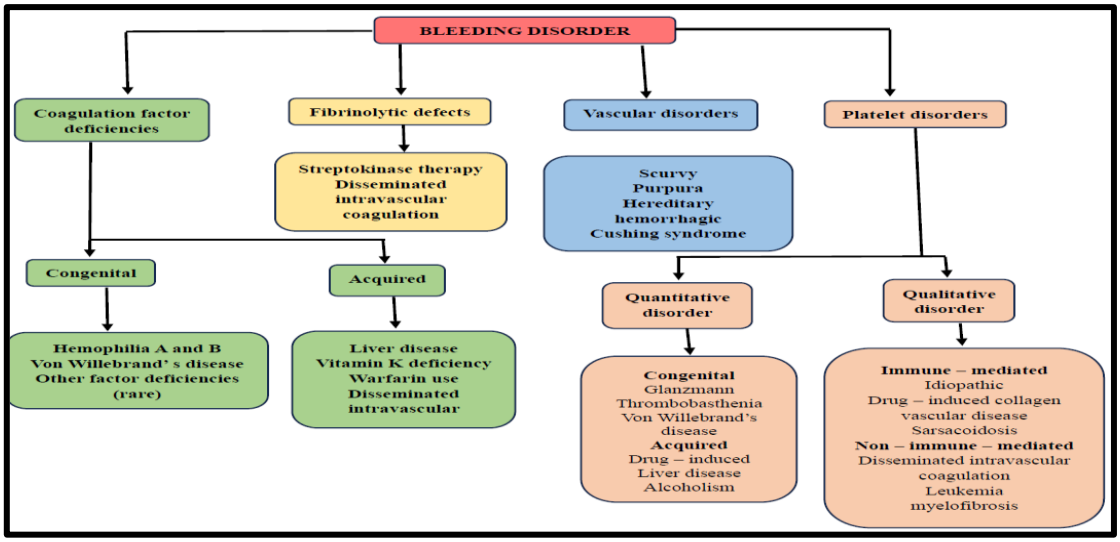


**Figure1: Types of bleeding disorder**

  

## 1. Basic Physiology of Hemostasis

**Hemostasis**: Hemostasis is the mechanism that leads to cessation of bleeding from a blood vessel. It is a process that involves multiple interlinked steps. This cascade culminates into the formation of a "plug" that closes up the damaged site of the blood vessel controlling the bleeding. It begins with trauma to the lining of the blood vessel.

**Stages**

The mechanism of hemostasis can divide into four stages. 1) Constriction of the blood vessel. 2) Formation of a temporary "platelet plug." 3) Activation of the coagulation cascade. 4) Formation of "fibrin plug" or the final clot. Hemostasis can be viewed as either primary or secondary or as a four-phase process.[10]

Primary hemostasis lasts two to three seconds and involves the production of platelets. It is thought to be the main method of stopping blood loss in small-diameter arteries and capillaries. Fibrin synthesis and deposition, which encircle and connect the platelet aggregation and stabilise the hemostatic clot, are linked to secondary hemostasis. Vascular and arterial blood flow is restored by the localised development of a fibrin clot at the site of injury. It may take several minutes to finish this step

**Hemostatic process, is divided into four stages: vascular, platelet, coagulation, and fibrinolytic. (Figure 2).[11]**

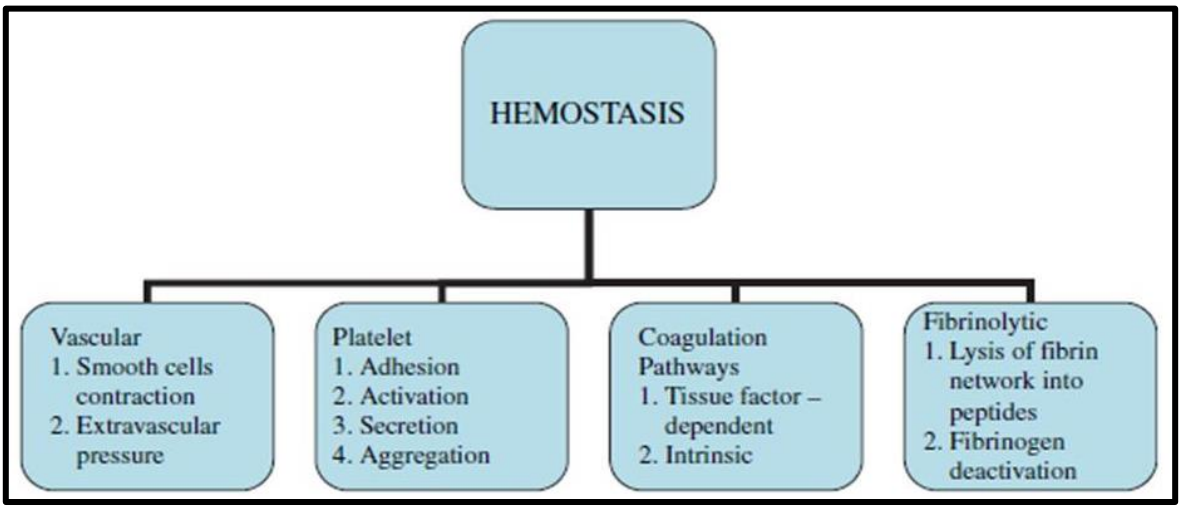


**Figure2: Stages of Hemostasis[3]**

## Medical Diagnosis of a Patient with a Bleeding Disorder

A bleeding condition is identified based on the patient's medical history, physical examination, and test results. Getting the patient's medical history is crucial for diagnosing

  

hemorrhagic disease, whether it is inherited or acquired. A physical examination showing several small-sized mucocutaneous hemorrhagic lesions in the form of ecchymoses and petechiae is suggestive of vascular or platelet abnormalities. Moreover, very heavy and frequent bleeding from superficial wounds may indicate a vascular or platelet bleeding issue.[12]

Prothrombin time, platelet count, and partial thromboplastin time are screening tests for bleeding disorders. The platelet count represents the quantity of platelets in the bloodstream, often falling between 150,000 and 400,000/µl. The haematologist might do more specialised testing to pinpoint particular flaws causing the bleeding issue.[13]

**Tests may include:**

- A complete blood count (CBC), which measures the amount of red and white blood cells in your body
- A platelet aggregation test, which checks how well your platelets clump together
- A bleeding time test, which determines how quickly your blood clots to prevent bleeding
- Activated Partial Thromboplastin Time (APPT)
- Prothrombin Time
- Special tests
- Von Willebrand Factor Assay[14]

## Bleeding Disorders in Periodontal Health and Disease

### Bleeding Disorder and Periodontal Health

**Periodontal health** should be defined as a state free from inflammatory periodontal disease that allows an individual to function normally and not suffer any consequences (mental or physical) as a result of past disease. It is also defined as the state free from inflammatory periodontal disease.[15]

Periodontal disorders are no longer merely bacterial infections. Instead, they are multifactorial, complicated disorders that are the result of a complex interaction between the subgingival microbiota, the host's immunological and inflammatory systems, and environmental moderators. Therefore, there are three main areas of periodontal health: microbial, host, and environment (Figure 3 ). As a number of these determinants are covered

in the study on gingival disorders caused by plaque, we will just look at the clinical signs of periodontal health.[15]

One cannot overstate the importance of identifying these crucial predisposing and modifying variables as both controllable and uncontrolled determinants of periodontal health and disease. Anything that causes dental plaque to accumulate—such as tooth morphology, tooth location, or restorations—is considered a predisposing factor.

A moderating factor is any substance or circumstance that modifies an individual's response to the deposition of subgingival plaque (e.g., smoking, systemic diseases, pharmaceuticals)

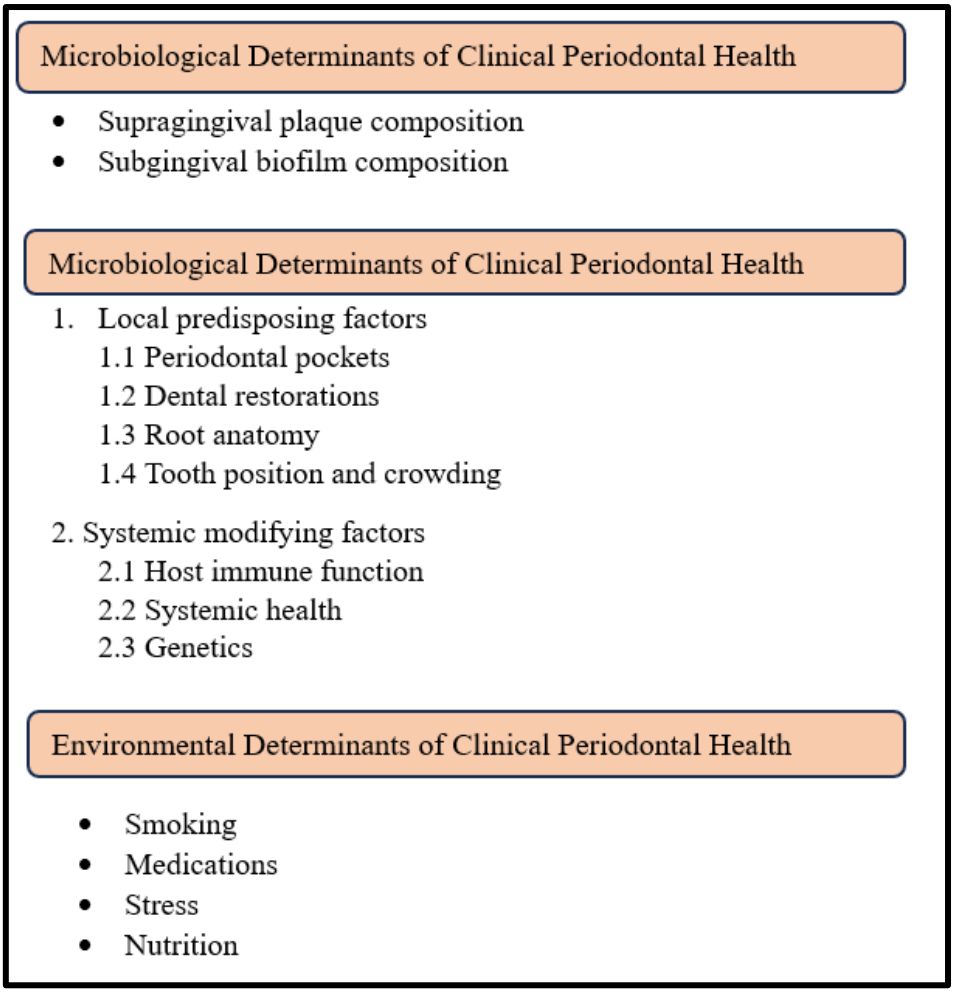


**Figure 3: Determinants of clinical periodontal health[15]**

**Bleeding Disorder and Periodontal Disease**

Oral microbiota disturbance by several microbes is the primary cause of periodontitis, a chronic, multifactorial inflammatory disease. Pro-inflammatory factors are abundant and inflammatory cells have an irregular infiltration; these are the characteristics of periodontitis.[16] Periodontitis, mostly caused by the inflammatory and toxic byproducts of

periodontal bacteria, begins as an overstressed and constricted inflamed periodontium and can have systemic effects, too. This disorder, which has been identified as one of the most common disorders globally with serious social and economic ramifications, is clinically characterised by deep pockets, loss of attachment, tooth movement, and, ultimately, tooth loss.[17]

Periodontitis exhibits unique hematologic patterns, including leucocytosis and/or anaemia, when seen from a hematogenic perspective. Because of this, periodontitis has come to be gradually linked to blood problems, such as hematogenic conditions (anaemia, for example), bleeding disorders (haemophilia, blood clots), or malignant conditions (leukaemia).[18] While the immune system's response to periodontal disease provides a simple explanation for the leucocytosis state, the anaemic status is a bit more complex, and changes in the bone marrow may be explained by the extended systemic inflammation brought on by periodontitis. Beyond this, blood and bone are two tissues with undissociated molecular linkages, and periodontitis is a chronic disorder causing bone loss.[19]

There are two kind of risk factor in case of periodontal disease out of which one is modifiable and another is non-modifiable.[20] Cigarette smoking is one of the vital modifiable risk factors for chronic periodontal disease. Higher progression of microbial film is severe in smokers than nonsmokers and more worsen chronic condition occurs due to habit of smoking. Most prevalent systemic disease is diabetes mellitus predispose to periodontitis. In diabetic patient, prevalence of periodontitis occurs more readily as compared to other immunocompromised patients.[21] Stress is also another consideration as immunosuppression and necrotizing ulcerative gingivitis occurs mainly due to stress.[22]

## Management of Periodontal Patients with Bleeding Disorders

**Pre-operative measures** involve obtaining a comprehensive medical history that includes information on past hemorrhagic episodes following trauma or surgery, as well as spontaneous bleeding. Additionally, a family history of hereditary bleeding disorders, a history of current illnesses such as renal and hepatic failure, and a list of medications that interfere with hemostasis (e.g., non-steroidal anti-inflammatory drugs, antibiotics).[3]

Pre-operative care of patients on anticoagulant therapy with coumarin involves the continuation, reduction or withdrawal of the medication. The decision should be based on the

international normalized ratio value, the invasiveness and extent of dental procedure, current illnesses and medications.[3]

- The international normalized ratio is a key component in the dental treatment of these patients. When the international normalized ratio is ≤3.5, periodontal surgical procedures can be carried out on these patients in a dental office.
- When the international normalized ratio is >3.5, the anticoagulation regimen has to be adjusted and should consult with the medical care provider and describe, in detail, the periodontal procedure and risk for bleeding.[3]
- A safe approach entails reduction of the coumarin dose 2–3 days before the procedure and repetition of international normalized ratio testing the morning of the procedure to ensure that the value is<4.
- International normalized ratio values can be normalized to 3.5 by making minor adjustments involving the reduction, but not discontinuation of coumarin. Entire withdrawal of coumarin is not recommended because of the rebound thrombotic effect noticed especially in patients with prosthetic cardiac valves when coumarin intake reinitiated. It takes up to 4 days for the international normalized ratio values to return to normal.
- Therefore, reducing the international normalized ratio value may increase the risk for thrombosis in patients with other concomitant illnesses such as liver and renal disease, and patients with alcohol consumption.
- Extensive-invasive periodontal surgical procedures in such patients should be performed in a hospital setting. Intravenous unfractionated heparin should be given as a substitute for coumarin.[3]

**Treatment protocol may have to be modified to minimize the risk of intra-operative and postoperative bleeding.**

- Patients lacking vitamin K, because of malabsorption syndrome, should receive vitamin K supplement before the dental appointment to restore liver function and the synthesis of coagulation factors.
- If the patient has liver failure, the dental management of the patient should involve platelet transfusion in a hospital setting. Anticoagulant medications reduce the risk of embolism and increase the probability of bleeding during and after the dental procedure.

- There are a number of case reports stating that serious thromboembolic episode in patients who discontinued taking the anticoagulant medications is three times higher than that of a bleeding event in patients who remained on the anticoagulant regimen.
- Unfractionated heparin can be interrupted 4–6 hours before the surgical procedure, thus substantially minimizing the time the patient is under a suboptimal level of anticoagulation and subsequently reducing the risk for a thromboembolic event.
- Anticoagulation treatment is resumed 12–18 hours after the dental procedure. Fractionated or low-molecular-weight heparin may provide an alternative substitute for coumarin, without the need for the patient to be admitted to hospital.
- Subcutaneous administration of low-molecular-weight heparin provides the benefit of conveniently adjusting the anticoagulation regimen at the point of care.[3]

## Conclusion

Several disorders of erythrocytes and leukocytes may affect the course of periodontal disease via alteration wound healing, and enhanced susceptibility to infection. Periodontal disease increases the inflammatory load that interfere with erythropoietic mechanism and patients with bleeding disorder are more prone to severe periodontal infection. Dental surgeons are facing the conditions like inherited, acquired and drug related bleeding disorder. These raise the possibility of excessive blood loss, poor wound healing and infection. However, no absolute contraindication exists for periodontal treatment when good pre, peri and post operative management of periodontal procedure have been done. Therefore, it is important to understand, If a patient has been diagnosed with a hematologic deficiency, the dental care provider have to consult the patient's hematologist and modify the treatment plan accordingly.

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