

Exercise

53

Screening Tests for Haemostasis

Objectives

- To learn the principle, technique and interpretation of screening tests for haemostasis— bleeding time (BT) and clotting time (CT).
- To know the normal range of BT and CT and abnormal values in diseases.

Haemostasis is the process by which the bleeding from an injured site is arrested by formation of haemostatic plug, followed by removal of that plug spontaneously in due course of time. Following five components are involved in arrest of such a bleeding and subsequent removal of haemostatic plug:

1. Integrity of vascular wall
2. Platelets—abnormalities in count and function
3. Coagulation system—various plasma coagulation factors
4. Fibrinolytic mechanism
5. Inhibitors of coagulation

Normally, a delicate balance is maintained in these factors (Fig. 53.1). Anything that interferes with any of these components results in abnormal bleeding. For investigation of a case for haemostatic function, following scheme is followed:

- A. *Clinical evaluation* that includes patient's history including intake of drugs, family history, details of sites of bleeding, frequency, and character of haemostatic defect.
- B. *Screening tests* for assessment of abnormalities of various components of haemostasis.
- C. *Specific tests* to pinpoint the cause of abnormality.

While clinical evaluation and specific tests can be learnt from textbook, following screening tests are carried out routinely to assess above-mentioned components of haemostasis:

1. *Disorders of vascular haemostasis:* Bleeding time (BT), Hess capillary test (tourniquet test).
2. *Disorders of platelets:* count, bleeding time

3. *Coagulation system:* Whole blood clotting (coagulation) time (CT), activated partial thromboplastin time with kaolin (APTTK), one-stage prothrombin time (PT), thrombin time (TT)
4. *Fibrinolytic system:* Fibrinogen, fibrin degradation products (FDP)
5. *Inhibitors of coagulation:* FDPs

Two of the commonly used screening tests, bleeding time (as a screening test of bleeding from platelet disorders and vascular integrity) and whole blood clotting time (as a

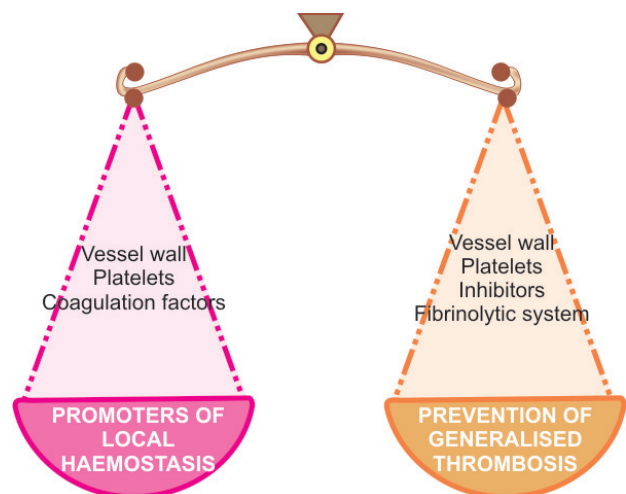


FIGURE 53.1 ♦ The haemostatic balance.

screening test for bleeding from coagulation disorders), are discussed below.

But before that, a few words about the method of collection of blood for coagulation studies are essential. Blood for coagulation studies is collected by venepuncture in 3.8% trisodium citrate in the ratio of 1:9, i.e. 4.5 ml of blood is added to a clean collection tube containing 0.5 ml of citrate. Care must be taken that the sample is neither haemolysed nor clotted.

Bleeding Time

Bleeding time is duration of bleeding from a standard puncture wound on the skin which is a *measure of the function of the platelets as well as integrity of the vessel wall*. This is one of the most important preliminary indicators for detection of bleeding disorders. This is also the most commonly done preoperative investigation in patients scheduled for surgery.

Principle. A small puncture is made on the skin and the time for which it bleeds is noted. Bleeding stops when platelet plug forms and breach in the vessel wall has sealed.

METHODS FOR BLEEDING TIME

1. Finger tip method
2. Duke's method
3. Ivy's method

1. Finger Tip Method

Procedure

- ◆ Clean the tip of a finger with spirit.
- ◆ Prick with a disposable needle or lancet.
- ◆ Start the stop-watch immediately.
- ◆ Start gently touching the pricked finger with a filter paper till blood spots continue to be made on the filter paper.
- ◆ Stop the watch when no more blood spot comes on the filter paper and note the time.

Disadvantages

- i. It is a crude method.
- ii. Bleeding time is low by this method.

Normal bleeding time 1-3 minutes.

2. Duke's Method

Procedure

- ◆ Clean the lobe of an ear with a spirit swab.
- ◆ Using a disposable lancet/needle, puncture the lower edge of the earlobe to a depth of approximately 3 mm.

- ◆ Start the stop-watch immediately.
- ◆ Allow the drops of blood to fall on a filter paper without touching the earlobe and then slowly touching the blood drop gently on a new area on the filter paper.
- ◆ Stop the watch when no more blood comes over the filter paper and note the time.

Advantages of the method

- i. The ear lobule has abundant subcutaneous tissue and is vascular.
- ii. Flow of blood is quite good.

Normal bleeding time 3-5 minutes.

3. Ivy's Method

Procedure

- ◆ Tie the BP apparatus cuff around the patient's upper arm and inflate it upto 40 mmHg which is maintained throughout the test.
- ◆ Clean an area with spirit over the flexor surface of forearm and allow it dry.
- ◆ Using a disposable lancet or surgical blade, make 2 punctures 3 mm deep 5-10 cm from each other taking care not to puncture the superficial veins.
- ◆ Start the stop-watch immediately.
- ◆ Go on blotting each puncture with a filter paper as in Duke's method.
- ◆ Stop the watch, note the time in each puncture and calculate average bleeding time (Fig. 53.2).

Advantages of the method

- i. This is the method of choice.
- ii. It is a standardised method.
- iii. Bleeding time is more accurate.

Normal bleeding time 3-8 minutes.

Clinical Application of Bleeding Time

The bleeding time is *prolonged* in following conditions:

- i. Thrombocytopenia
- ii. Disorders of platelet functions
- iii. Acute leukaemias
- iv. Aplastic anaemias
- v. Liver disease
- vi. von Willebrand's disease
- vii. DIC
- viii. Abnormality in the wall of blood vessels
- ix. Administration of drugs prior to test, e.g. aspirin