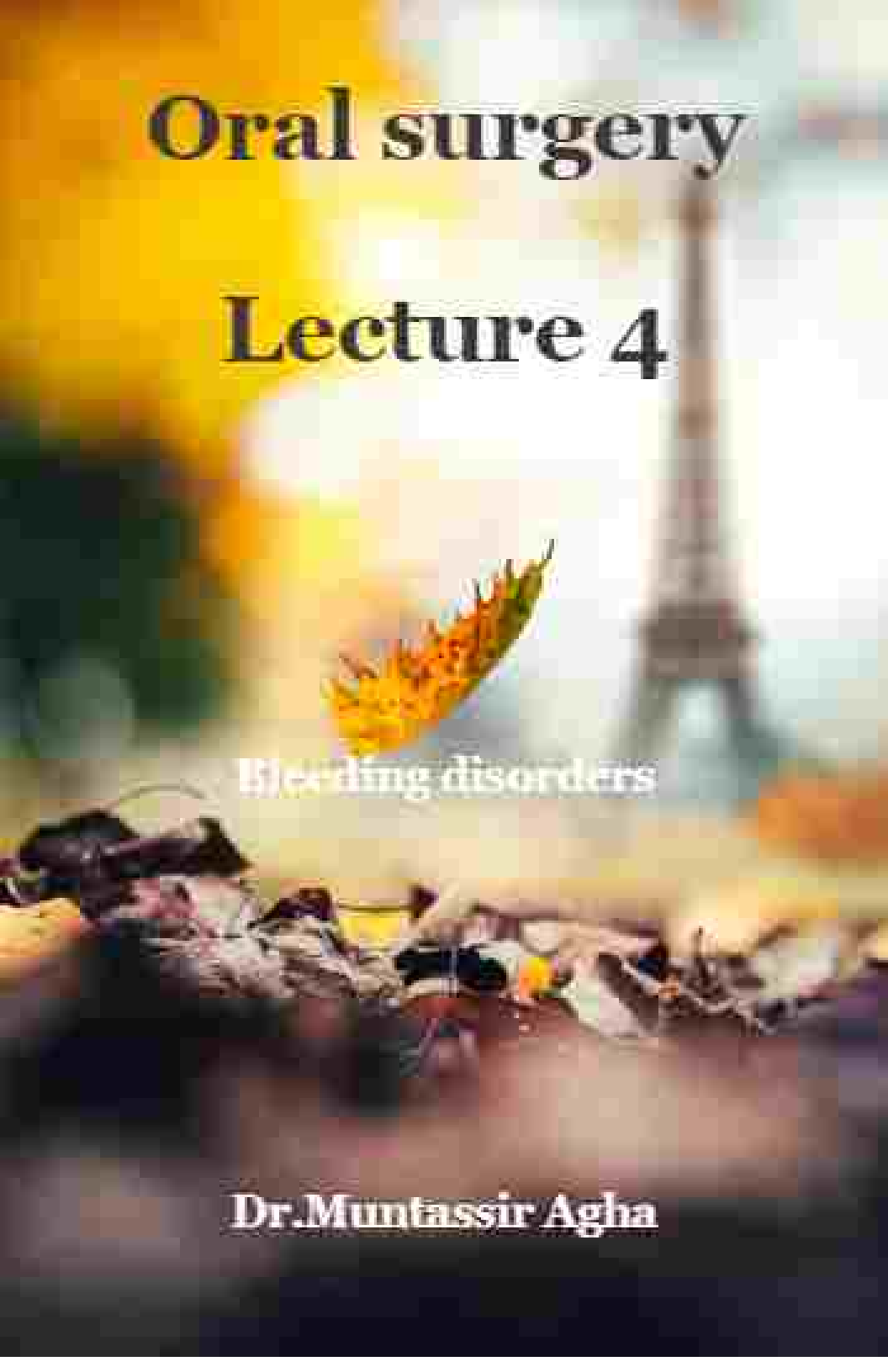
Oral surgery

Lecture 4



Bleeding disorders

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These are conditions that alter ability of blood vessels, platelet, and coagulation factors to maintain homeostasis. There is inherited bleeding disorders that are genetically transmitted while acquired bleeding disorders occur as the result of diseases that affect vascular wall integrity, platelets, coagulation factors, and drugs, radiation, or chemotherapy for cancer.

Pathophysiology

The three phases of hemostasis for controlling bleeding are: vascular, platelet, and coagulation (and fibrinolysis).The vascular and platelet phases are referred to as primary, and the coagulation phase is secondary. The coagulation phase is followed by the fibrinolytic phase, during which the clot is dissolved (Box 1.1).

Vascular phase (sensing).	Primary
Platelet phase (processing).	Primary
Coagulation phase (responding).	Secondary
Fibrinolytic phase.	Tertiary

Vascular phase:

- The vascular phase begins immediately after injury and involves vasoconstriction of arteries and veins in the area of injury, retraction of arteries that have been cut, and buildup of extravascular pressure by blood loss from cut vessels. This pressure aids in collapsing the adjacent capillaries and veins in the area of injury.
- Vascular wall integrity is important for maintaining the fluidity of blood.
- The smooth endothelial lining consists of a non wettable surface that, under normal conditions, does not activate platelet adhesion or coagulation. In fact, the

endothelial cells synthesize and secrete three potent anti-platelet agents: prostacyclin, nitric oxide, and certain adenine nucleotides.

- Exposure of vessel wall sub endothelial tissues, collagen & basement membrane through chemical or traumatic injury serves a tissue factor (tissue thromboplastin) & initiates coagulation via the extrinsic pathway.
- Injured endothelial cell release adenosine diphosphate (ADP) which include platelet adhesion. Also promote thrombus formation through exposure of subendothlial tissue to von willebrand's factor(vWF), Endothelial cell also contribute to normal homeostasis & in vascular integrity through synthesis of type IV collagen fibronectin & vWF

platelet phase

- Platelet are cellular fragments they don't have nucleus stay 8-12 days in the circulation.
- Nonviable platelets are removed and destroyed by the spleen and liver.
- Function of platelets include; maintenance of vascular integrity, formation of platelet plug to aid in initial control of bleeding & stabilization of platelet plug through involvement in the coagulation process.
- About 10% of platelets are used to care and protect endothelial cells, allowing for endothelial and smooth muscle regeneration.

Coagulation phase

- *The process of coagulation is mean fibrin-forming system take 9-18 minutes from injury to a fibrin-stabilized clot.*
- *Two systems involved in the coagulation:*
- *The extrinsic system is initiated through tissue factor after tissue injury.This process activate factor VII (VIIa) which called in the past tissue thromboplastin.*
- *The intrinsic system is initiated by surface contact to activate factor XII.*
- *Both systems (pathways) use common pathway to form the end product fibrin.*

Normal Control of Bleeding

1. Vascular phase
   a. [illegible]
   b. [illegible]

2. Platelet phase
   a. [illegible]
   b. [illegible]
   c. [illegible]

3. Coagulation phase
   a. [illegible]
   b. [illegible]
   c. [illegible]

4. Fibrinolytic phase
   a. [illegible]
   b. [illegible]

Box 1.1

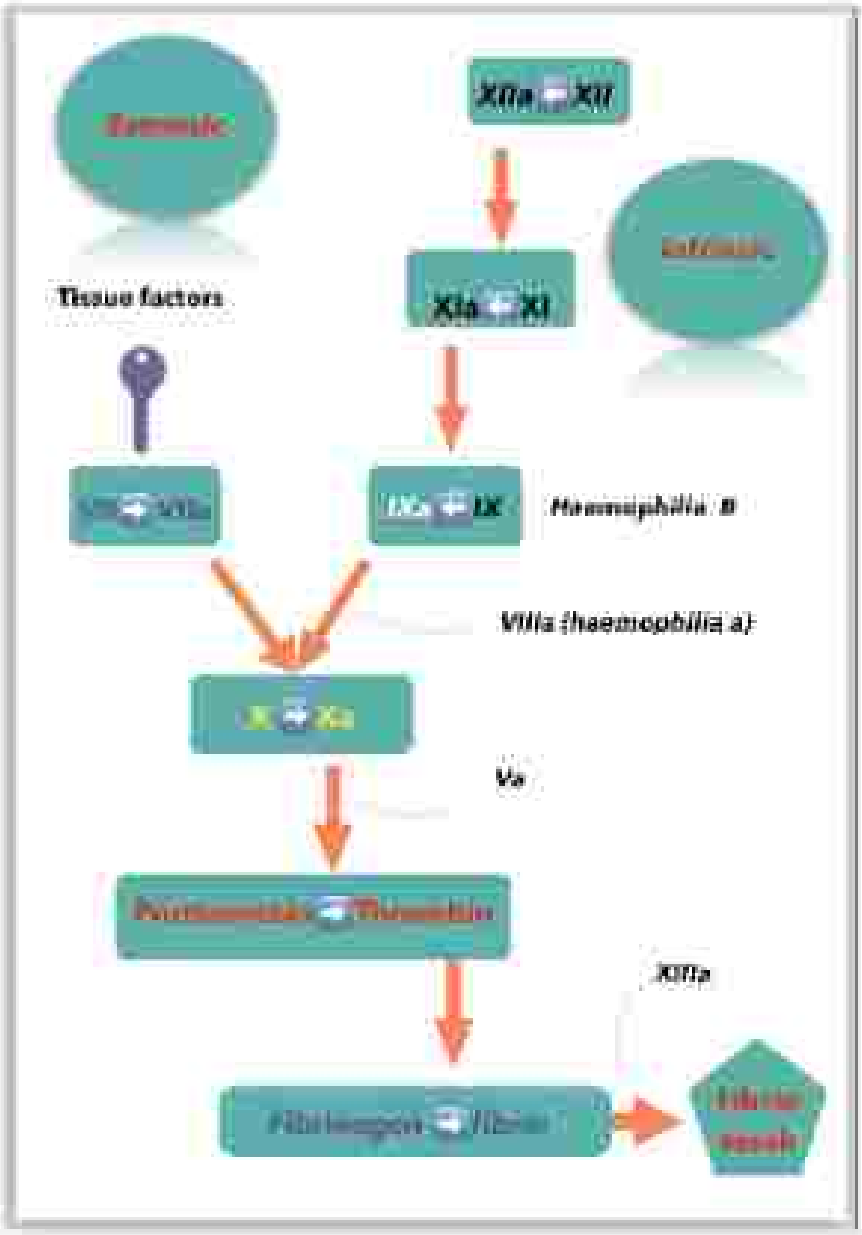


Fig. 1.1

Fibrinolytic phase:

- *Fibrin-lysing (fibrinolytic) system is needed to prevent coagulation of intra vascular blood away from the site of injury & to dissolve the clot once it has served its function in homeostasis.*
- *This system involve plasminogen, a proenzyme for the enzyme plasmin which produced in the liver. Endogenous plasminogen activator released by endothelial cells at the site of injury.*
- *The effect of plasmin on fibrin & fibrinogen is to split off large piece that are broken up into smaller segments called fibrin degradation products (FDP), those increase vascular permeability & interfere with thrombin induced fibrin formation thus causing bleeding problems.*

Timing of clinical bleeding:

A disorder that may occur in the vascular or platelet phase leads to an immediate bleeding problem after injury or surgery. however if the vascular and platelet phase are normal and the coagulation phase is abnormal, the bleeding problem will not be detected until several hours after the injury. In case of small cut for example, little bleeding would occur until several hours after the injury and then a slow trickle of bleeding would start. If the coagulation defect were severe, this slow loss of blood could continue for days. The amount might occur (0.5 ml per minute).

Clinical presentation

signs & symptoms:

some diseases give certain signs & symptoms which indicate bleedings problems.

- Liver disease: patient has liver disease ,presented with jaundice ,spider angiomas, ecchymosis and petechiae on the skin or mucosa due to reduction in number of platelets due to liver disease & hypersplenism result from the effect of portal hypertension.
- Genetic coagulation disorders such as haemophilia A & B, the patient has ecchymosis, hemarthrosis & dissecting hematomas.
- Chronic leukaemia: presented with ulceration of oral mucosa, hyperplasia of gingiva, petechiae and ecchymosis.

Laboratory tests

Partial thromboplastin time PTT: (25-35 seconds) this check the intrinsic system (factor VIII, IX, XI & XII) & common pathway factor (V&X) prothrombin & fibrinogen, and results in excess of 35 seconds are considered abnormal or prolonged.

Prothrombin time PT: (11-15 seconds) used to check the extrinsic pathway (factorVII) & common pathway (V&X) prothrombin time & fibrinogen)
(VII & X and prothrombin) are vitamin k-dependent & are depressed by coumarin-like drugs & should be checked by INR
PT is prolonged when any factor is blow 10% of its normal value.

Platelet count :

- 140 000-400 000 cubic mm normal value.
- 50 000 - 100 000: excessive bleeding after sever trauma.
- Below 50 000: excessive bleeding after minor trauma skin & mucosal purpura.
- 20 000 /cubic mm: spontaneous bleeding.

Bleeding Time(BT): for platelet dysfunction & thrombocytopenia.

- **Thrombin Time(TT):**
- Thrombin is added to the patient blood sample as activating agent ,it's convert fibrinogen into insoluble fibrin which makes up the essential clot .it by passes the intrinsic ,extrinsic & common pathway.
- Normal Values (9-13 sec).
- 16-18 sec. consider prolonged. Which usually caused by excessive plasmin & or fibrin-split product.

Disorder of common pathway:

A prolonged a PTT & PT indicate a common pathway factor deficiency.

Congenital deficiency of factor V&X, prothrombin & fibrinogen are rare.

Acquired deficiency indicated Conditions that cause both testes (PTT & PT) are prolonged are(vit k deficiency& liver disease).

MEDICAL MANAGEMENT:

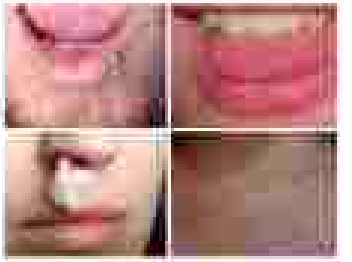
Vascular defects:

Hereditary hemorrhagic telangictasia

- (osler-weber-rendu disease) it's an autosomal dominant, a feature of telangiectasia lesions involving the skin & mucous membrane.
- Bleeding as epistaxis due to inert mechanical fragility of the vessels. lesion appear by age of 40s& increase in number with age.

WHAT IS HEREDITARY HEMORRHAGIC TELANGIECTASIA (HHT)?

HHT or Hereditary Hemorrhagic Telangiectasia is an inherited disorder that results in blood vessel abnormalities and malformations. In patients, this causes chronic nosebleeds and issues with vital organs such as the lungs, liver, brain, and even the spinal cord. Treatment is targeted at managing the bleeding.



Ehlers-Danlos dis., osteogenesis imperfecta, marfan syndrome are hereditary disorder of connective tissues.

Ehlor-Danlos syndrome:
Abnormal vessels wall weakness, arterial aneurysms & bleeding from spontaneous rupture.

Acquired connective tissue disorder like scurvy, vit C deficiency has capillary fragility & delayed wound healing. long use of steroid therapy also lead to thinning of connective tissue may result in bleeding.

Serum sickness can lead to purpura through immune complex deposits in the vessel walls . drugs like penicillin, sulphonamide thiazide diuretics & hepatitis associated with serum sickness.

Platelet disorders:

Von WilleBrands disease:

Most common disorder, autosomal dominant traits cause mild to moderate bleeding due to defect in platelet adhesion .vWB factor made from a group of glycoproteins, this glycoprotein needed to carry factor VIII ,(unbound factor VIII in circulation will be destroyed), & to allow platelet to adhere to the tissue ,the complex of factor VIII & v WB factor attaches to the surface of circulating platelets it's from this location that the vWB factor contribute to hemostasis.

Clinical finding:

Patient with mild form of the disease may have -ve history .sever form may have +ve family history & sever bleeding after trauma or surgery it manifested as cutaneous &

mucosal bleeding because of platelet adhesion lacking, hemarthrosis and or epistaxis.

laboratory investigation; PT& TT are normal .PFA-100 and aPT prolonged , platelet count normal. another investigation needed to establish the diagnosis & type of vWB include immunoassay of vWF & specific assays for factor VIII.

***TREATMENT;* by given cryoprecipitate.**

Bernand -soulier disease:

Disorder in platelet adhesion, bleeding will be treated by blood transfusion with normal blood.

Disorder of platelet disease: in some cases platelet may fail to complete the release of PF3, this due to defective thromboxane production due to anti inflammatory drugs, aspirin,NSAIDs (endomethacin ibuprofen,sulfinpyrazone), betalacton antibiotic penicillin &cephalaxin .

Coagulation disorders:

Haemophilia A:

- *Is an x-linked recessive trait. the abnormal homeostasis due to deficiency in factor VIII, this factor is bounded to vWF in circulation.*
- *Clinical findings: sever HE cause sever bleeding, Hemarthrosis, ecchymosis ,soft tissue hematoma, after trauma or surgery there will be sever bleeding which may threaten life.Spontaneous bleeding from mouth, gingivae, tongue ,lips. Haemophiliac patient greatly affected by contamination from blood transfusion by HIV & hepatitis C virus.*

Replacement of factor VIII include;
minor spontaneous bleeding 25-30 % replacement. minor dental surgery 50% replacement.
Major surgery 50-100% replacement.

Hemophilia B:(christmas disease,factor IX deficiency):
X -linked recessive trait.
Clinical manifestation the same as haemophilia A . screening laboratory tests results are similar to both A&B ,specific factor assays for factor IX establish the diagnosis. purified factor IX product are recommended for treatment of minor & major bleeding recombinant factor IX is now available for clinical use.

Disseminated intra vascular coagulation DIC:
DIC is a condition that results when the clotting system is activated in all or a major part of vascular system, despite widespread fibrin production, the major clinical problems are bleeding not thrombosis, the syndrome is associated with infection, burn, snake bite ,shock ,antigen antibody complex, acidosis ,obstetric complication (abruption placenta missed abortion ,amniotic fluid embolism).
Clinical finding of DIC:
Sever bleeding from small wound purpura ,spontaneous bleeding from the nose ,gum,GIT,UT.
Treatment
control of bleeding or thrombosis, replacement of coagulation factors, platelet & fibrinogen patient given cryoprecipitate , fresh frozen plasma.
If thrombosis is a major problem heparin IV is given.

Anti coagulant drugs:

Heparin:

heparin is used in high doses to treat thrombo embolism (IV bolus of 5000IU& iv infusion over 5-10 days period) & in low dose as prophylaxis for thromboembolism.

Heparin should be given to the hospitalized patient ,it has plasma half life of 1-2 hours it's required monitoring with a PTT.

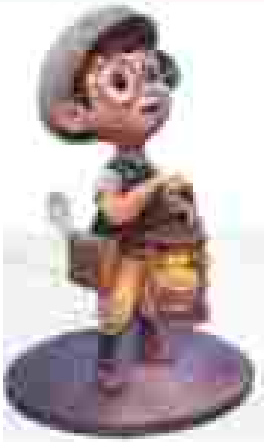
Coumarin: warfarin:

Is most widely used as oral anti coagulant that inhibits the biosynthesis of VIT K-dependent coagulation proteins (factor VIIIX X & prothrombin).

It metabolised by the liver & excreted by urine. PT is used to monitor warfarin therapy the international normalized ratio is used to allows better comparison of PT values among different laboratories INR for warfarin is 2.5 with rang 2.0-3.0 .

Anti platelet drugs:

anti platelet treatment has been reported to reduce over all mortality from vascular complication by 30%. Aspirin has been widely used ,exert it's anti platelet action through anti thrombotic function & impairing aggregation. NSAID such as ibuprofen also inhibits the function of platelets.



Dental management of the patients with bleeding disorder

Detection of bleeder patient:

I. History:

a. Bleeding problems in relative,
b. Bleeding problems after operation or teeth extraction.
c. Bleeding after trauma or cutting wound.
d. Medication causing bleeding problems: aspirin, anticoagulant drugs, long term anticoagulant therapy, certain herbal preparation.
e. Presence of disease:

- leukaemia.
- liver disease.
- Haemophilia.
- Congenital heart disease.
- Renal disease.

f. Spontaneous bleeding from nose & mouth.

II- Clinical examination:

- jaundice pallor
- spider angioma
- ecchymosis
- petechiae
- oral ulcers
- hemarthrosis.

III- Screening laboratory test:

PT,PTT, TT, & Platelet count(PC) .

IV - Surgical procedure. [excessive bleeding after surgery may be the first signs]

Screening laboratory test for detection of a potential bleeder:

The dentist can use five clinical laboratory test:

1. PT (11-15s)
   - Activated by tissue thromboplastin.
   - Test for extrinsic &common pathways (normal in haemophilic patient).
2. aPTT (25-35s):
   - Used for intrinsic & common pathway.
3. TT (9-13 seconds):
   - Test to form initial clot from fibrinogen activated by thrombin.
4. Platelet count
5. PFA-100

Selection of screening laboratory tests:

- Aspirin therapy screen of PFA-100.
- Coumarin therapy screening for PT.
- Possible liver disease, screening for platelet count ,PT.
- Chronic leukemia, screening for platelet count.
- Renal disease (artificial glass heparin), screening test for: aPTT.
- Cancer(lung ,prostate) , screening for TT.

DENTAL MANAGEMENT OF THE PATIENT WITH BLEEDING DISORDER:

HEMOPHILIA:

- Injection; block anaesthesia ,lingual infiltration, or injection in the floor of the mouth ,& intra muscular injection should be avoided unless replacement of factors have been used in the patient with mild to sever factor VIII deficiency.
- infiltration anaesthesia & intraligamentary injection usually given with out factor replacement.
- orthodontic treatment root canal with out over instrumentation, polishing can be done.
- periodontal surgery ,root planning, extraction ,dento alveolar surgery & complex oral surgery need factor replacement
- preoperative ;consult the haematologist to confirm the diagnosis ,severity of the disease ,mild to moderate form usually treated in dental clinic, sever cases treated in the hospital. Replacement of factor VIII, one hour before procedure.
- Dental treatment ;good surgical technique, treat acute infection, pressure packs, use gelfoam with thrombin to control bleeding, splint for patient with multiple extraction.
- Postoperative; in dental clinic patient need second dose of factor VIII.
- Hospitalized patient will need additional doses of factor replacement. also should check for signs of allergy.
- Avoid uses of aspirin or NSAIDs.

Von WELLBRAND'S DISEASE:

- *Mild form ,surgical procedure can be done in the dental clinic with out use of desmopressin & EACA(e-aminocaptoic acid) or tranexamic acid (cyklocapron) .*
- *More sever require factor VIII construction.*
- *Dental management:*
- *Establish for good oral hygiene.*
- *Palatal splint treatment of acute infection.*
- *post operative patient should examined 24-48 hours for bleeding if bleeding present give the patient tranexamic acid & EACA.*

THROMBOCYTOPENIA

Dental management:

- *30,000 cubic mm infiltration & block anaesthesia can given also most routine dental procedure can performed.*
- *50,000 /cubic mm exo or dentoalveolar surgery can be done.*
- *More advanced surgery need 80,000-100,000/cubic mm or higher .*
- *Replacement of platelet by transfusion (platelet concentration) after blood centrifugation.*
- *The use of tranexamic acid & EACA minimize the need for platelet replacement.*