HEAMATOLOGY

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Hemostasis

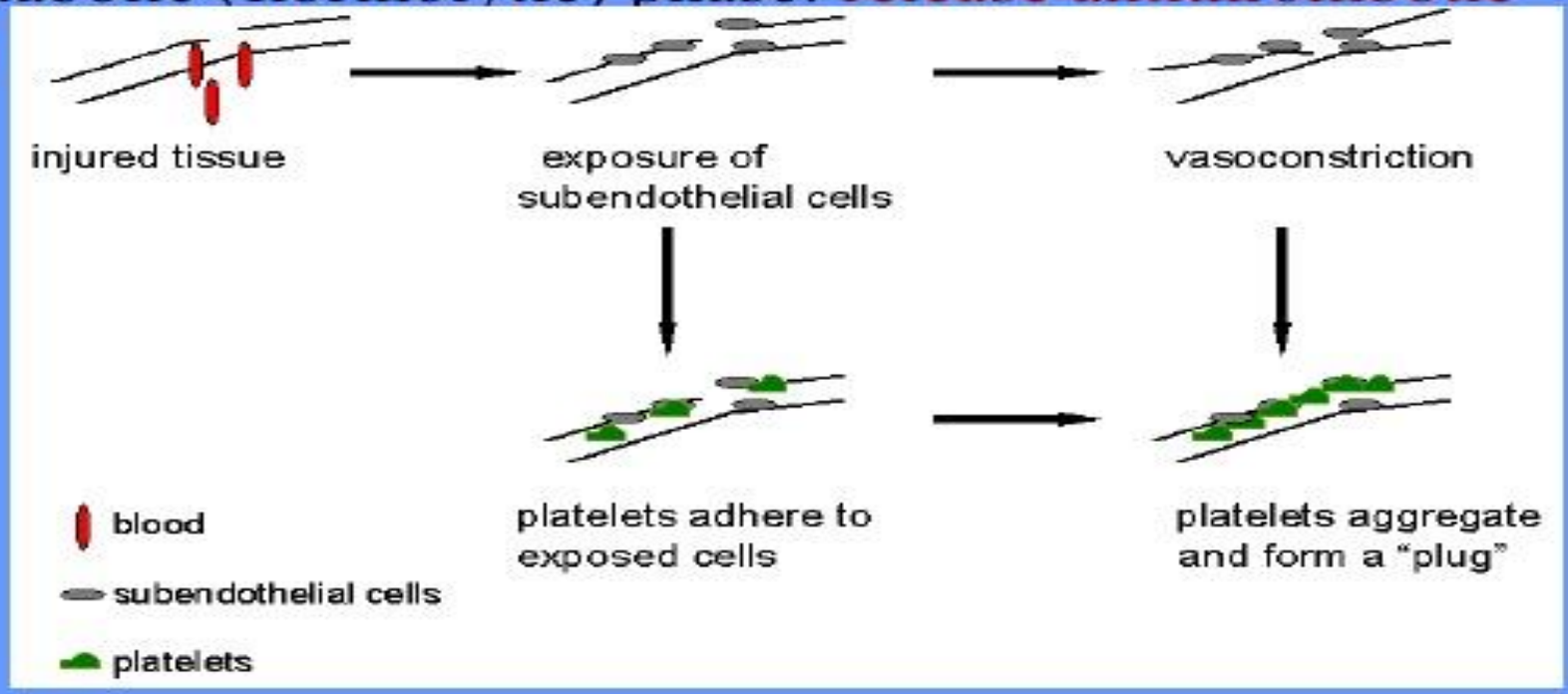
- 1. Vascular phase : vasoconstriction, immediately
- 2. Platelet phase : adhesion & aggregation, several seconds after

primary

- 3. Coagulation phase : later, contains extrinsic & intrinsic pathways

secondary

- 4. Metabolic (fibrinolytic) phase: release antithrombotic agent



Vascular Injury

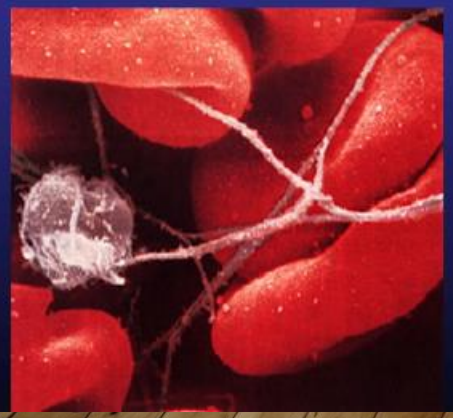
Exposure of
Subendothelial Collagen

Vasoconstriction
First

Release of Tissue Factor

Platelet Adhesion, Aggregation, and Activation
(Primary Hemostasis)
Second

Coagulation Cascade
(Secondary Hemostasis)
Third



Stable Fibrin/Platelet Clot

Fibrinolysis [as needed]

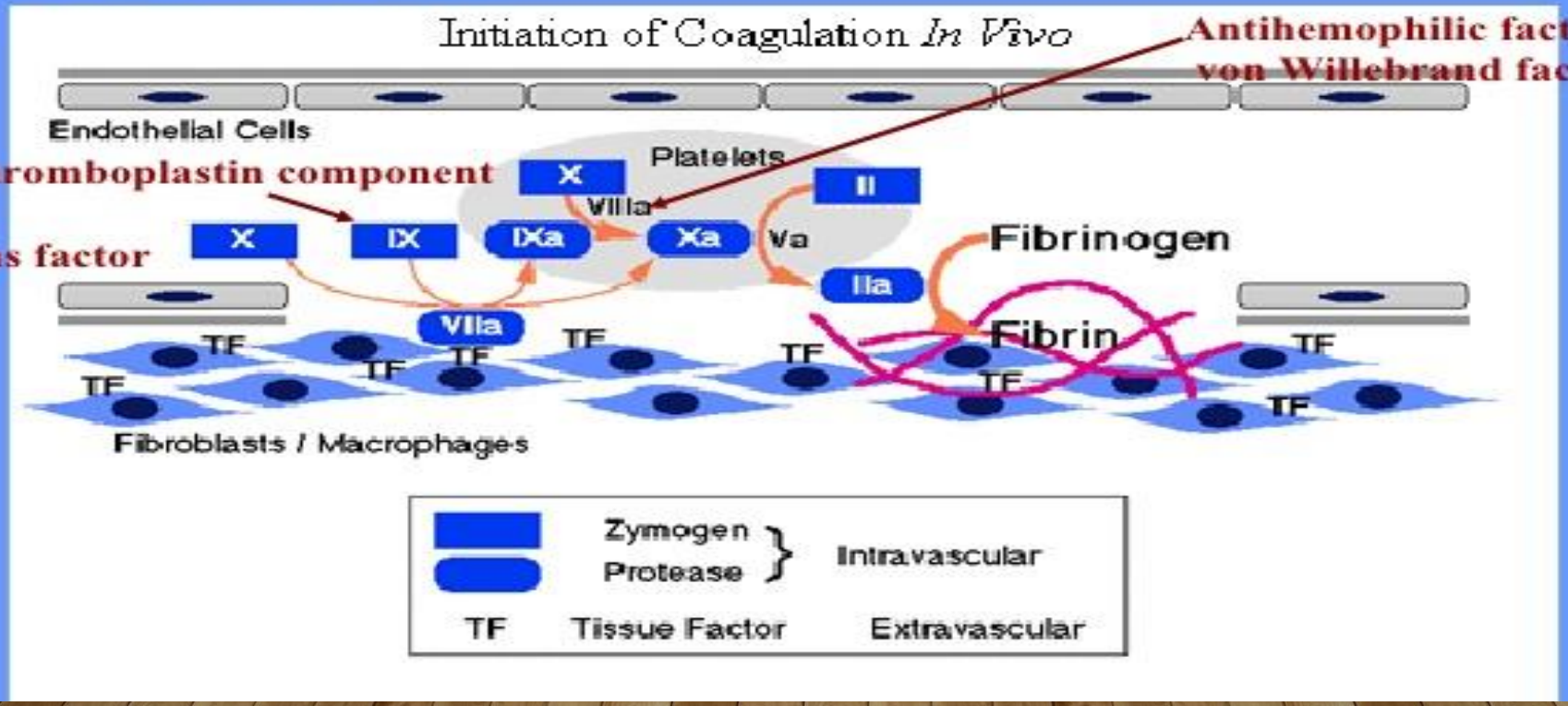
Hemostasis

- The intrinsic pathway :

  Initiated through surface contact **activation of factor XII** by exposed subendothelial tissues--collagen

- The extrinsic pathway :

  Initiated through tissue thromboplastin released by injured tissue, which activates factor VII



Antithrombotic agent

- Postaglandin: secretion by endothelial cell — primary

- Antithrombin III (AT III): main Antithrombotic agent
- Protein C: inactivate factor V and VIII with protein S
- Plasmin: activated by urokinase and streptokinase from plasminogen

— secondary

Etiology of bleeding disorder

- 1. Nonthrombocytopenia
- 2. Thrombocytopenia purpuras
- 3. Disorders of coagulation

Etiology of bleeding disorder

- Nonthrombocytopenia

1. vascular wall alteration : infection, chemical, allergy
2. Disorder of platelet function :

Genetic defects (bernard-soulier disease: glycoprotein, GP-Ib dysfunction with VWF)

Aspirin, NSAIDs, broad-spectrum antibiotics(Ampicillin, Penicillin, Gentamycin, Vancomycin)

Autoimmue disease

Etiology of bleeding disorders

- Disorders of coagulation
  1. Inherited : Hemophilia A
     Christmas disease
     von Willebrandis Disease
  2. Acquired : Liver disease
     Vitamin K deficiency
     Anticoagulation drugs (heparin, coumarin)
     Anemia

Evaluation of bleeding disorders

- 1. Take history
- 2. Physical examination
- 3. Screening clinical laboratory tests
- 4. Observation of excessive bleeding following a surgical procedure

History

- Bleeding problems in relatives
- Bleeding problems following operations and tooth extractions, trauma
- Use of drugs for prevention of coagulation or pain
- Spontaneous bleeding from nose mouth etc..

Screening laboratory tests

- 1. Platelet count
- 2. BT (Bleeding Time)

primary

- 3. PT (Prothrombin Time)
- 4. aPTT (active Partial Thrombopastin Time)
- 5. TT (Thrombin Time)

secondary

Platelet count

- Test platelet phase: evaluation of platelet function
- Normal (140,000 to 400,000/mm3)
- Thrombocytopenia : < 140,000/mm3
- Clinical bleeding problem : <50,000/mm3
- Spontaneous bleeding with life theartening : <20,000/mm3

BT (Ivy method)

- Test platelet & vascular phase
- Normal if adequate number of platelets of good quality present intact vascular walls
- Normal (1 to 6 minutes)

PT (Prothrombin Time)

- Activated by tissue thromboplastin
- Tests extrinsic (factor VII) and common (I,II,V,X) pathways
- Normal (11-15sec)
- Coumarin therapy- PT at 1.5 to 2.5 time
- International normalized ratio= INR, (1) surgery can be done under INR< 3.0 (2) when INR=3.0-3.5, consultation is needed (3) delay surgery when INR>3.5

Activated PTT (aPTT)

- Activated by contact activator (kaolin)
- Tests intrinsic and common pathway
- Normal (25-35 sec)
- Heparin therapy- PTT in 50-65 sec range by promote AT III

TT (Thrombin Time)

- Activated by thrombin
- Tests ability to form initial clot from fibrinogen
- Normal (9 to 13 seconds)

1. No historical bleeding problem	Following surgical procedure
2. History bleeding problem	PT, aPTT, TT, BT
3. Aspirin therapy	BT, aPTT
4. Coumarin therapy	PT
5. Renal dialysis (heparin)	aPTT
6. Possible liver disease	BT, PT
7. Chronic leukemia	BT
8. Long term antibiotic therapy	PT
9. Vascular wall alteration	BT
10. Cancer (fibrinogenolysis)	TT

Dental management of the medically compromised patient

condition	Platelet count	BT	PTT	PT	TT
1. Aspirin therapy	+	+	+	+	-
2. Coumarin therapy	-	-	++	++	-
3. Heparin therapy	+	+	++	-	-
4. Liver disease	+	+	++	++	++
5. leukemia	+	+	-	-	-
6. Long term antibiotic	-	-	++	++	++
7. Vascular wall defect	-	+	-	-	-
8. thrombocytopenia	++	++	-	-	-
9. hemophilia	-	-	++	-	-
10. fibrinogenolysis	-	-	+	+	++

-: normal, +: may be abnormal, ++: abnormal

Patient at low risk

- 1. patient with no history of bleeding disorders, normal
  examinations, no medications associated with bleeding
  disorders and normal bleeding parameters
- 2. patients with nonspecific history of excessive bleeding
  with normal bleeding parameters (PT, PTT, BT,
  platelet count, are within normal time)

Patient at moderate risk

- 1. patients in chronic oral anticoagulant therapy (coumadin)
- 2. patients on chronic aspirin therapy

Patient at high risk

- 1. patients with known bleeding disorders
  Thrombocytopenia
  Thrombocytopathy
  Clotting factor defects
- 2. Patient without known bleeding disorders found to have abnormal , platelet count, BT, PT, PTT

Dental management of bleeding disorders

- **Replacement therapy :**
  1. platelet concentrate : thrombocytopenia (1 unit= 30,000/ uL enough for 1 day)
  2. Fresh frozen plasma : liver disease, Hemophilia B, vWD type III
  3. Factor VIII,IX concentrate : Hemophilia A (1 unit /kg can add 2%, so 50 unit /kg add 100%)
  4. Factor IX concentrate : Hemophilia B
  5. 1-desamino-8-darginine vesopressin (DDAVP) : Hemophilia A, vWD type I, II

- **Antifibrinolytic therapy:**
  1. E-aminocaproic acid (EACA, Plaslloid)
  2. Tranexamic acid (AMCA, Transamin)

Local hemostatic methods

- splints, pressure packs, sutures; gelfoam with thrombin, surgicel, oxycel, microfibrillar collagen(avitene), topical AHF

Heparin (anticoagulant)

- Complex inhibited (IXa, Xa, XIa, XIIa)
- Used in deep vein thrombosis , renal dialysis
- Rapid onset, Duration 4-6hrs (given IV)
- Monitoring by aPTT: 50-65 sec
- Discontinue 6 hrs before surgery then reinstituting therapy 6-12hrs post –op
- Protamine sulfate can reverse the effect

Coumarin (Vit k anatagonist)

- Inhibit Vit K action (Factor II,VII,IX,X)
- Used venous thrombosis, cerebrovascular disease
- Duration ↑ haft-life 40hrs
- Monitored by PT : INR 1.5-2.5
- PT>2.5, reduction coumarin dosage (2-3 days)
- Vit. K can reverse the effect

Aspirin (antiplatelet)

- Inhibit cycloxygenase, TxA2 formation ↓
- Analgesic drug impairs platelet function
- Aterial thrombosis, MI
- Tests-BT, aPTT
- If tests are abnormal , MD should be consulted before dental surgery is done
- Stop aspirin for 5 days, substitute alternative drug in consultation with MD

Thrombocytopenia

- Disease in number of circulation platelets
- Idiopathic thrombocytopenia, secondary thrombocytopenia
- TX : is none indicated unless

  platelets<20000/mm3, or excessive bleeding
- TX : Steroid, platelet transfusion

Von Willebrandis Disease

Gene mutation on Von Willebrandis factor; most common Inherited disease in America (1%)

- Type I : 70%-80%, partial loss on quantity
- Type II : poor on quality
- Type III : severe loss on quantity, inactive to DDAVP

Hemophilia

- Sex-linked recessive trait, X chromosome, male > female
- Prolong aPTT, normal BT,PT
- Hemophilia A (factor VIII deficiency)
- Hemophilia B or Christmas disease (factor IX deficiency)
- Severity of disorder : severe<1%, moderate 1-5%,
  mild 6-30%
- TX : Replacement factors, antifibrinilytic agents, steroids

Hemophilia-dental management

- Preventive dentistry
  1. tooth brushing, flossing, rubber cup prophylaxis & topical fluoride, supragingival scaling
  2. without prior replacement therapy
- Pain control
  1. block anesthesia: factor level>50%
  2. Avoid aspirin, NSAIDs

Hemophilia-dental management

- Orthodontic treatment :
  1. no contraindication in well-motivated patients
  2. care with placement of bands and wires
- Operative dentistry
  1. rubber dam to protect tissue against accidental laceration
  2. wedges should be place to protect and retract papilla

Hemophilia-dental management

- Pulp therapy
  1. Preferable to extraction
  2. Avoid overinstrumentation and overfilling
- Periodontal therapy
  1. no contraindication of probing and supragingival scaling
  2. deep scaling, curettage, surgery need replacement therapy

Hemophilia-dental management

- Oral surgery :
  1. Dental extraction: 40%-50% level
  2. Maxillofacial surgery (including surgery extraction of impaction teeth): 80-100%
  3. Antifribrinilytic therapy & local hemastatic measure
  4. do not open lingual tissue in lower molar regions to avoid hemorrhage track down a endanger airway

Summary

- History, PE, Lab data
- Consultation with physician
- Antibiotics to prevent post-op infection
- Avoid aspirin and NSAIDs
- Local hemostatic measure is very important

The End

- Thank you!