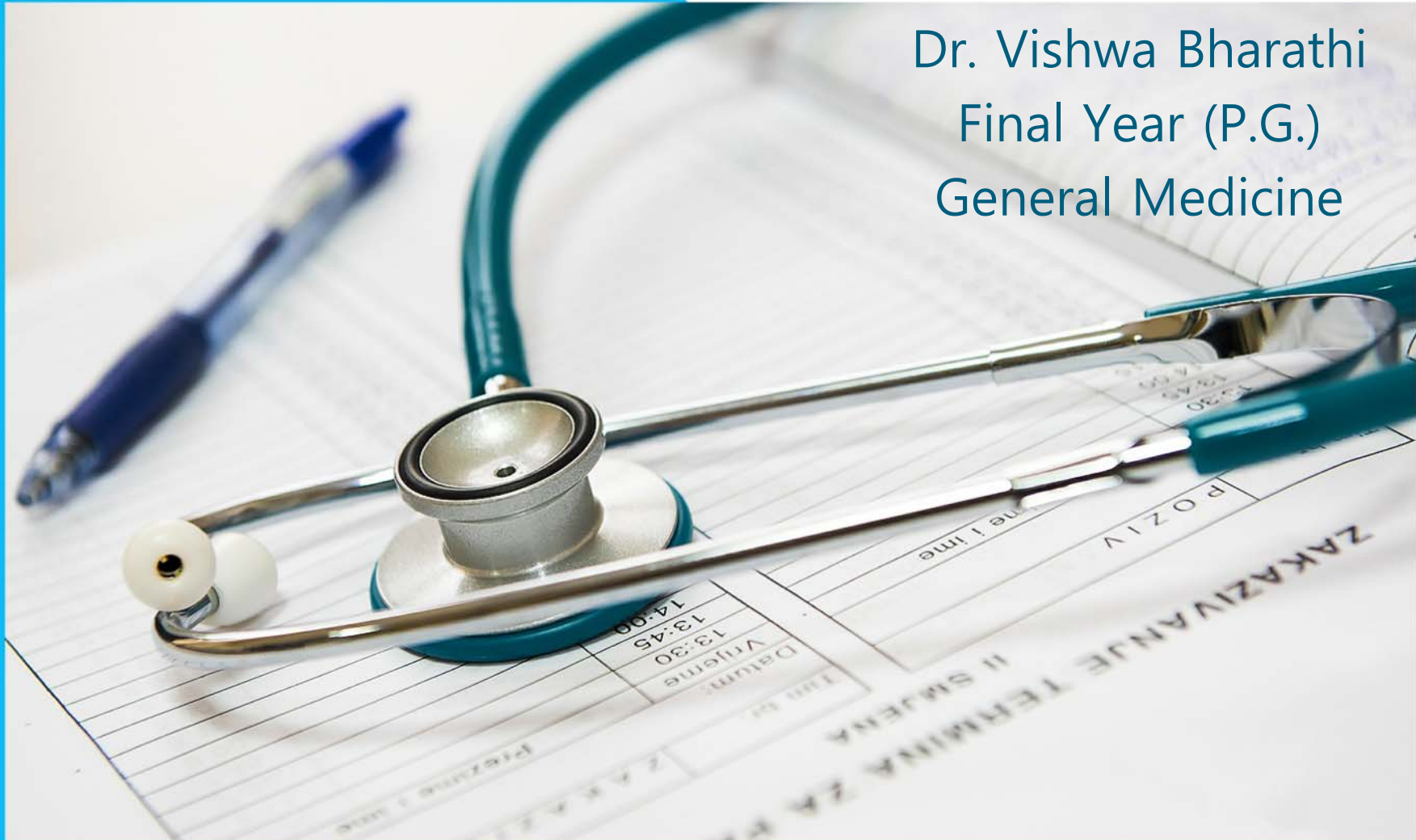


DISSEMINATED INTRAVASCULAR COAGULATION (DIC)

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Final Year (P.G.)
General Medicine



Introduction



According to International Society of Thrombosis & Hemostasis

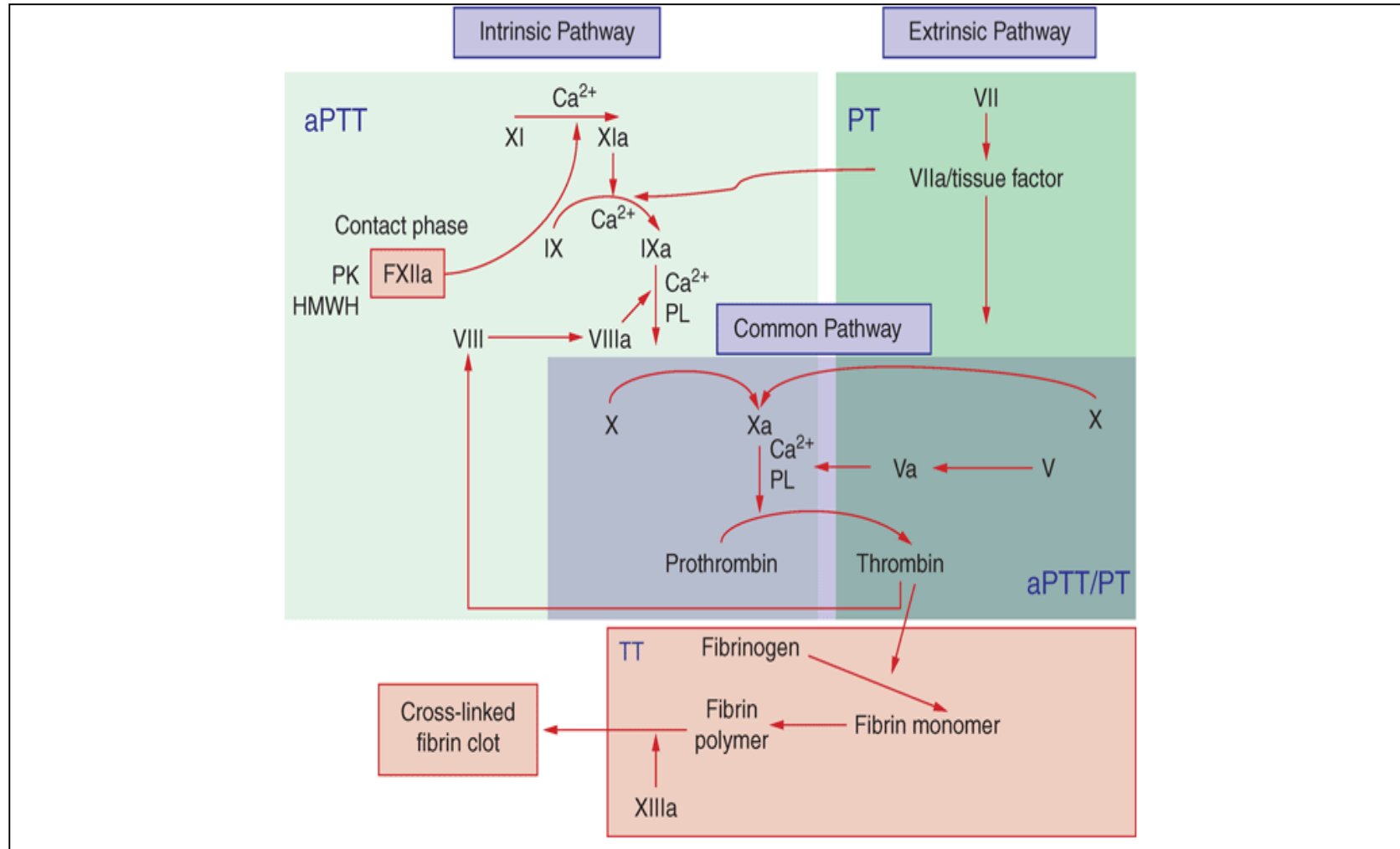
- ❖ Disseminated intravascular coagulation (DIC) is an acquired syndrome characterized by intravascular activation of coagulation with loss of localization arising from different causes.
 - ❖ It can originate from and also cause damage to the microvasculature, which if sufficiently severe ,can produce multi-organ dysfunction.
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Frequency of DIC

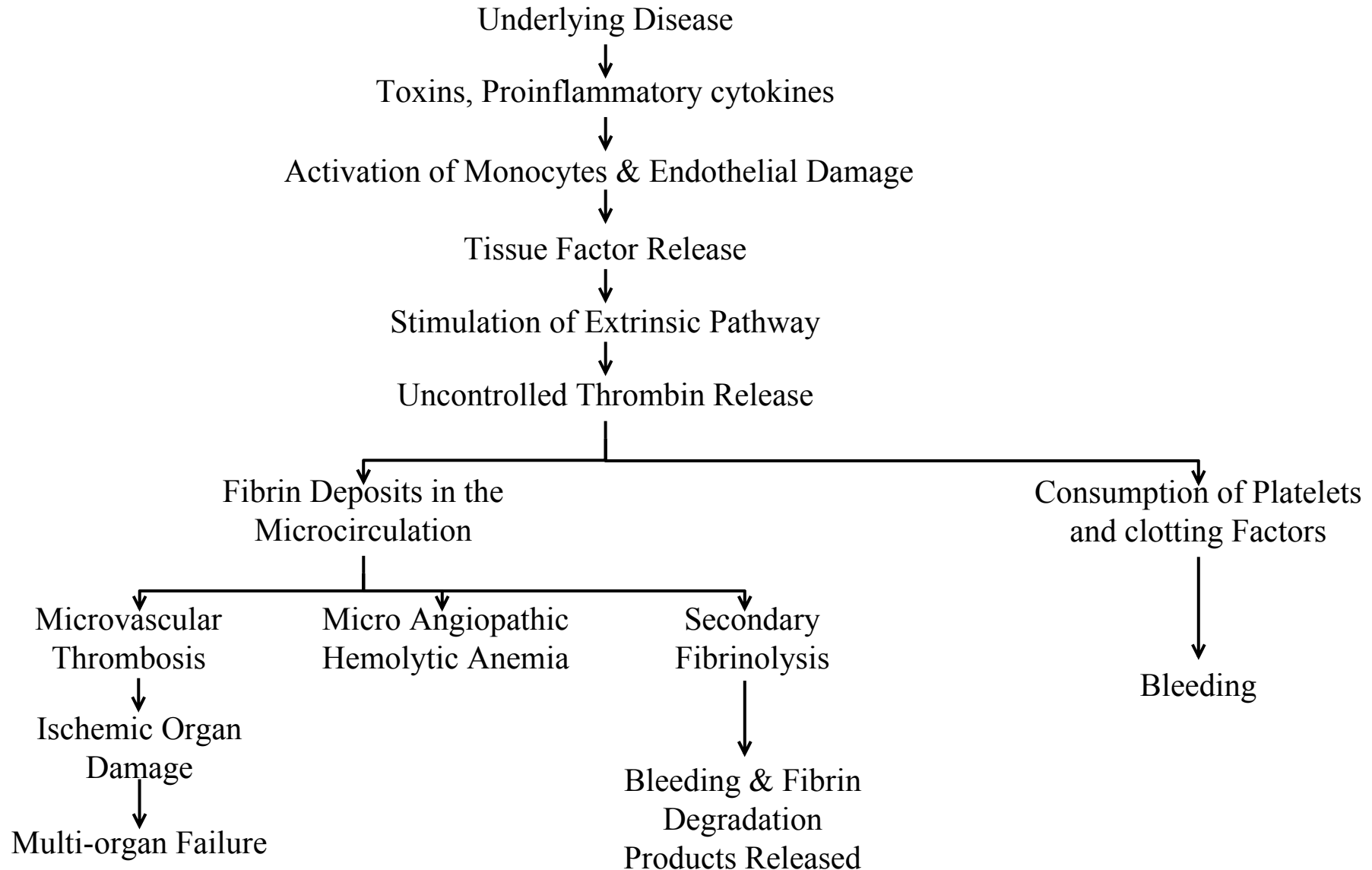


- ❖ DIC occurs in 30 – 50% of patients with sepsis, with equal frequency in gram positive and gram negative bacterial infections.
- ❖ It can occur in more than 50% patients with abruptio placentae, septic abortions and amniotic fluid embolism.
- ❖ In about 30% patients with **HELLP** syndrome and severe pre eclampsia
- ❖ In 10 -15% of Cancer patients with metastasis
- ❖ 50 -70% pts with neurotrauma

Summary Of Coagulation Pathways



Pathophysiology



Clinical Features of DIC



- ❖ Skin ecchymosis
- ❖ Bleeding from i/v sites, endotracheal tubes and urinary catheters.
- ❖ Gingival bleeding, epistaxis, malena
- ❖ Cough, dyspnoea
- ❖ Confusion, disorientation
- ❖ Fever

In addition, symptoms related to underlying disease

Common Clinical Causes Of DIC



Sepsis

- ❖ Bacterial: staphylococci, streptococci, pneumococci, meningococci, gram negative bacilli
- ❖ Viral
- ❖ Mycotic
- ❖ Parasitic
- ❖ Rickettsial

Trauma and tissue injury

- ❖ Brain injury, extensive burns, fat embolism, rhabdomyolysis

Common Clinical Causes Of DIC



Drugs

- ❖ Fibrinolytic agents, aprotinin, warfarin, prothrombin complex concentrates, amphetamine

Vascular disorders

- ❖ Giant hemangiomas, aortic aneurysms

Obstetrical complications

- ❖ Abruptio placentae, amniotic fluid embolism, septic abortion, dead fetus, **HELLP** syndrome, severe pre eclampsia

Cancer

- ❖ Adenocarcinoma of pancreas, prostate, hematologic malignancies

Common Clinical Causes Of DIC



Immunologic disorders

- ❖ Acute hemolytic transfusion reaction, organ or tissue transplant rejection, Graft versus host disease

Envenomation

- ❖ Snake, insects

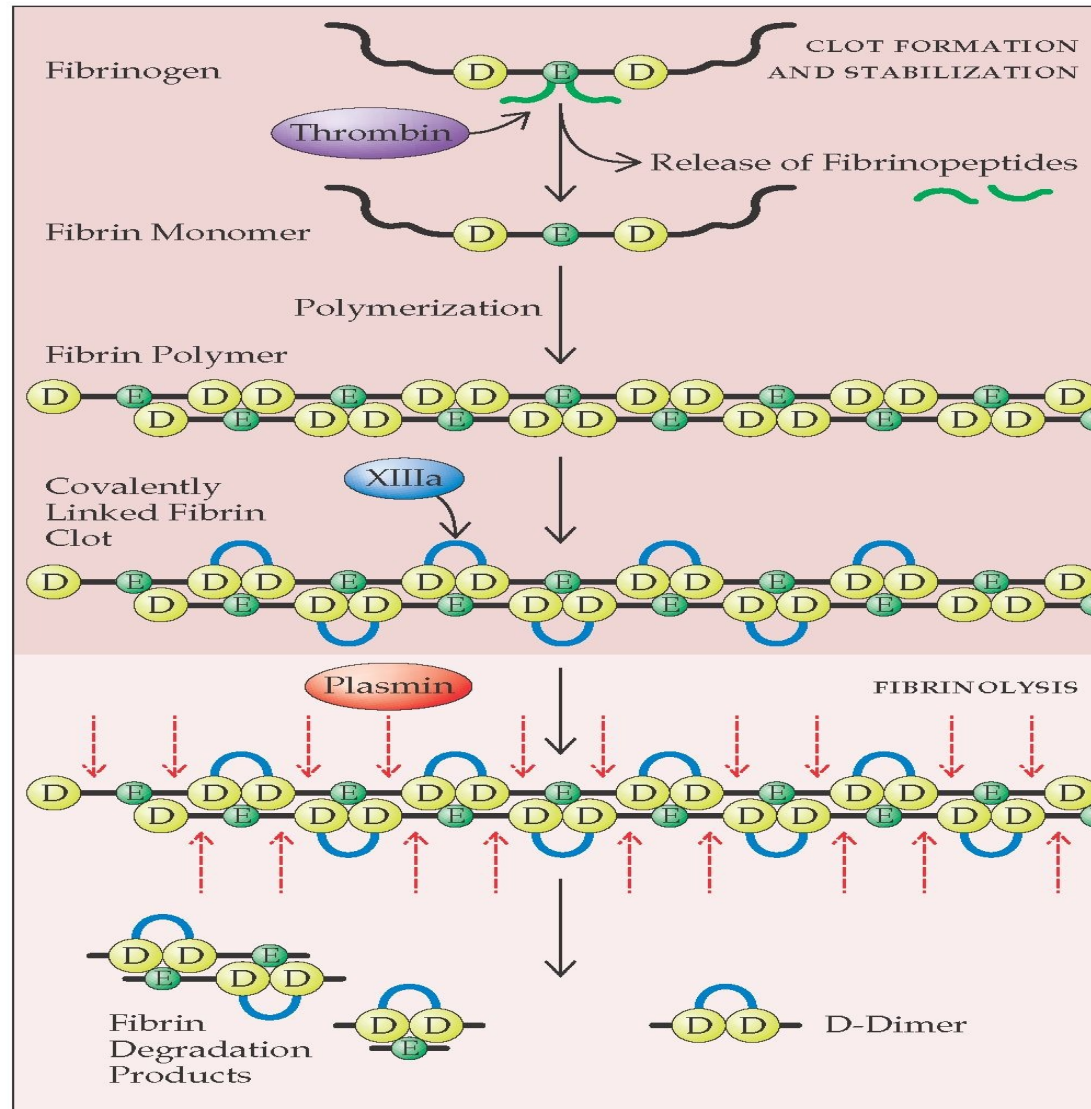
Liver disease

- ❖ Fulminant hepatic failure, cirrhosis, fatty liver of pregnancy

Miscellaneous

- ❖ Shock, acute respiratory distress syndrome, massive transfusion
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Fibrinolytic System



Laboratory Studies



Screening assays

- ❖ Prothrombin time(PT)
- ❖ Activated partial thromboplastin time (APTT)
- ❖ Platelet count,RBC count and blood smear analysis
- ❖ Fibrinogen levels

Lab markers of thrombin generation

- ❖ D–dimer
- ❖ Protamine paracoagulation assay for fibrin monomer
- ❖ Ethanol gel assay for fibrin monomers
- ❖ Thrombin anti-thrombin complex

Ancillary tests

- ❖ Fibrin degradation products
- ❖ Antithrombin levels
- ❖ Anti plasmin levels
- ❖ Factor V levels

Laboratory Studies (Contd...)



D-dimer test

- ❖ It is a very sensitive test for the diagnosis of DIC
- ❖ The test has a negative predictive value of $> 90\%$
- ❖ Normal value is 0.2 – 0.5 mg/ml

False positive D-dimer test

- ❖ Recent surgery
- ❖ Trauma
- ❖ Renal, liver and cardiac failure

Laboratory Studies (Contd...)



Fibrin degradation products

- ❖ FDPs are a measure of plasmin cleaved fibrinogen or fibrin
- ❖ FDPs do not distinguish between plasmin degradation by product of either fibrin or fibrinogen
- ❖ FDP s have a sensitivity of 85% & specificity 50%
- ❖ Normal value < 10 mg/ml
- ❖ **A combination of FDP and D dimer has 100% specificity and sensitivity**

Diagnostic Criteria for DIC



International Society for Thrombosis and Hemostasis
Disseminated Intravascular Coagulation Scoring System

Use only in patients with an underlying condition known to be associated with DIC

	0	1	2
Thrombocytopenia	$> 100,000 /\text{mm}^3$	$\leq 100,000 / \text{mm}^3$	$\leq 50,000 / \text{mm}^3$
D-dimer	Normal	≤ 10 times ULN	≥ 10 times ULN
PT prolongation	< 3 sec	3-6 sec	> 6 sec
Fibrinogen	> 100 mg/dl	≤ 100 mg/dl	

Overt DIC ≥ 5 points
Non overt DIC < 5 points

Acute and Chronic DIC



Parameters	Acute (decompensated DIC)	Chronic (compensated DIC)
Platelet count	Reduced	Variable
Prothrombin time	Prolonged	Normal
APTT	Prolonged	Normal
Thrombin time	Prolonged	Normal
Plasma fibrinogen	Reduced	Normal – elevated
Plasma factor 5	Reduced	Normal
Plasma factor 8	Reduced	Normal
Fibrin degradation products	Elevated	Elevated
D -dimer	Elevated	Elevated

Reference: Medicine Update 2015

Differential Diagnosis of DIC



- ❖ Advanced liver disease
- ❖ Thrombotic micro angiopathy
- ❖ Fibrinogenolysis
- ❖ Disorders of hemostasis (correctable factor deficiency, vit k deficiency)
- ❖ Thrombocytopenia

Management of DIC



- ❖ Management of DIC involves following three important steps, which should be initiated timely and sequentially.
- ❖ **I. Vigorous therapy underlying disorder.**
- ❖ **II. Energetic treatment of life threatening complication e.g. shock, hypoxaemia, and acidosis.**
- ❖ **III. Therapy of DIC per se.**
- ❖ When there is no bleeding or venous thromboembolism with only lab parameters deranged - observation without any replacement therapy
- ❖ Frequent monitoring of blood counts and clotting factors
- ❖ Monitoring the CVP, gas exchange and electrolyte balance

Management of DIC (Contd...)



Prompt treatment of the underlying cause

- ❖ Optimal antibiotics in sepsis syndrome
- ❖ Uterine evacuation for abruptio placenta
- ❖ Restoration of hemodynamic stability for hypovolemic shock
- ❖ Anti snake venom for snake bite

ANTIBIOTICS

- ❖ Always i.v antibiotics are given
- ❖ started after taking blood cultures
- ❖ Outcomes are worse if the organism is insensitive to the initial regimen

Management of DIC (Contd...)



COMPONENT SUPPORT

PLATELET TRANSFUSION

- ❖ Platelet count should be maintained around 20,000-30,000/mm³ in a bleeding patient
- ❖ single donor platelet transfusion

CRYOPRECIPITATE

- ❖ Is rich in factor VIII, Fibrinogen and VWF
- ❖ 1-2 units/ 10 kg can be given
- ❖ Maintain fibrinogen level > 100 mg/dl

Management of DIC (Contd...)



FRESH FROZEN PLASMA

- ❖ Provides all clotting factors and corrects PT and APTT
- ❖ Dose 10-15ml/kg every 8-12 hrly
- ❖ Transfusion can be stopped once lab parameters improve

ANTITHROMBIN CONCENTRATES

- ❖ More effective in the presence of hepatic insufficiency

ACTIVATED PROTEIN C CONCENTRATES (Drotecogin alfa)

PROTHROMBIN COMPLEX CONCENTRATES

Management of DIC (Contd...)



HEPARIN

- ❖ Is a naturally occurring anticoagulant

In acute DIC heparin can aggravate bleeding

To date use of heparin in acute DIC has no proven survival ben

Indications of heparin in DIC

- ❖ Chronic DIC of malignancy
- ❖ Clinical thrombosis: dermal necrosis, purpura fulminans, acral ischemia, VTE
- ❖ Retained dead fetus with hypofibrinogenemia
- ❖ AML M3 prior to conventional chemotherapy

Management of DIC (Contd...)



SYNTHETIC INHIBITORS OF THROMBIN

- ❖ Hirudin, desirudin, bivalirudin, argatroban, melagatran, ximelgaran, dabigatran
- ❖ Can be used in heparin induced thrombocytopenia and when heparin is ineffective in the presence of antithrombin deficiency

FIBRINOLYSIS INHIBITORS

- ❖ They block the secondary fibrinolysis that accompanies DIC
Tranexamic acid and Epsilon Amino Caproic Acid (EACA) prevent Fibrin degradation by plasmin and reduce bleeding episodes in patients with confirmed fibrinolysis

Prognosis



- ❖ Prognosis depends on the underlying disorder
- ❖ If the condition is self limiting, prognosis is good
- ❖ Appropriate and early initiation of antibiotic therapy has a positive impact on the outcome
- ❖ Prognosis is poor if there is
 - Failure to recognize the underlying etiology and in case of sepsis if the organism is insensitive to the initial empirical antibiotic regimen

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- ❖ Disseminated intravascular coagulation in obstetric disorders and its acute hematological management,jecko thachil,school of clinical sciences,university of liverpool,UK,2009

Thank You !

