**Disseminated intra-Vascular coagulation (DIC)**

**Definition**:

It's a **complex systemic thrombohemorrhagic disorder** resulting from breakdown of the delicate balance between the activity of the coagulation and the coagulation inhibiting enzyme.

It's characterized by the **widespread activation of coagulation**, which results in the intravascular formation of fibrin and ultimately thrombotic occlusion of small and midsize vessels and concomitant consumption of procoagulants and platelets.

**Causes**

DIC can occur in the following conditions:

1. **Cancers**:
	1. [Lung](http://en.wikipedia.org/wiki/Lung), [pancreas](http://en.wikipedia.org/wiki/Pancreas), [prostate](http://en.wikipedia.org/wiki/Prostate) and [stomach](http://en.wikipedia.org/wiki/Stomach).
	2. [Acute myeloid leukemia](http://en.wikipedia.org/wiki/Acute_myeloid_leukemia) (particularly [APML](http://en.wikipedia.org/wiki/Acute_promyelocytic_leukemia)).
	3. Metastatic carcinoma.
2. [**Obstetric**](http://en.wikipedia.org/wiki/Obstetric):
	1. [abruptio placentae](http://en.wikipedia.org/wiki/Abruptio_placentae),
	2. [pre-eclampsia](http://en.wikipedia.org/wiki/Pre-eclampsia),
	3. [amniotic fluid embolism](http://en.wikipedia.org/wiki/Amniotic_fluid_embolism),
	4. Placenta previa.
	5. Septic abortion.
3. **Massive tissue injury**: Trauma, burns, extensive surgery
4. **Infections**:
	1. **Bacterial:** [Gram-negative](http://en.wikipedia.org/wiki/Gram-negative) sepsis, [Neisseria meningitidis](http://en.wikipedia.org/wiki/Neisseria_meningitidis), [Streptococcus pneumoniae](http://en.wikipedia.org/wiki/Streptococcus_pneumoniae), [histoplasmosis](http://en.wikipedia.org/wiki/Histoplasmosis), [Rocky mountain spotted fever](http://en.wikipedia.org/wiki/Rocky_mountain_spotted_fever).
	2. **Viral**: [Arenaviruses](http://en.wikipedia.org/wiki/Arenavirus) causing [**Argentine hemorrhagic fever**](http://en.wikipedia.org/wiki/Argentine_hemorrhagic_fever) or [**Bolivian Hemorrhagic Fever**](http://en.wikipedia.org/wiki/Bolivian_Hemorrhagic_Fever)
	3. [**Protozoa**: Malaria](http://en.wikipedia.org/wiki/Malaria).
	4. **Fungi**: aspergillosis.
5. **Miscellaneous**:
	1. [**Liver**](http://en.wikipedia.org/wiki/Liver) **disease**,
	2. [**snake bite**](http://en.wikipedia.org/wiki/Snake_bite)**,**
	3. giant [hemangioma](http://en.wikipedia.org/wiki/Hemangioma),
	4. [**shock**](http://en.wikipedia.org/wiki/Shock_%28circulatory%29),
	5. [heat stroke](http://en.wikipedia.org/wiki/Heat_stroke),
	6. [**vasculitis**](http://en.wikipedia.org/wiki/Vasculitis)**,**
	7. [**aortic aneurysm**](http://en.wikipedia.org/wiki/Aortic_aneurysm),
	8. [**Serotonin syndrome**](http://en.wikipedia.org/wiki/Serotonin_syndrome)**.**
6. **Severe** in incompatible blood transfusion.
7. **Transplantation rejection**.

DIC Is initiated by:

1. **Tissue damage**: release of TF.
2. **Cell damage**: release of procoagulants.
3. **Endothelial damage**: reduce the anticoagulant effect of endothelium

…or any combination of the three phenomena.

**Mechanism of DIC**

Release of tissue factor is the key Mechanism

Fibrinolysis system suppression

In adequate removal of fibrin

Circulating of FDP

Fibrinolysis in the microcirculation

|  |  |  |
| --- | --- | --- |
|  | Signs of thrombosis | Signs of haemorrhagic diathasis |
| CNS | **Multifocal lesion & Coma** | Cerebral haemorrhage. |
| Skin | **Skin ischemia & Gangrene** | Ecchymosis & purpura |
| Resp. | **Respiratory distress syndrome** | Mucosal membrane hge & epistaxis |
| GIT | **GIT ulceration** | GIT bleeding |
| Renal | **Oliguria and cortical necrosis** | haematuria |



Diagnosis

|  |  |  |  |
| --- | --- | --- | --- |
|  | Tests | DIC (secondary fibrinolysis) | Primary fibrinolysis |
| Screen | PT | Increased  | Normal |
| aPTT | Increased | Normal |
| PLT count | Decreased  | Normal |
| Coag. | Fibrinogen | Decreased  | Normal or decreased  |
| AT III | Decreased  | Normal |
| FDPs | Increased | Increased |
| Fibrinolysis | Plasminogen | Decreased  | Decreased |
| PAI | Decreased  | Decreased |
| α2 AP | Decreased  | Decreased |
| α 2 macroglobulin | Decreased  | Normal |

**Markers of primary of fibrinolysis**

1. B β peptide 1-42.
2. Fibrinogen degradation products.

**Markers of DIC**

|  |  |  |
| --- | --- | --- |
|  | Prothrombin Fragment 1-2. | Indicate thrombin formation |
|  | FP. **A** &B. |
|  | Thrombin anti-thrombin complex (**TAT**) |
|  | Decrease anticoagulants (ATIII,PC). |
|  | Palsminogen-Antiplasmin complex (**PAP**) | Indicate 2ndry fibrinolysis |
|  | B β peptide 15-42. |
|  | Fibrin degradation products. |
|  | D-Dimer |  |

**Management of DIC**

1. **ttt of the cause.**
2. **Management of bleeding:**
* FFP + PLT conc. + cryoprecipitate +packed RBCs
1. **Management of thrombosis:**
	* Heparin is contraindicated except in incompatible blood transfusion and amniotic fluid embolism.
	* Anti-PLT: prostacyclin.
	* AT & recombinant PC conc. especially with sepsis.
2. **Antifibrinolytic therapy: is contraindicated.**