Circulatory Disturbances 3: Hemorrhage

Learning Objectives

• Recognize and describe hemorrhage as to its size and location using proper terminology

• Outline the pathogenesis of hemorrhage

• Describe the outcome of hemorrhagic lesions
Edema

Congestion and Hyperemia

Hemorrhage

Thrombosis and Embolism

Infarction

Shock
HEMORRHAGE

Hemorrhage

• Escape of blood from the cardiovascular system
## HEMORRHAGE

### Causes

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Causes

- Trauma
- Sepsis, viruses, or toxins
- Abdominal neoplasia
- Coagulation disorders
- Platelet disorders
- Congestion (capillary hemorrhage)
# Hemorrhage

## Causes

- **Trauma**
- **Sepsis, viruses, or toxins**
- **Abdominal neoplasia**
- **Coagulation disorders**
- **Platelet disorders**
- **Congestion (capillary hemorrhage)**
Significance

Location:
- Brain
- Pericardium

Volume and rate:
↑ worse - Hemorrhagic shock
HEMORRHAGE

Subdural / Epidural hemorrhage

- Blood accumulation beneath / above the dura

Compresses the brain
Cardiac Tamponade

- Heart failure due to massive accumulation of fluid/blood in the pericardial sac

Compresses the atria and ventricles - restricts diastolic cardiac filling
Hemorrhage by Rhexis

- Hemorrhage from a tear in blood vessel or heart
Hemorrhage by Rhexis

- Hemorrhage from a tear in blood vessel or heart
HEMORRHAGE

Hemorrhage by Rhexis

- Hemorrhage from a tear in blood vessel or heart

Results in moderate to marked hemorrhage
HEMORRHAGE

Hemorrhage by Diapedesis

- Bleeding from a small defect
Hemorrhage by Diapedesis

- Bleeding from a small defect
HEMORRHAGE

Hemorrhage by Diapedesis

- Bleeding from a small defect

- RBCs passing through a wall in inflammation or vasculitis
- RBCs entering alveoli with lung congestion
HEMORRHAGE

Hemorrhagic Diathesis

- Increased tendency to hemorrhage from usually insignificant injuries

Seen in a wide variety of clinical disorders
- Platelet disorders
- Coagulation deficiency
HEMORRHAGE

Hematoma

- Extravascular 3D blood clot
- Hemorrhage enclosed within a tissue
HEMORRHAGE

Hematoma

- Extravascular 3D blood clot
- Hemorrhage enclosed within a tissue

Photos: Dr R Lofstedt, AVC
HEMORRHAGE

Hemopericardium

- Blood in the pericardial sac
HEMORRHAGE

Hemopericardium

- Blood in the pericardial sac

Can lead to cardiac tamponade
HEMORRHAGE

Hemothorax

- Blood in the thorax (pleural cavity)
Hemoabdomen (Hemoperitoneum)

- Blood in the abdomen (peritoneal cavity)
Hemoabdomen (Hemoperitoneum)

- Blood in the abdomen (peritoneal cavity)
HEMORRHAGE

Hemarthrosis

- Blood in the joint spaces
HEMORRHAGE

Hemoptysis • Coughing blood from the lungs or airways
HEMORRHAGE

Epistaxis

- Bleeding from the nose
Hematemesis • Vomiting up blood
HEMORRHAGE

Hematochezia
• Presence of fresh blood in the stool

Melena
• Presence of tarry blood in the stool
HEMORRHAGE

Petechia(e)
- Pinpoint (~1-2 mm) hemorrhages
- Most common in the skin, mucosa, serosa
HEMORRHAGE

Purpura

- 3 mm – 1 cm hemorrhages
- Most common in the skin, mucosa, serosa
ECCHYMOSES

- Hemorrhages larger than 1 cm
- Often blotchy and irregular
Hemorrhage which looks like red paint was applied with a brush.
Suffusive hemorrhage

- Areas of hemorrhage larger than ecchymoses and contiguous
HEMORRHAGE

Suffusive hemorrhage

• Areas of hemorrhage larger than ecchymoses and contiguous
Agonal hemorrhage

- Refer to petechiae and ecchymoses that are associated with the death struggle (terminal hypoxia)
Resolution of Hemorrhage

• Arrest of hemorrhage occurs as a result of hemostasis (next lecture)
• Resolution depends on the amount of hemorrhage

1. Resorption

• A small amount can be resorbed

2. Organization

• Larger amounts require breakdown and removal of RBCs by macrophages
  • Hemoglobin pigment broken down sequentially
  • Connective tissue organization occurs in large hematomas
HEMORRHAGE

Resolution of Hemorrhage

Yellow-Brown

Hemosiderin

Blue-Green

Bilirubin

Red - Blue

Hemoglobin
HEMORRHAGE

Organizing hematoma

- Center contains fibrin and RBCs that are phagocytosed by macrophages
- Outside is composed of vascularized fibrous tissue

Aural hematoma
Coelomic cavity of male turkey with ruptured aorta – which term is correct for this lesion?

1. Hemorrhage by diapedesis
2. Hemorrhage by rhexis
3. Hemarthrosis
4. Petechiae
5. Hemoptysis
What’s your diagnosis?

1. Hemothorax
2. Hydrothorax
3. Chylothorax
4. Hemopericardium
5. Hydropericardium
Morphologic Diagnosis and Speculate on cause...

1. Hydroperitoneum - Ruptured small intestine
2. Ascites - Left Heart Failure
3. Hydroperitoneum - Liver Failure
4. Ascites - Right heart failure
What type of hemorrhage is this?

1. Ecchymoses
2. Paintbrush hemorrhage
3. Purpura
4. Petechiae
5. Suffusive hemorrhage
This aortic rupture could have resulted in which of the following? (tissue from a horse)

1. Hemothorax
2. Cardiac tamponade
3. Cor pulmonale
4. Hemoptysis
5. Hemopericardium