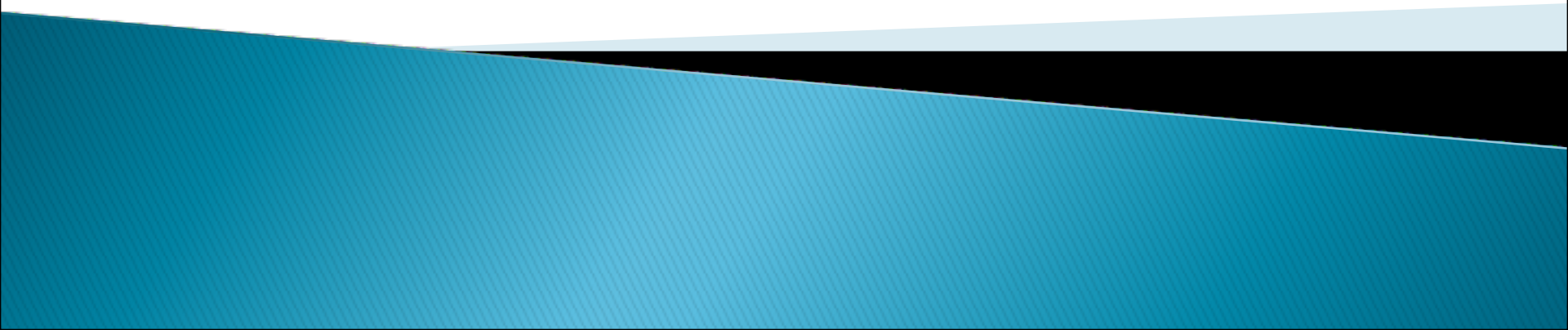


ANEURYSMS AND DISSECTIONS



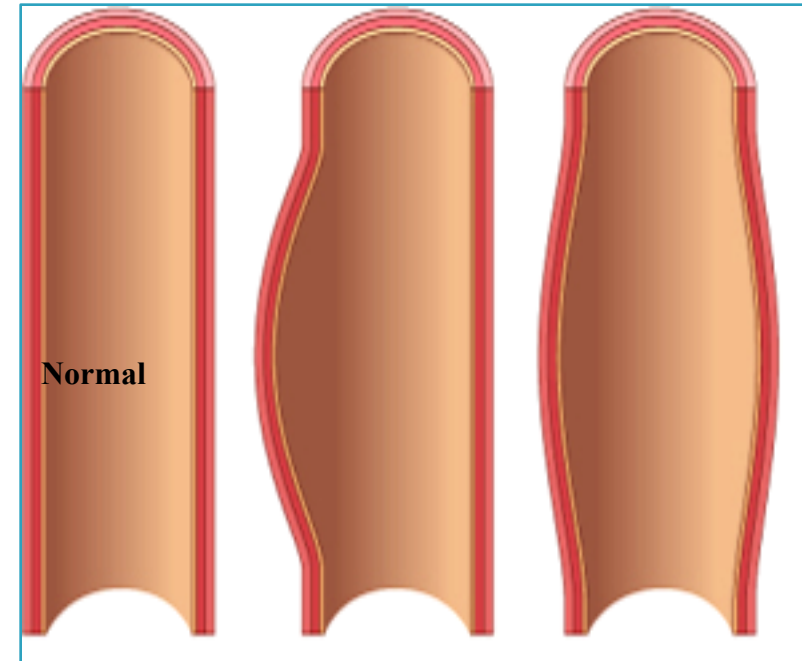
Aneurysm

- ▶ localized abnormal dilation of artery or heart

- ▶ Types:

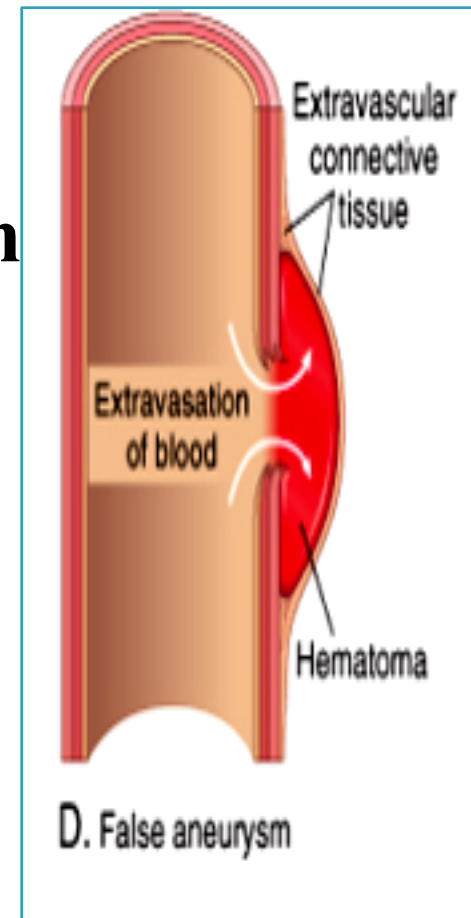
1-"true" aneurysm

- all three layers of arterial wall or attenuated wall of heart
- e.g. Atherosclerotic, syphilitic, congenital aneurysms, ventricular aneurysms following transmural MI



2- “false” aneurysm

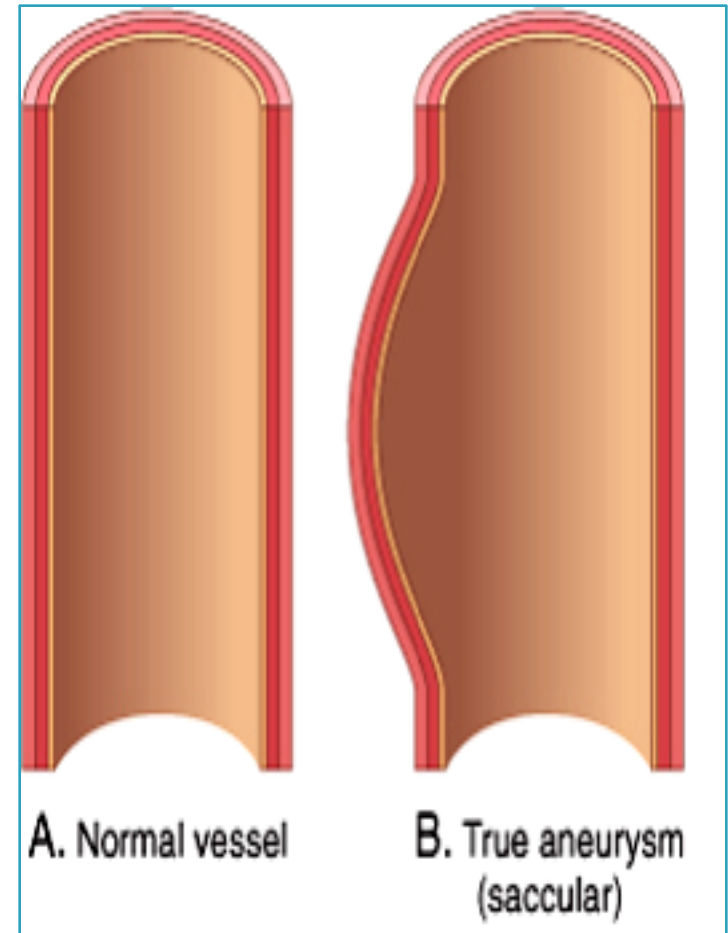
- (a.k.a pseudo-aneurysm)
- a breach in vascular wall leading to hematoma communicating with intravascular space ("pulsating hematoma")
- E.g. ventricular rupture after MI contained by pericardial adhesion
- E.g. a leak at the junction of a vascular graft with a natural artery.



- ▶ **aneurysms are classified by macroscopic shape and size:**
- ▶ **Note: shape and size are not specific for any disease or clinical manifestations**

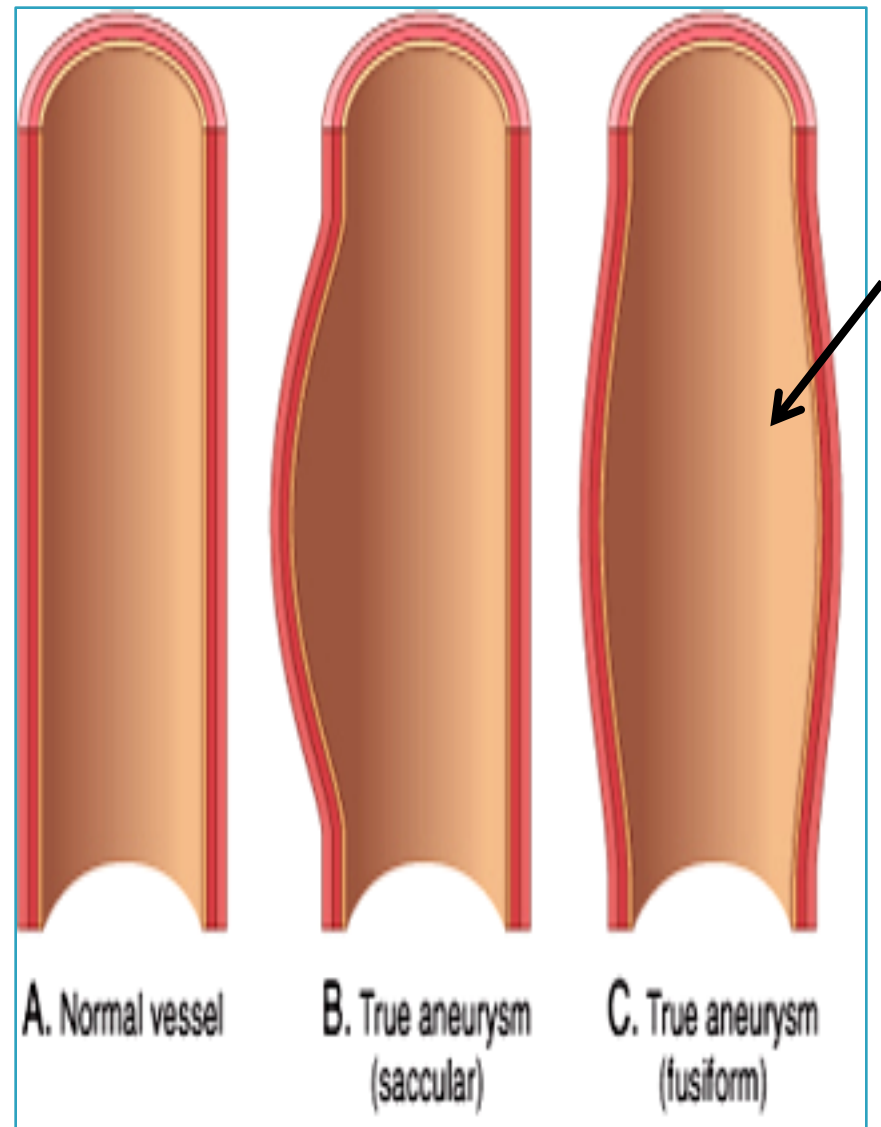
1- Saccular aneurysms

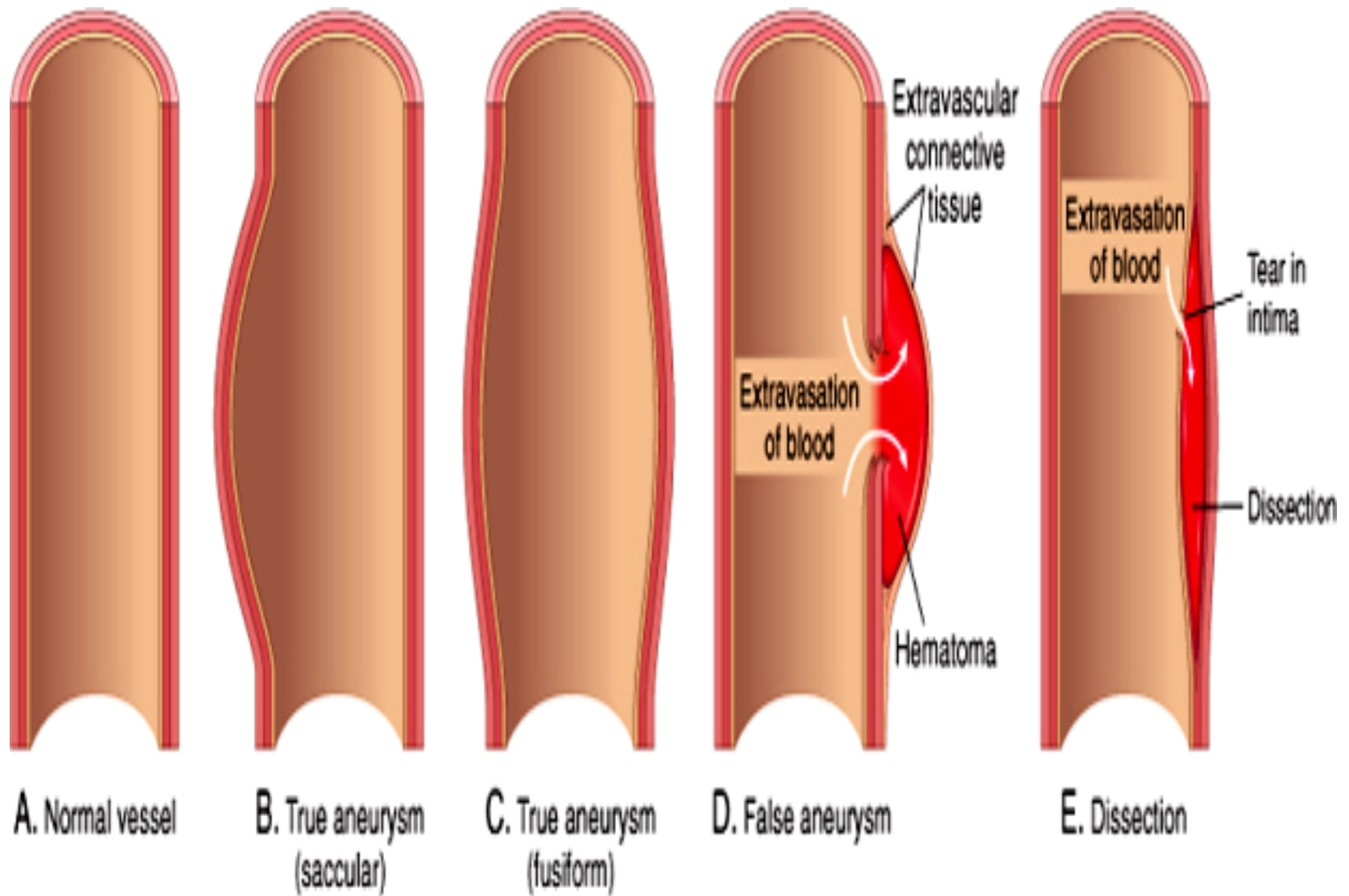
- spherical outpouchings
- involving only a portion of vessel wall
- often contain thrombi.



2- Fusiform aneurysms

- ▶ **diffuse, circumferential dilation of a long vascular segment**
- ▶ **they vary in diameter and length and can involve extensive portions of artery**





Aortic aneurysms

▶ *The two most important causes are:*

1- atherosclerosis :

- most common cause

→ intimal plaques compress underlying media

→ compromise nutrient and waste diffusion into arterial wall

→ media degeneration and necrosis

→ thinning and weakening of media

→ dilation of vessel

2- cystic medial degeneration of arterial media.

- ▶ causes include: trauma; congenital defects (e.g., *berry* aneurysms); hereditary defects in structural components (Marfan); infections (*mycotic* aneurysms); vasculitis.

Abdominal Aortic Aneurysm

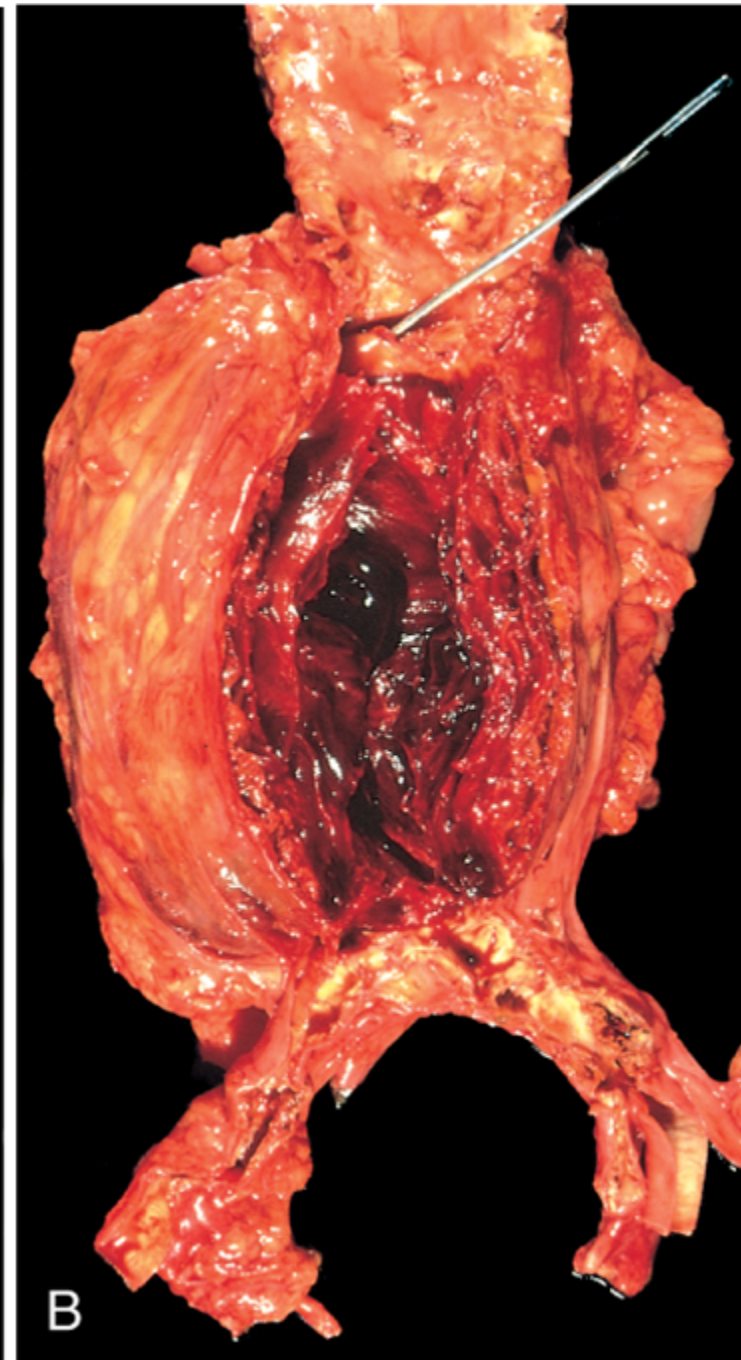
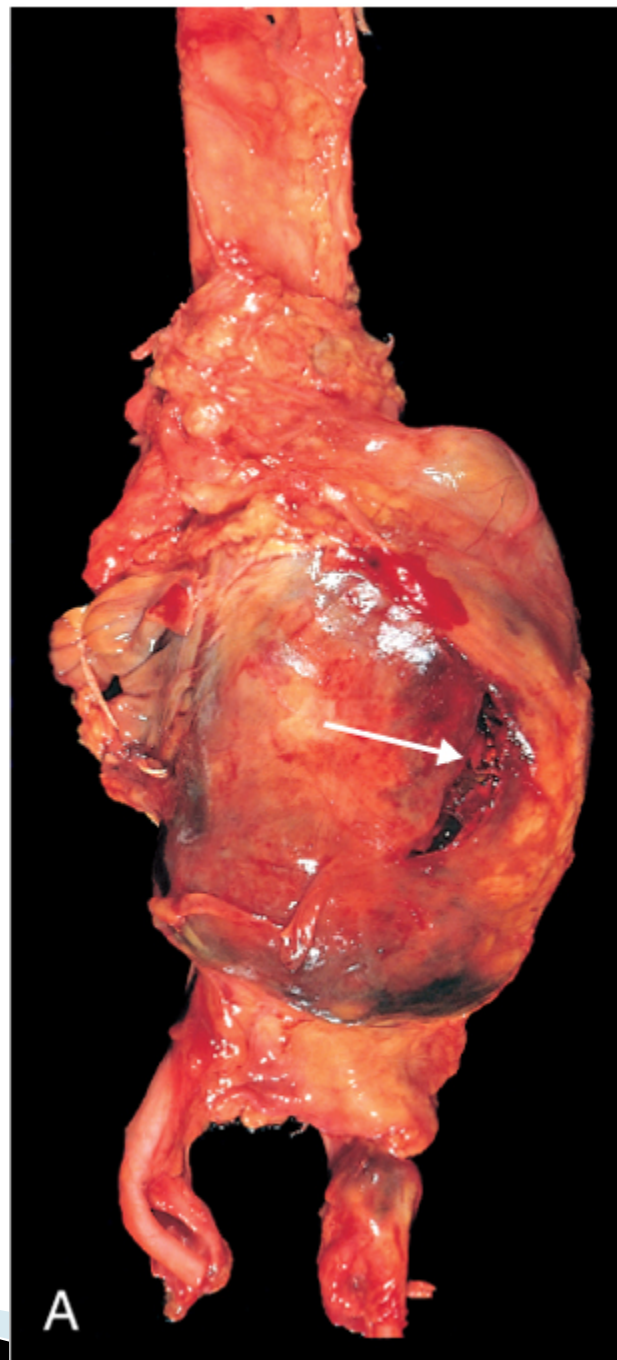
- ▶ Atherosclerotic aneurysms occur most frequently in **abdominal** aorta (= AAA)
- ▶ common iliacs, arch, and descending parts of thoracic aorta can also be involved
- ▶ **Pathogenesis**
- ▶ m/c men
- ▶ rarely < age 50.
- ▶ Atherosclerosis is a major cause of AAA

- ▶ other contributors include: hereditary defects in structural components of the aorta (e.g., defective fibrillin production in **Marfan disease** affects elastic tissue synthesis)
- ▶ an altered balance of collagen degradation and synthesis mediated by local inflammatory infiltrates and the destructive proteolytic enzymes

AAA- Morphology

- ▶ Usually below renal arteries and above bifurcation of aorta
 - ▶ can be saccular or fusiform
 - ▶ as large as 15 cm in diameter, and as long as 25 cm.
 - ▶ Microscopically: atherosclerosis; thinning of media
 - ▶ frequently contains a laminated mural thrombus
- 

**Abdominal
aortic
aneurysm and
complications**
A: rupture
B: thrombosis



Mycotic aneurysms

- ▶ Infection of a major artery that weakens its wall is called a *mycotic aneurysm*
- ▶ can originate from:
 - (1) embolization of a septic thrombus (infective endocarditis)
 - (2) extension of adjacent suppurative process
 - (3) circulating organisms infecting arterial wall

Syphilitic Aneurysm

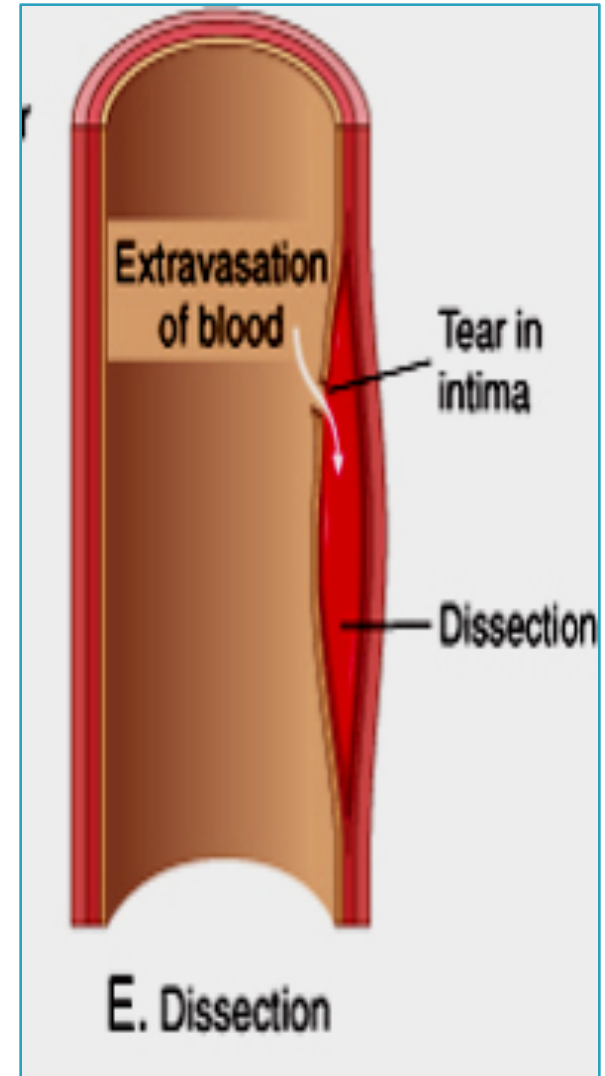
- ▶ *Caused by* The spirochetes *T. pallidum*
- ▶ A rare complication (early recognition and treatment of syphilis)
- ▶ **Tertiary** stage of syphilis can cause *obliterative endarteritis* of vasa vasorum of aorta
- ▶ ischemic medial injury
- ▶ aneurysmal dilation of aorta and aortic annulus
- ▶ eventually valvular insufficiency.

The clinical consequences of AAA

- ▶ **Rupture** → massive hemorrhage
 - risk is directly related to size (≥ 5 cm)
 - mortality for unruptured aneurysms = 5%,
 - if rupture mortality rate $> 50\%$
- ▶ **Obstruction** of downstream vessel → **ischemic injury**
- ▶ **Embolism** → mural thrombus
- ▶ **compression** on adjacent structures (e.g. ureter or vertebrae)
- ▶ **abdominal mass** (often pulsating)

Arterial *dissection*

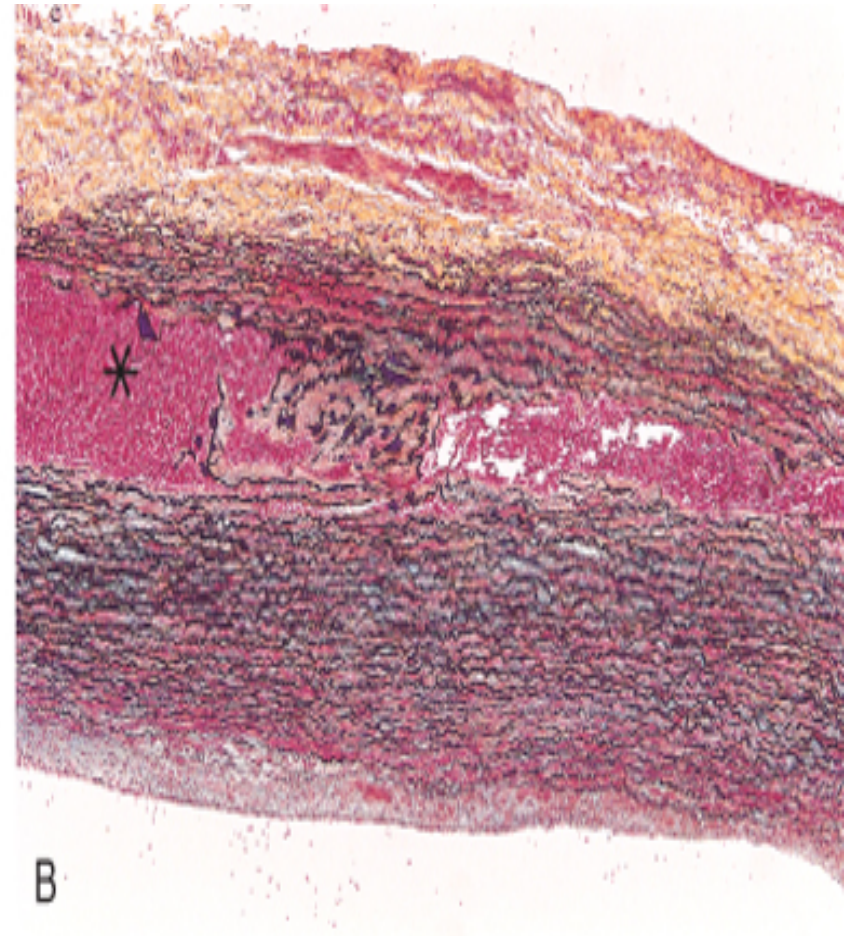
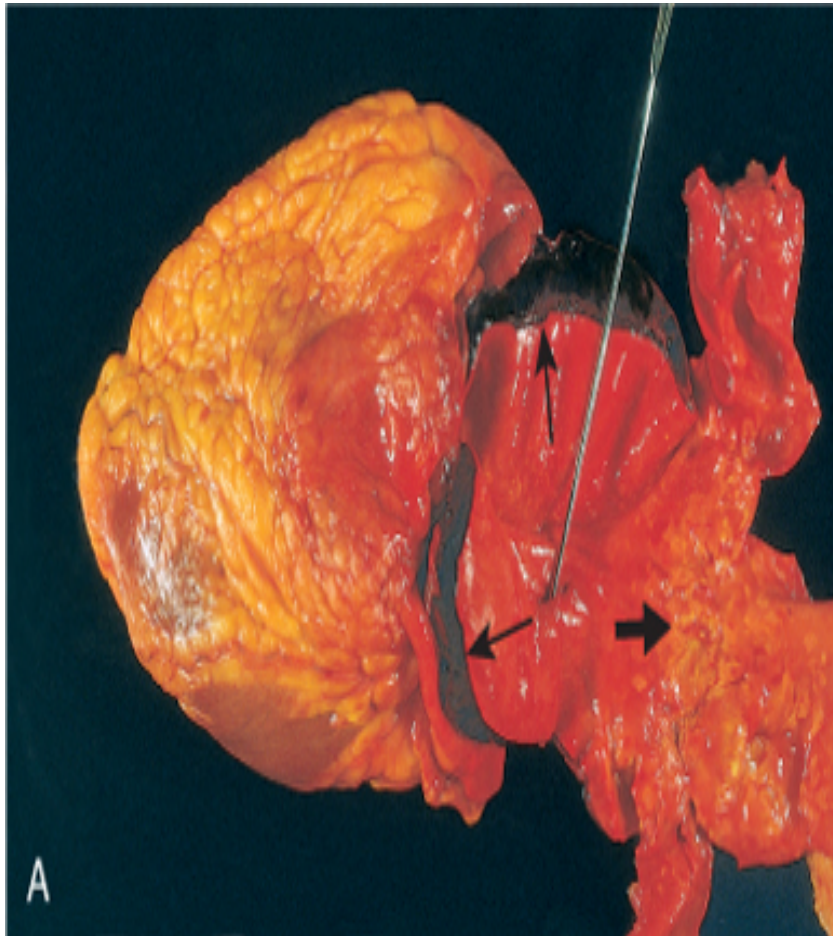
- ▶ Extravasation of blood that enters the wall of artery through an intimal tear, as a hematoma dissecting between its layers.
- ▶ often but not always aneurysmal.
- ▶ Both true and false aneurysms as well as dissections can rupture, often with catastrophic consequences



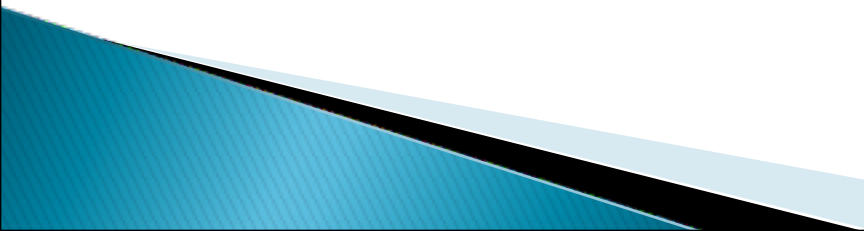
Aortic dissection

- ▶ A catastrophic event whereby blood dissects apart the media to form a blood-filled channel within aortic wall
- ▶ Complications are :
 - massive hemorrhage
 - cardiac tamponade (hemorrhage into the pericardial sac).

Aortic dissection



Pathogenesis of Aortic dissection

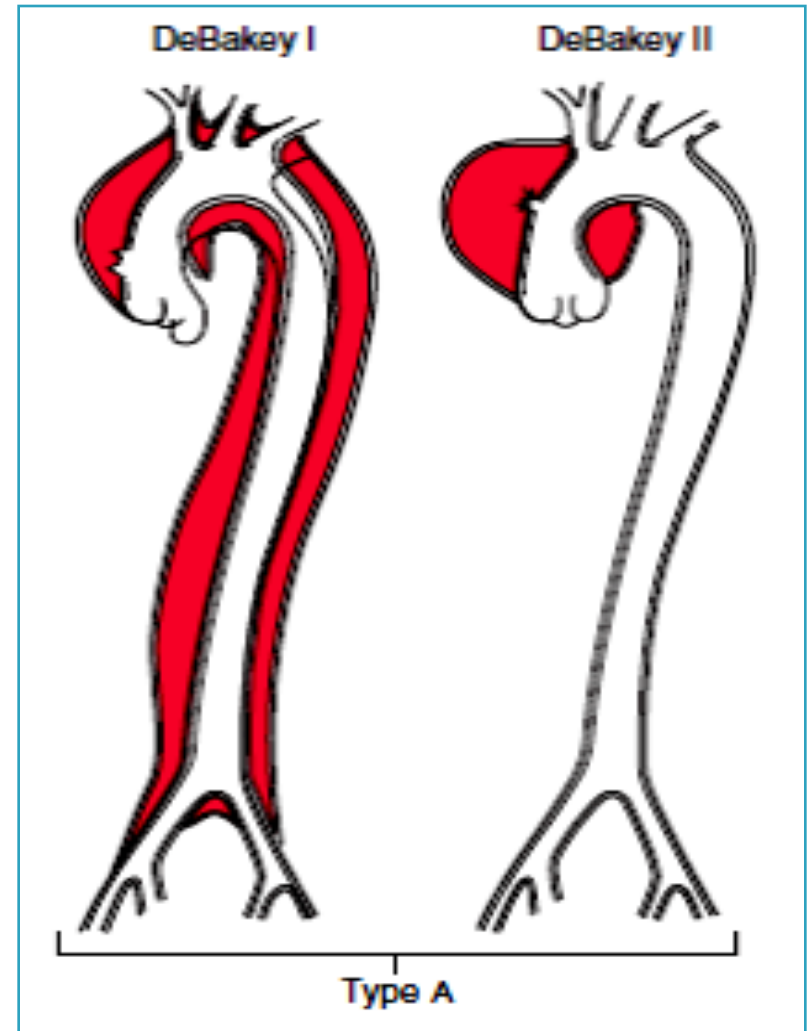
- ▶ 1- Hypertension is *the* major risk factor
 - ▶ pressure-related mechanical injury and/or ischemic injury.
 - ▶ 2- inherited or acquired connective tissue disorders causing abnormal vascular ECM
 - ▶ (e.g., Marfan syndrome, Ehlers-Danlos syndrome, vitamin C deficiency, copper metabolic defects)
- 

Marfan syndrome

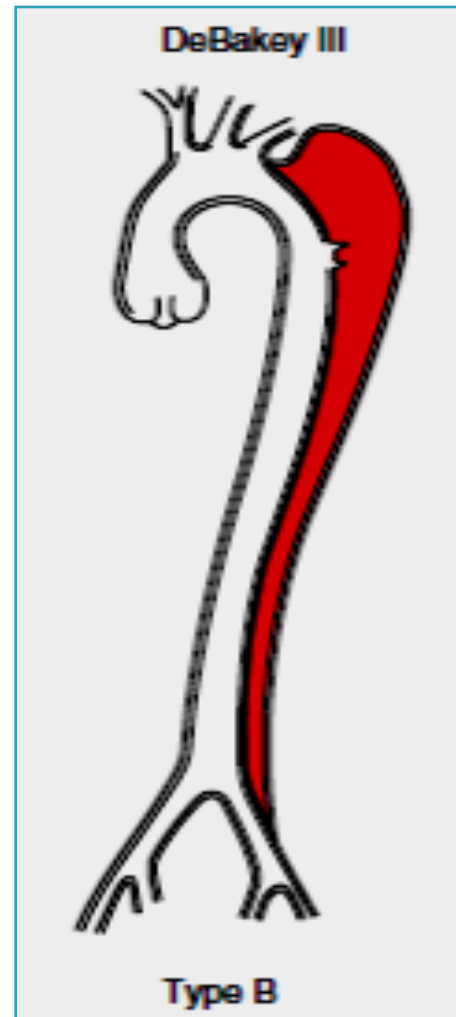
- ▶ the most common among inherited or acquired connective tissue disorders associated with aortic dissection
- ▶ autosomal dominant disease of **fibrillin**, an ECM scaffolding protein required for normal elastic tissue synthesis.
- ▶ skeletal abnormalities (elongated axial bones); ocular findings (lens subluxation) ; cardiovascular manifestations

Aortic dissections are generally classified into two types:

- ▶ 1- The more common (and dangerous) *proximal* lesions (called *type A dissections*), involving either the ascending aorta only or both the ascending and descending aorta (**types I and II of the DeBakey classification**)



- ▶ **2- *Distal lesions***
not involving the ascending part and usually beginning distal to the subclavian artery
(called ***type B dissections*** or **DeBakey type III**)



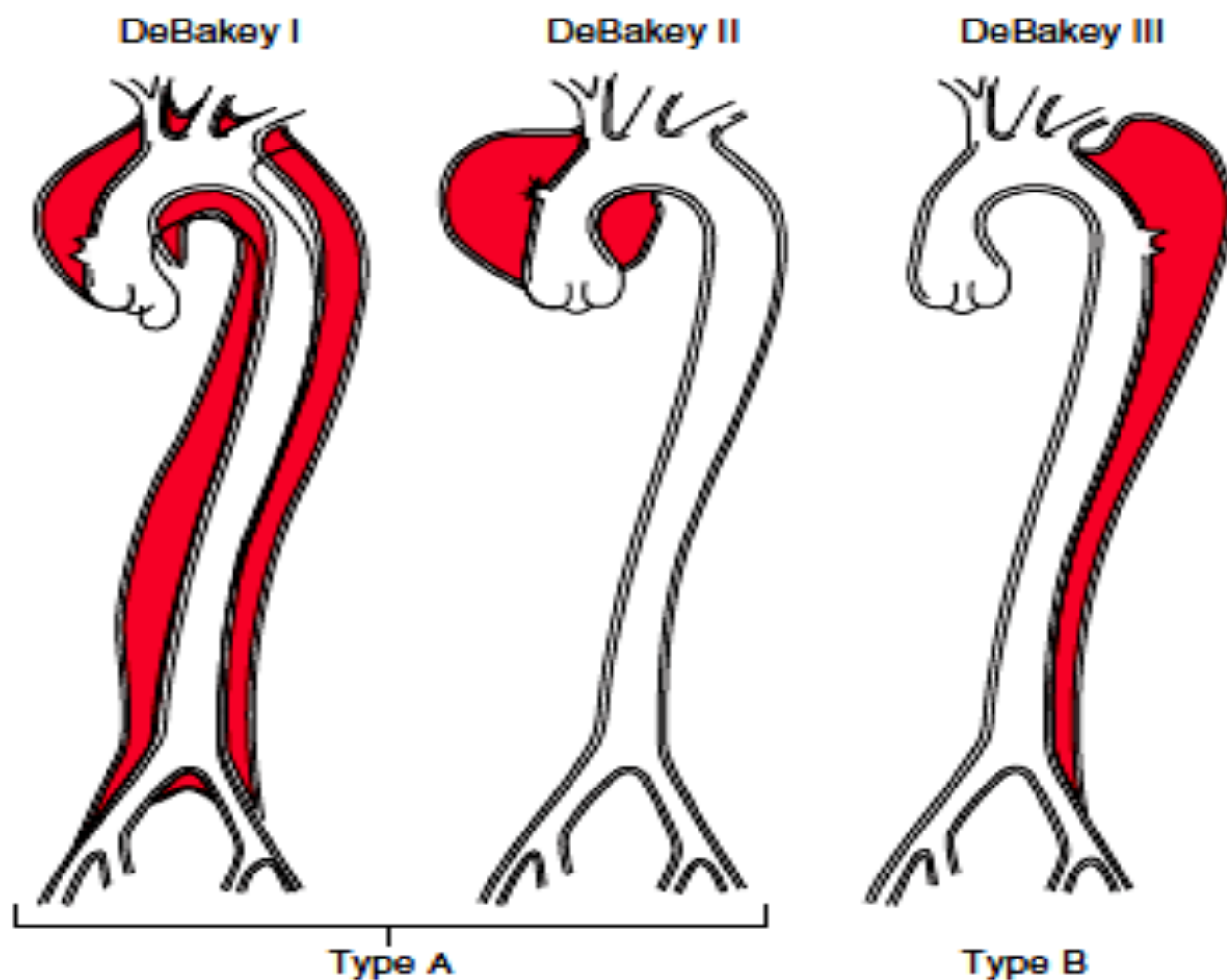


Figure 9-21 Classification of dissections. Type A (proximal) involves the ascending aorta, either as part of a more extensive dissection (DeBakey type I), or in isolation (DeBakey type II). Type B (distal, or DeBakey type III) dissections arise after the takeoff of the great vessels.

Clinical course

- ▶ **Previously, aortic dissection was typically fatal, but the prognosis has markedly improved.**
 - ▶ **Rapid diagnosis and institution of intensive antihypertensive therapy, coupled with surgical procedures involving plication of the aorta permits survival of 65% to 75% of patients**
- 