

Aortic aneurysms and vascular anomalies

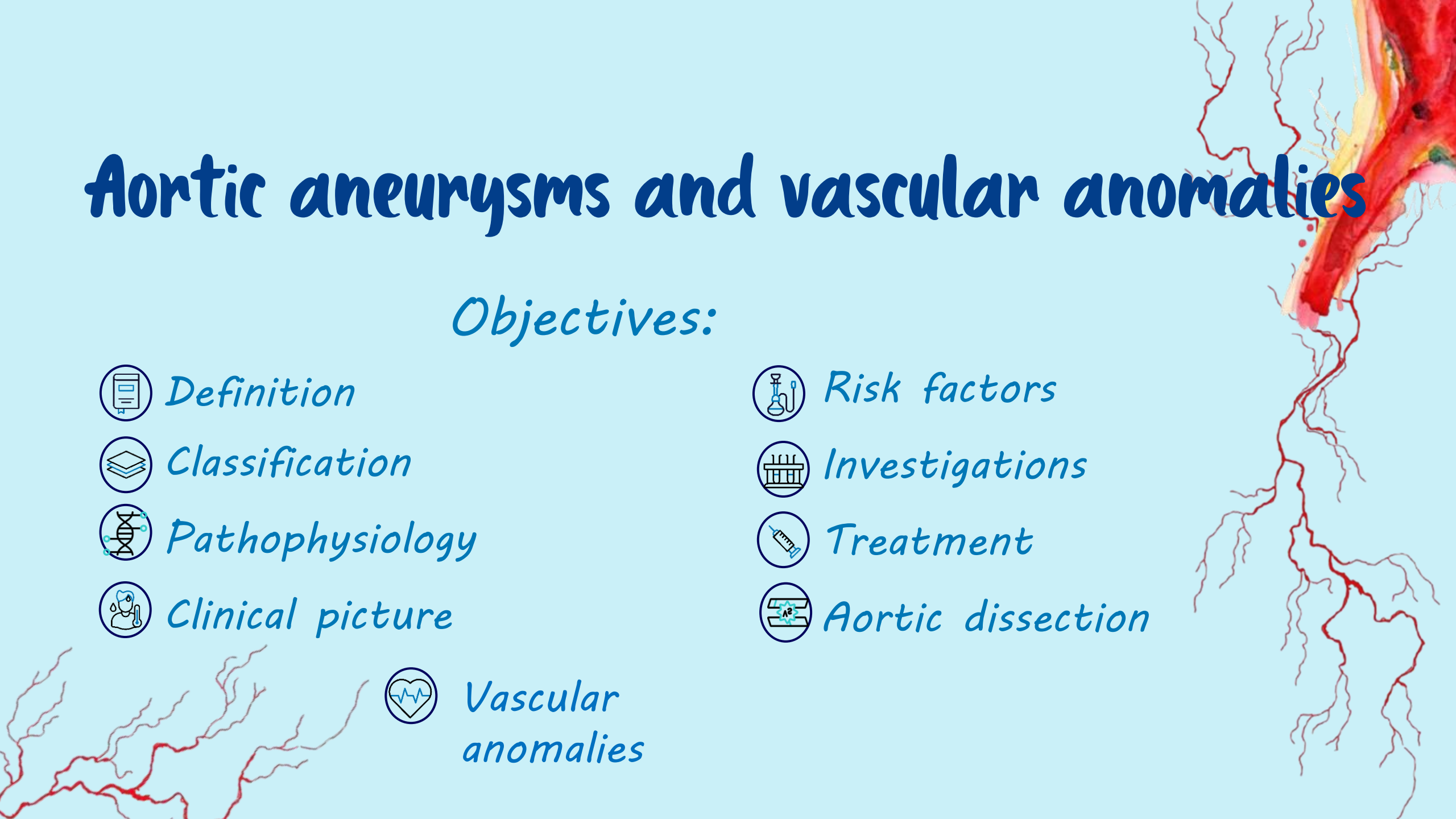


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Aortic aneurysms and vascular anomalies



Objectives:



Definition



Classification



Pathophysiology



Clinical picture



Risk factors



Investigations



Treatment



Aortic dissection



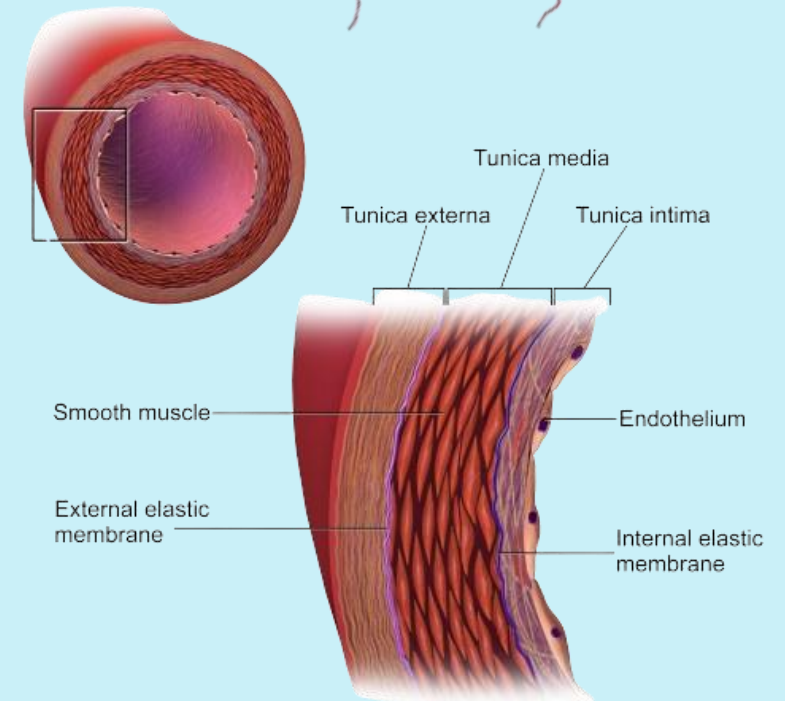
*Vascular
anomalies*



Definition

layers of the arteries:

1. **Intima: (innermost) layer:** composed of thin lining of epithelial cells that maintain smooth surface to prevent clotting.
2. **Media:** consist of smooth muscle and elastic tissue provides strength and elasticity to expand and contract the wall with each heartbeat.
3. **Adventitia (outermost) :** made of connective tissue providing structural support and protection. contains vasa vasorum small blood vessels supply blood to the artery wall itself.

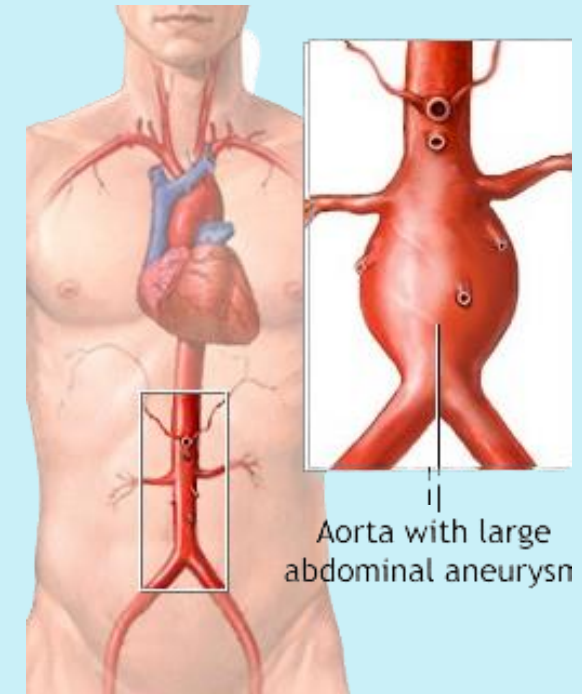




Definition

What is an Aneurysm?

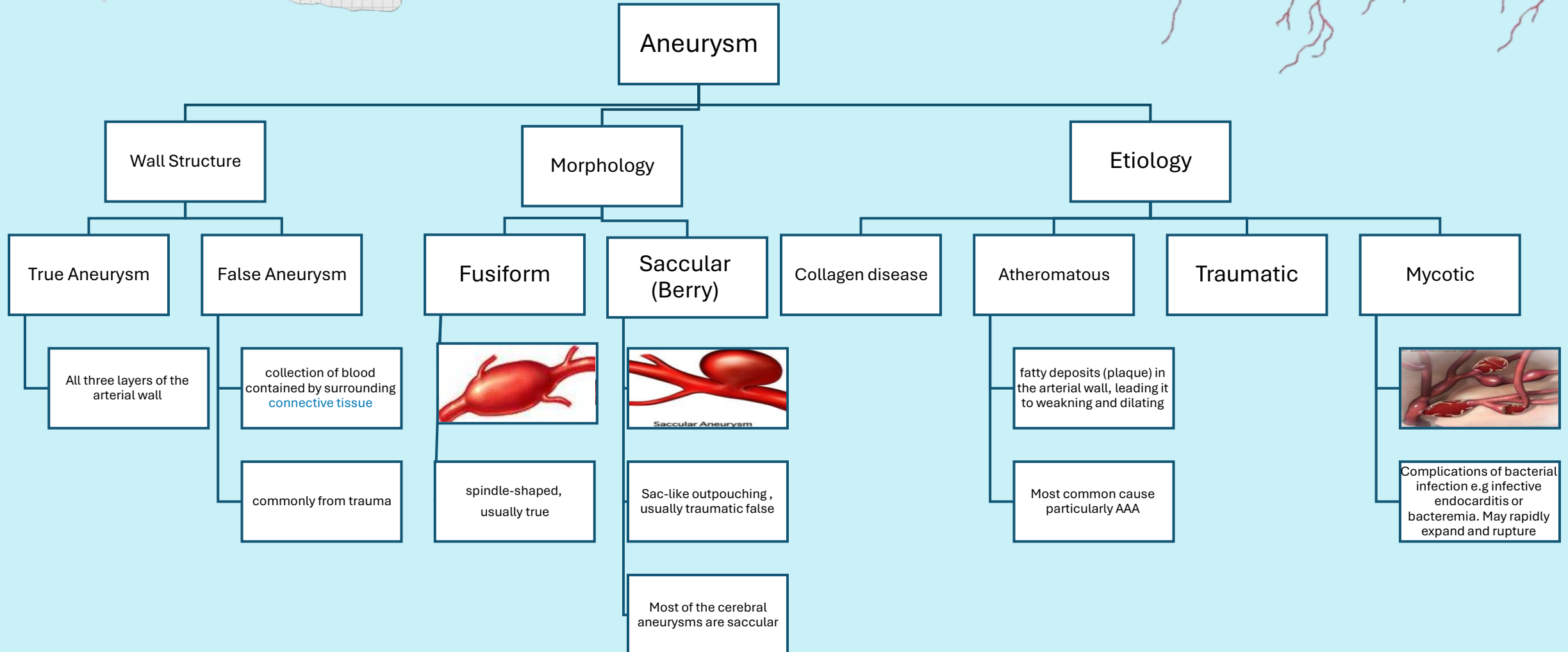
increase in the arterial wall's size exceeding $\Rightarrow$ 50% of its normal diameter forming a localized dilation.



The majority are true fusiform atherosclerotic aneurysms



Classification





Pathophysiology

1. Weakened arterial wall and increased hemodynamic stress. due to:

- Marfan sx.
- vascular-type Ehlers-Danlos
- familial thoracic aortic aneurysm and dissection.

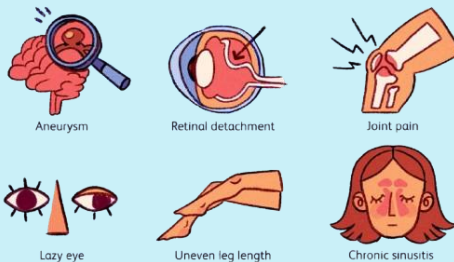
2. degradation of the "extracellular matrix" and reduction of "elastin".

- MMPs: **matrix metalloproteinases** brake down these structural proteins.
- Antiproteolytic enzymes fail to properly inhibit MMPs causing weakening of the arterial wall.

3. Immune and hormonal influence.

4. Degenerative complication following aortic dissection (AD).

Marfan Syndrome Symptoms





Clinical picture

➤ *Asymptomatic*

- **Most aneurysms** especially AAA, are **asymptomatic** and are often discovered incidentally.

➤ *Symptomatic*: resulting from thrombosis, embolism, compression of surrounding structures.

- **Dull, aching pain**: **commonest** presentation
 - Abdomen: caused by stretching of the artery.
 - Back: due to erosion of the lumbar vertebrae.
- **Loin and groin pain** (referred pain due to N. compression).
 - **Pulsatile mass**: the patient has a pulsating sensation related to the site of the aneurysm "common in femoral aneurysm" This may be palpable and observed by physicians, particularly in thinner patients.
 - **Compression symptoms**
 - dysphagia / breathing issues. (TAA) compressing the esophagus / trachea.
 - Hoarseness: compression of the recurrent laryngeal N in (TAA).
- **Rupture**
 - sudden severe pain in the abdomen or back.
 - Signs of shock: hypotension, tachycardia, dizziness, loss of consciousness.



Clinical picture

• Thoracic aortic

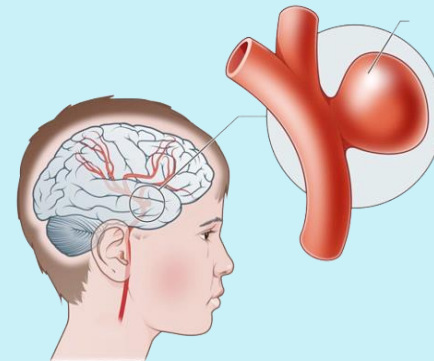
- Pain over jaw, neck, chest, upper back, left shoulder.
- Dyspnea.
- Cough.
- Hoarseness.

• Abdominal aortic

- Deep penetrating pain in the back or sides of the abdomen.
- Cold clammy skin.
- Numbness.
- Tingling in the feet.
- N/V.

• Cerebral aneurysm

- Droopy eyelid.
- Double vision.
- Pain above and behind the eye.
- Dilated pupil.
- Numbness.
- Weakness of one side of the face or body.



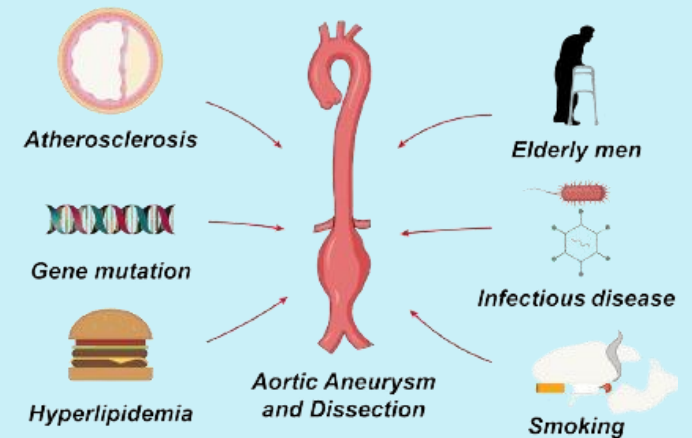
• Peripheral aneurysm

- A pulsating lump that can be felt in the neck, arm, or leg.
- Arm or leg pain.
- Gangrene
- The most common site is popliteal.

Risk factors

- **Age:** aneurysms are rare before the age of 50.
- **Gender:** males are six times more likely to be affected than females.
- **Smoking.**
- **Hypertension.**
- **Genetic predisposition.**
- **Obesity.**
- **Atherosclerosis.**
- **Race:** more common in white individuals.
- **Drug use (cocaine).**
- Infection with **syphilis**

*Female gender, black race, and (DM) appear to have a protective effect.



Case scenario

Sami is a **68-year-old** male and a **heavy smoker**. He complains of **dull abdominal pain radiating to the back, nausea**, and a feeling of fullness after eating small amounts of food.

He has a history of **hypertension, high cholesterol**, and a coronary stent. On examination, a central abdominal **pulsating mass** is found.





Clinical picture

Inspection

- Examine the area for any abnormal swelling or bulging or mass and observe for visible pulsations.

Palpation

- Palpate the area for any pulsation that expands with each heartbeat.
- Tenderness: Assess for tenderness over the aneurysm, might indicate inflammation or a stretched aneurysm at risk to rupturing.
- Shape and Size: Determine the shape (fusiform / saccular) and size of the aneurysm.
- Mobility and Consistency: It should feel firm and smooth and may be slightly movable from side to side.

Auscultation

- Listen for a **Bruit** over the aneurysm site. In the event of a ruptured aneurysm, a loud machinery murmur can be auscultated over the site.





Clinical picture

Misdiagnosis

Many **lumps** in the upper abdomen can transmit aortic pulsation, potentially leading to misdiagnosis as aneurysms. as in the case where the aorta is encased by **pathologically enlarged lymph glands**.

A thrombosed popliteal aneurysm is smooth and solid, lacking pulsation or fluctuation. It can be moved slightly from side to side but not up and down. This condition may be mistaken for a **Baker's cyst** or a **semimembranosus bursa**.



Fig. 10.18 A popliteal aneurysm.



Clinical picture

Ruptured aneurysm

Ruptured AAA: A ruptured aneurysm is a surgical emergency involving the tearing of a weakened area in a blood vessel wall.

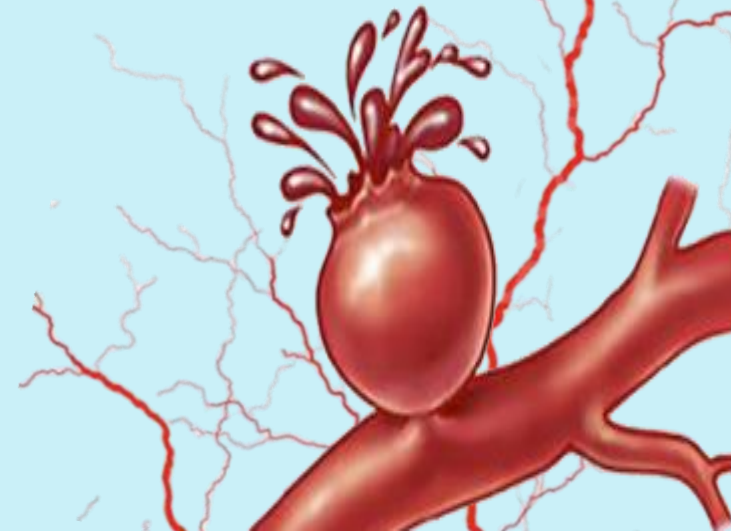
Abdominal Aortic Aneurysms can rupture in two main directions:

- Anteriorly into the peritoneal cavity.
- Posterolaterally into the retroperitoneal space.

Clinical Presentation:

• Pt. with ruptured aneurysm presents with the following triad:

1. Severe abdominal pain.
2. Hypotension.
3. Pulsatile abdominal mass.





Clinical picture

Ruptured aneurysm

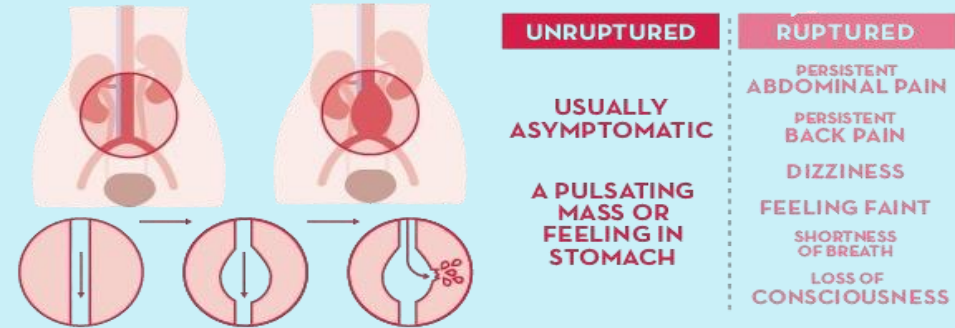
Diagnosis:

A CT-scan is performed to confirm the rupture and assess the possibility of endovascular repair.

Management:

- Immediate Resuscitation: administer oxygen, initiate IV fluids and establish a central line.
- Control Pressure: Keep systolic blood pressure ≤ 100 mmHg.
- Ensure quick transfer to the OR for surgical intervention.

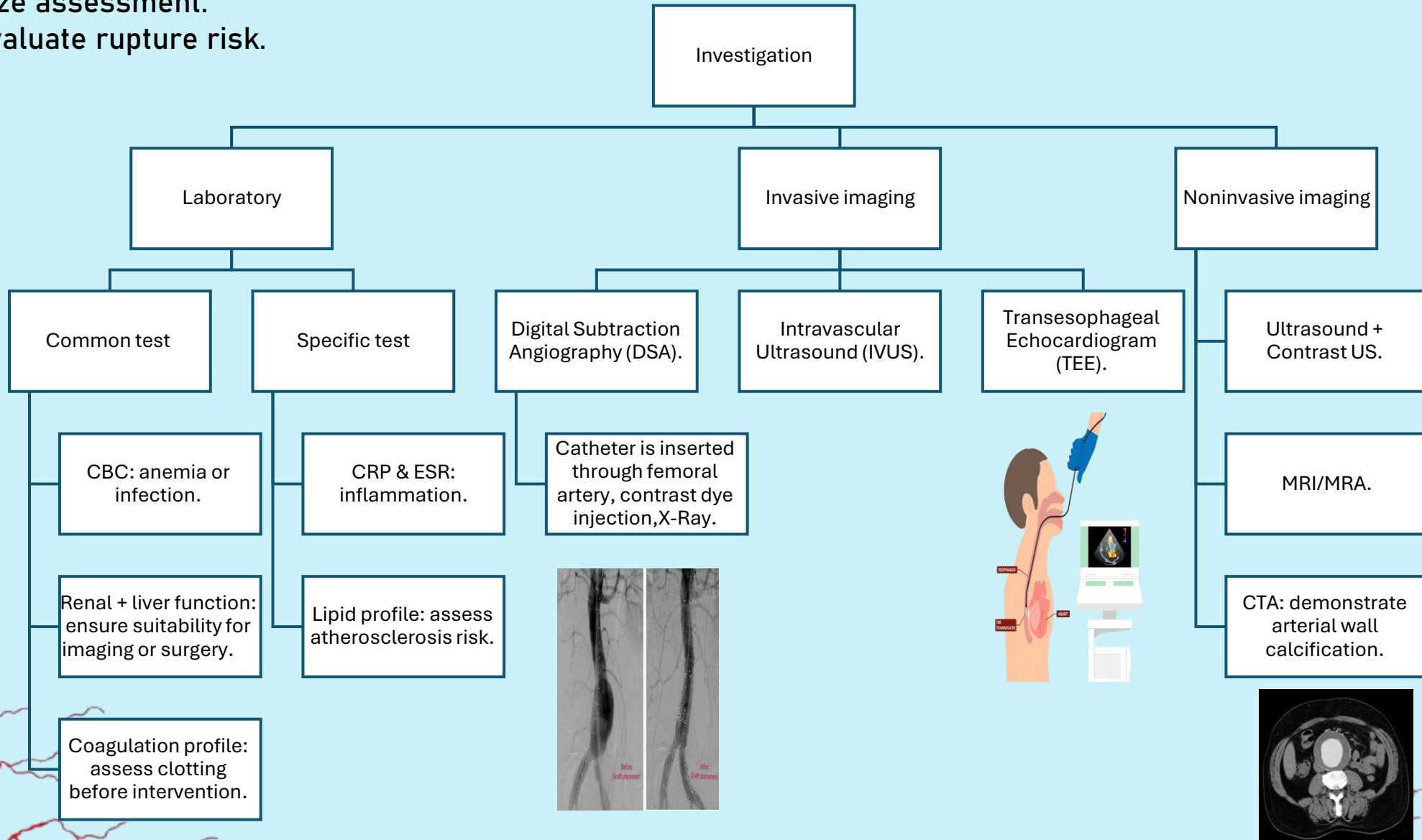
keep in mind: An **ECG** is a primary survey to evaluate **chest pain** but may show nonspecific results in acute aortic dissection. ST-segment changes can indicate myocardial ischemia, particularly if the dissection affects the coronary arteries.



Purpose:

- Confirm diagnosis.
- Size assessment.
- Evaluate rupture risk.

investigation

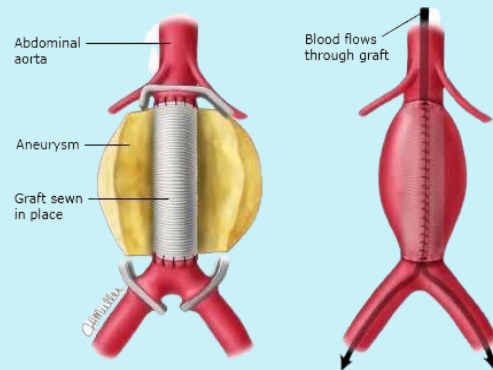




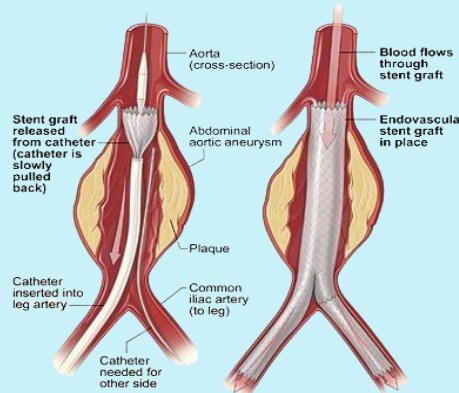
Treatment

purpose:

- Prevent rupture.
- Manage symptoms.
- Repair or remove the aneurysm.
- **Monitoring:** imaging to track the size.



Open surgical



EVAR

Interventions:

• Medications:

- Antihypertensives.
- Statins.
- Anti platelets.

• Surgical:

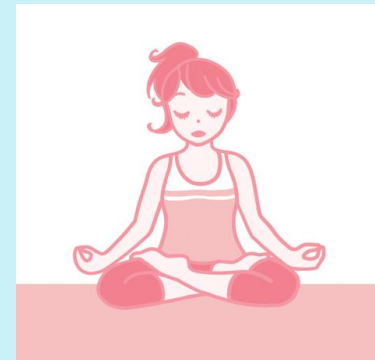
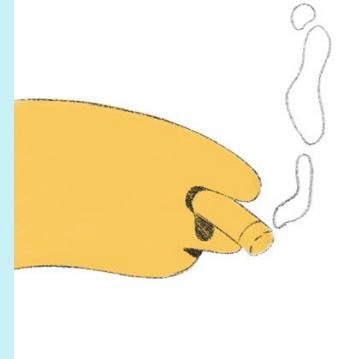
- Open surgical repair:
 - Removal of the aneurysm and placement of a graft.
 - Endovascular aneurysm Repair (EVAR):
 - Minimally invasive placement of a stent graft via catheter.
- *5.5 cm or symptomatic is an indication for surgery.**



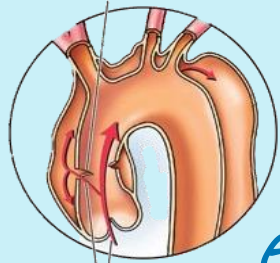
Treatment

Follow up:

- Regular imaging (CTA and US), is conducted to monitor for complications e.g. leakage and graft migration .
- Lifestyle change:
 - Quit smoking, improve diet, and exercise.
 - Control BP and cholesterol to reduce the risk of future aneurysm growth and prevent complications.



Tear in wall



Blood flow



Aortic Dissection

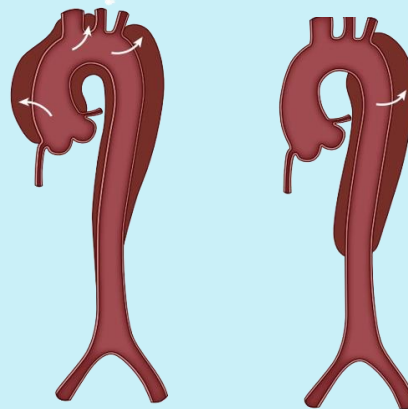
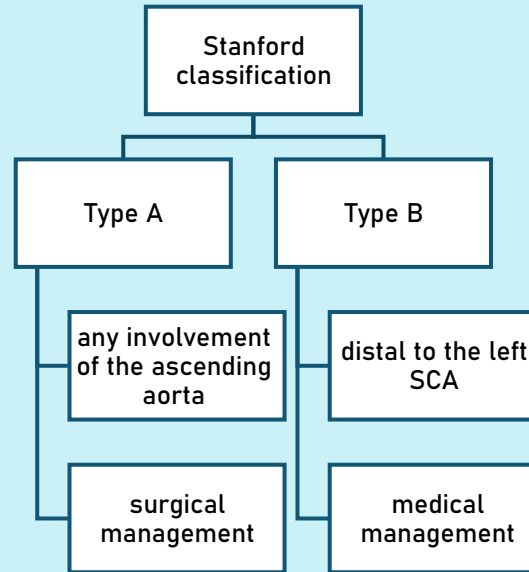
Aetiology

- a defect in the intima, resulting in blood splitting the medial layer and creating a false lumen.

(a disease of the media)

- most commonly occurs in the ascending aorta
- more common in 50–70-year-old men.
- usually occurs as a spontaneous event.
- important associations : history of hypertension , Marfan syndrome, Loey-Dietz and pregnancy.

- **Bernoulli's law** explains that the false lumen has higher p. and may compromise the flow in the true lumen.



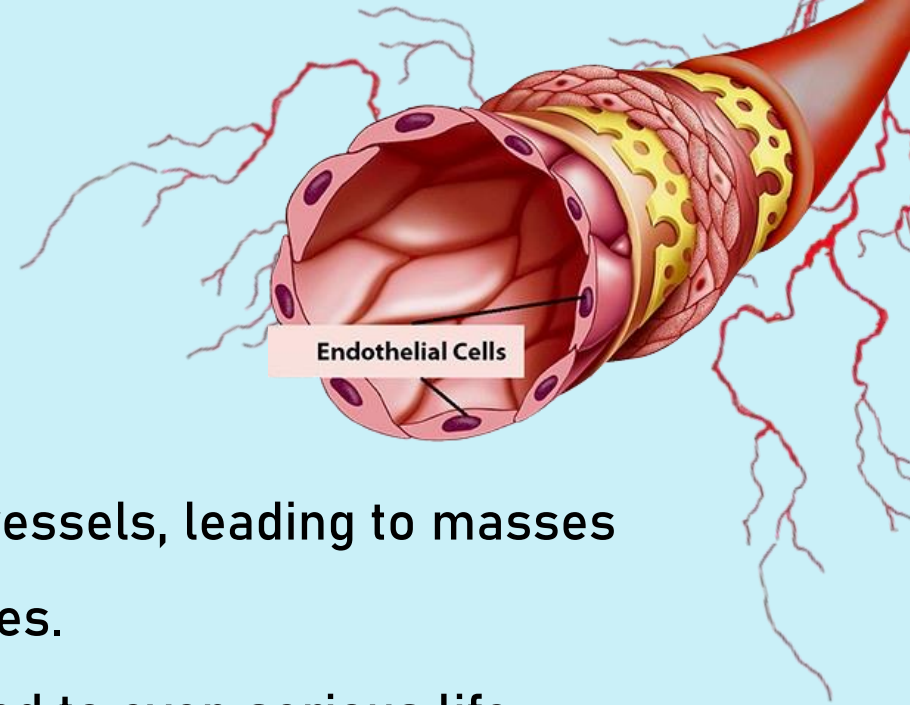
Clinical features:

- tearing intrascapular pain.
- may rupture back into the lumen or externally into the pericardium (**cardiac tamponade**) or mediastinum (**left haemothorax**).
- symptoms and signs of a stroke or TIA.
- MI.
- aortic regurgitation.
- renal pain and renal failure.
- Paraplegia.
- abd. pain and bowel ischaemia.
- leg pain, pallor, loss or reduced pulses.





Vascular anomalies



Definition

congenital anomalies caused by abnormal growth of blood vessels, leading to masses originating and consisting of blood vessels with variable shapes.

- Results in significant cosmetic problems and some may lead to even serious life-threatening hemorrhage and other complications.

Classified biologically

based on their clinical behavior and endothelial cell characteristics into two groups:

1. Hemangiomas.
2. vascular malformations.



Vascular anomalies

Hemangiomas

- vascular anomalies caused by “endothelial proliferation”.
- True benign tumor
- young endothelial cells: embryonic cells with short doubling time.
- the most common tumors of the head and neck in infancy and childhood. Mainly in pre-mature.
- Female to male is 3:1,
- Complications: lazy eye, bleeding, Kasabach-Merritt syndrome, Skeletal distortion, Congestive HF.
- Appear as small lesions at the age of 3-4 weeks and resolve spontaneously near 5-9 years.
- Treatment is indicated when they are complicated.
- First line of treatment is by systemic steroids or beta blockers (propranolol) which induce involution of the lesion.
- Other : LASER or surgery.





Vascular anomalies

Vascular malformation

- structural abnormalities resulting from errors in the morphogenesis of embryonic vessels.
- formed of mature endothelial cells which have normal turnover rate throughout their natural history.
- They appear at birth.
- no receptors and no mast cells between them.
- Never goes spontaneously as hemangiomas and they do not respond to steroids.
- Complications: Erosion of bones causes fractures, bleeding, and Stealing blood from a limb leading to atrophy of distal parts.

Sturge-Weber syndrome

1. Port-wine stains.
2. mainly involving the ophthalmic division.
3. seizure.
4. Ipsilateral glaucoma.

Port-wine stain: capillary malformation restricted to one or more of the three trigeminal sensory areas (ophthalmic, maxillary and mandibular branches).



Hemangiomas

Vascular malformation

define	vascular anomalies caused by “endothelia proliferation”.	structural abnormalities resulting from errors in the morphogenesis of embryonic vessels.
Endothelial cells	embryonic cells	mature endothelial cells
Endothelial turn over rate	short doubling time	normal
First presentation	at the age of 3-4 weeks	at birth
Female to male ration	3:1	1:1
Receptors and mast cells in-between cells	✓	✗
treatment	resolves spontaneously, steroids or beta blocker.	Never goes spontaneously and do not respond to steroids.



QUIZ

- 1. When discussing risk factor modification for a patient who has a 5-cm abdominal aortic aneurysm, the nurse will focus teaching on which patient risk factor?**
 - a. Male gender.
 - b. Turner syndrome.
 - c. Abdominal trauma history.
 - d. Uncontrolled hypertension.
- 2. A patient has a 6-cm thoracic aortic aneurysm that was discovered during routine chest x-ray. When obtaining an admission history from the patient, it will be most important for the nurse to ask about?**
 - a. low back pain.
 - b. trouble swallowing.
 - c. abdominal tenderness.
 - d. changes in bowel habits.



QUIZ

3. A 65-year-old male with a known large abdominal aortic aneurysm who has regular interval follow-ups presents with acute abdominal pain and altered mental status. Temperature is 37.7°C, HR 115, BP 88/56. Hemoglobin is 7.6, serum bicarbonate 18, and creatinine 1.3. What is the most appropriate next step?

- a. CT scan with IV contrast to delineate aneurysm anatomy.
- b. Admission to ICU for resuscitation and intubation under anesthesia.
- c. Urgent aneurysm repair.
- d. US evaluation of aneurysm.

Answers:

1. D; only hypertension can potentially be modified to decrease the patient's risk for further expansion of the aneurysm.
2. B; Difficulty swallowing may occur with a thoracic aneurysm because of pressure on the esophagus.
3. C; This patient has a ruptured abdominal aortic aneurysm, which carries an extremely high mortality. Time is of the essence. Given that the patient is hypotensive and acidotic, urgent repair is indicated. There is no time for imaging.

Thank you

Resources:

- ✓ *Bailey & Love's Short Practice of Surgery - 28th Edition.*
- ✓ *Sabiston Textbook of Surgery, 21st Edition.*
- ✓ *Browns introduction to the symptoms and signs of surgical disease - 6th edition.*
- ✓ *Surgical Recall - seventh edition.*
- ✓ *Lecture Notes _ 13th edition.*



*Don't forget
the oppressed people in **GAZA**
and all around the world*

Keep up the hard work and **boycott** the
occupation. Don't be part of the **crime**.

Here are some sources to help you follow up more easily.



داعم



disoccupied



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