ARTERIAL ANEURYSMS & AVM

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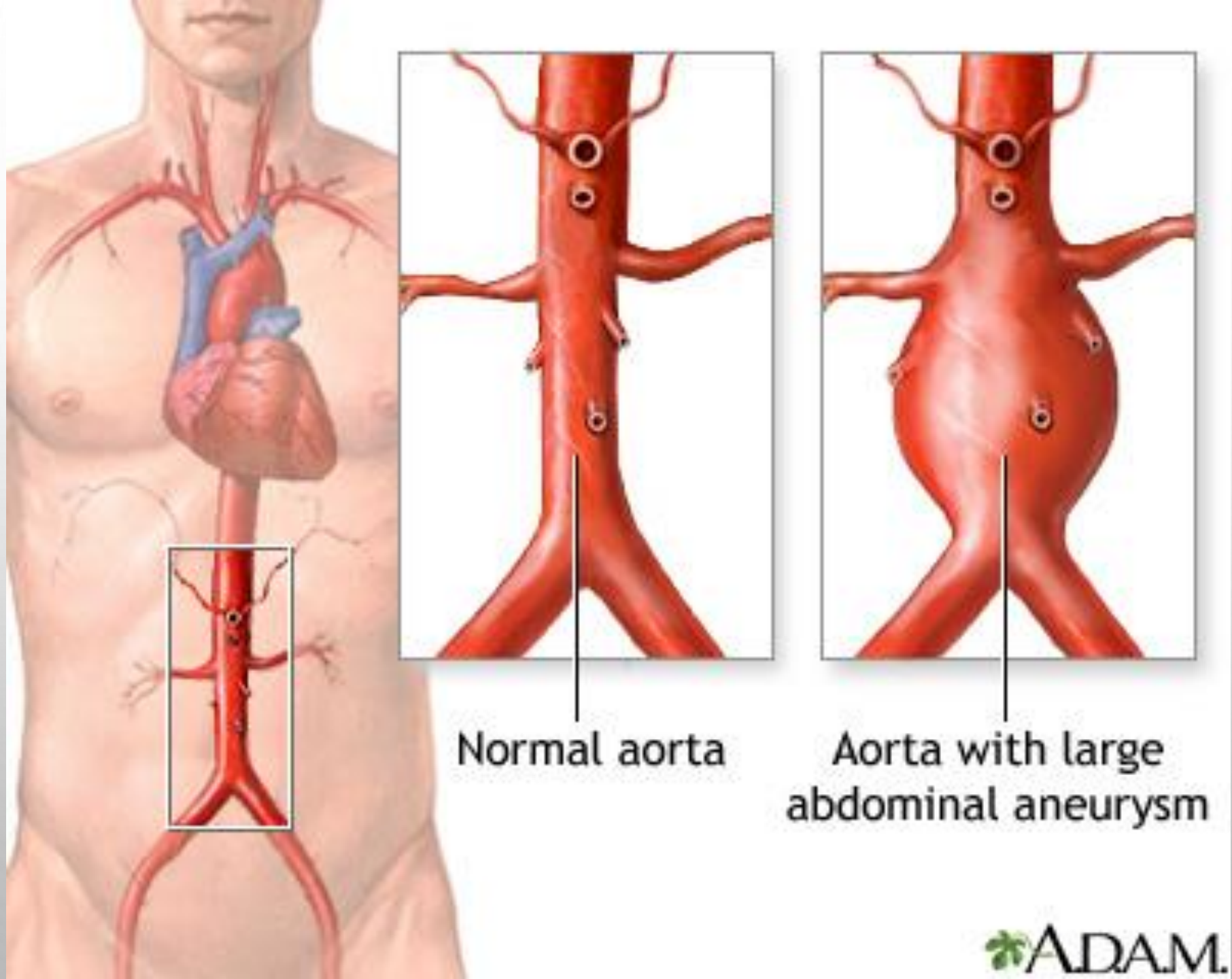
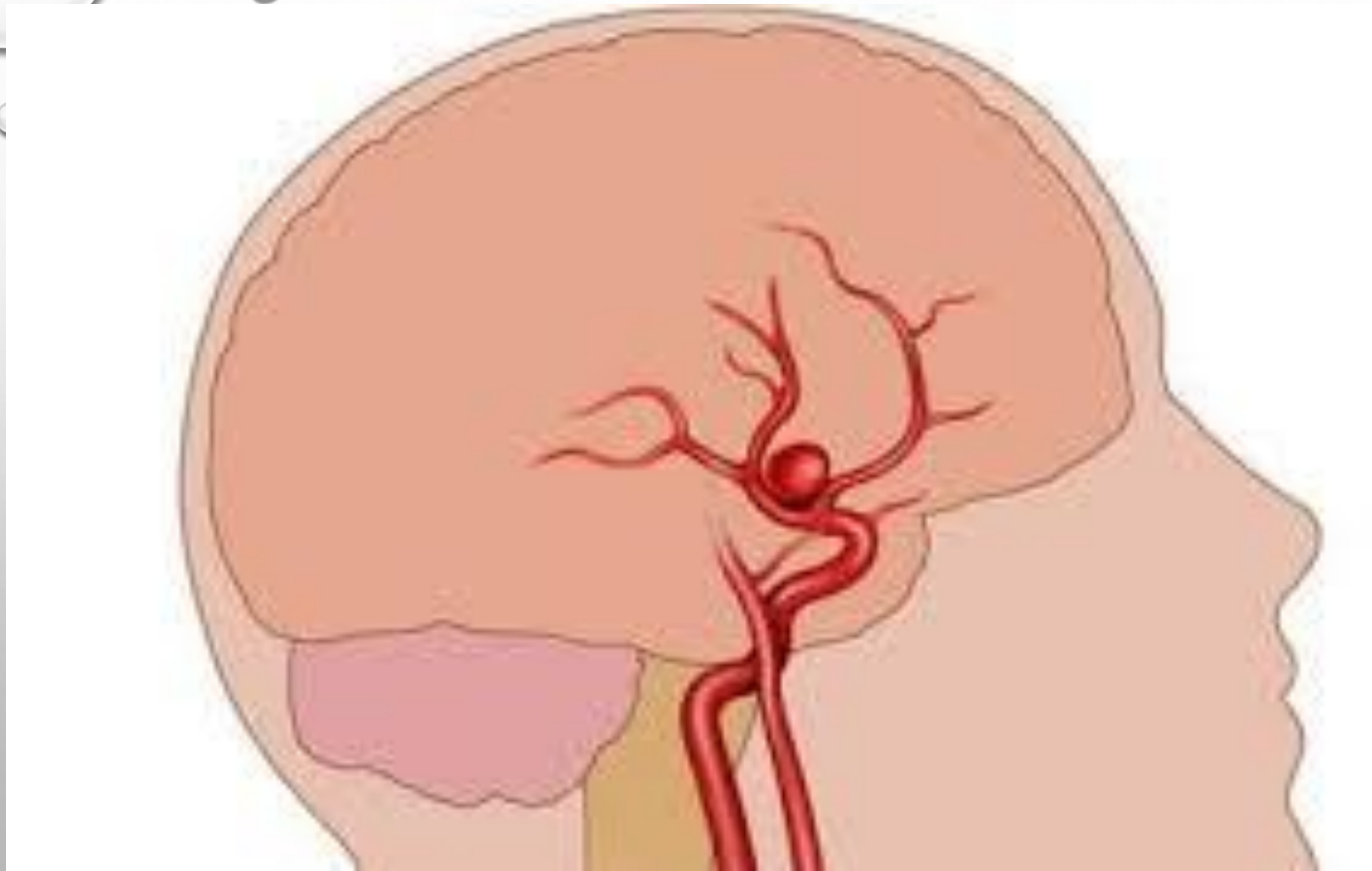
MBBS,MD,MRCS

ACTING CONSULTANT VASCULAR AND TRANSPLANT SURGEON

NCTH-RAGAMA


Normal aorta
Aorta with large abdominal aneurysm
A.D.A.M.

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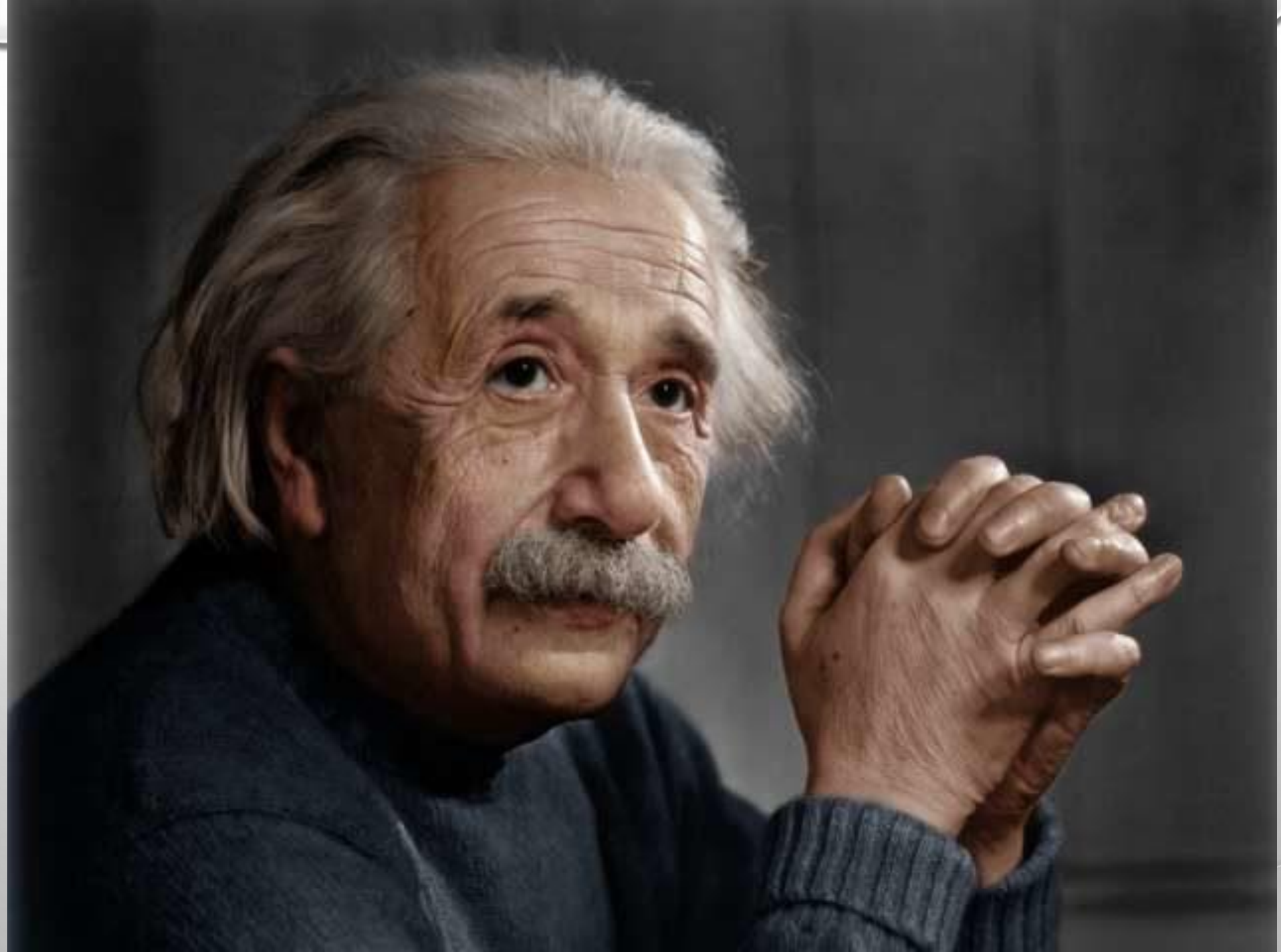
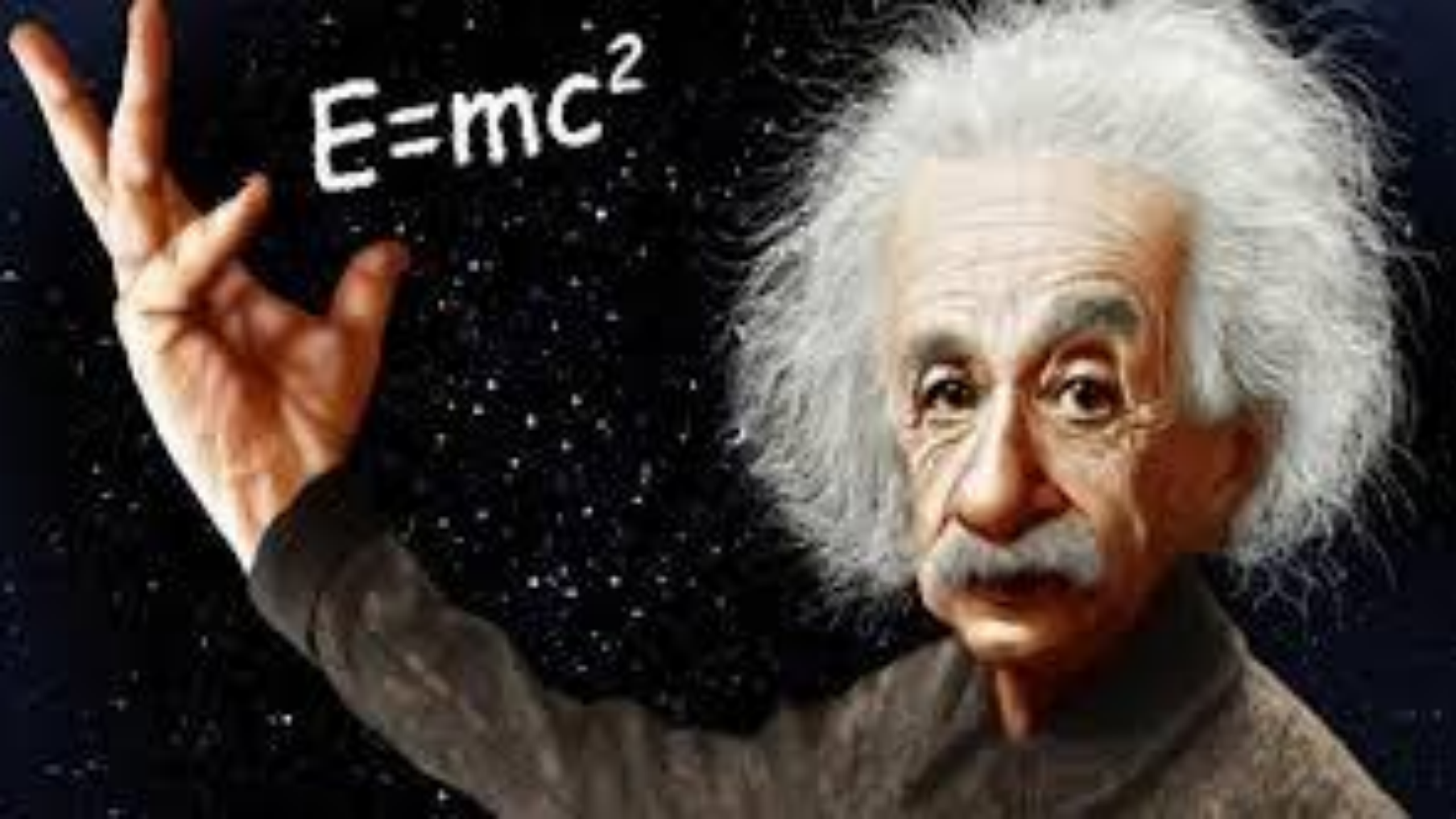



E=mc²

- IN DECEMBER 1948, DR. RUDOLPH NISSEN WRAPPED CELLOPHANE AROUND EINSTEIN'S ANEURYSM IN ORDER TO INDUCE FIBROSIS AND LIMIT EXPANSION.

- DIED IN APRIL 1955 FROM AN **ABDOMINAL AORTIC ANEURYSM.**

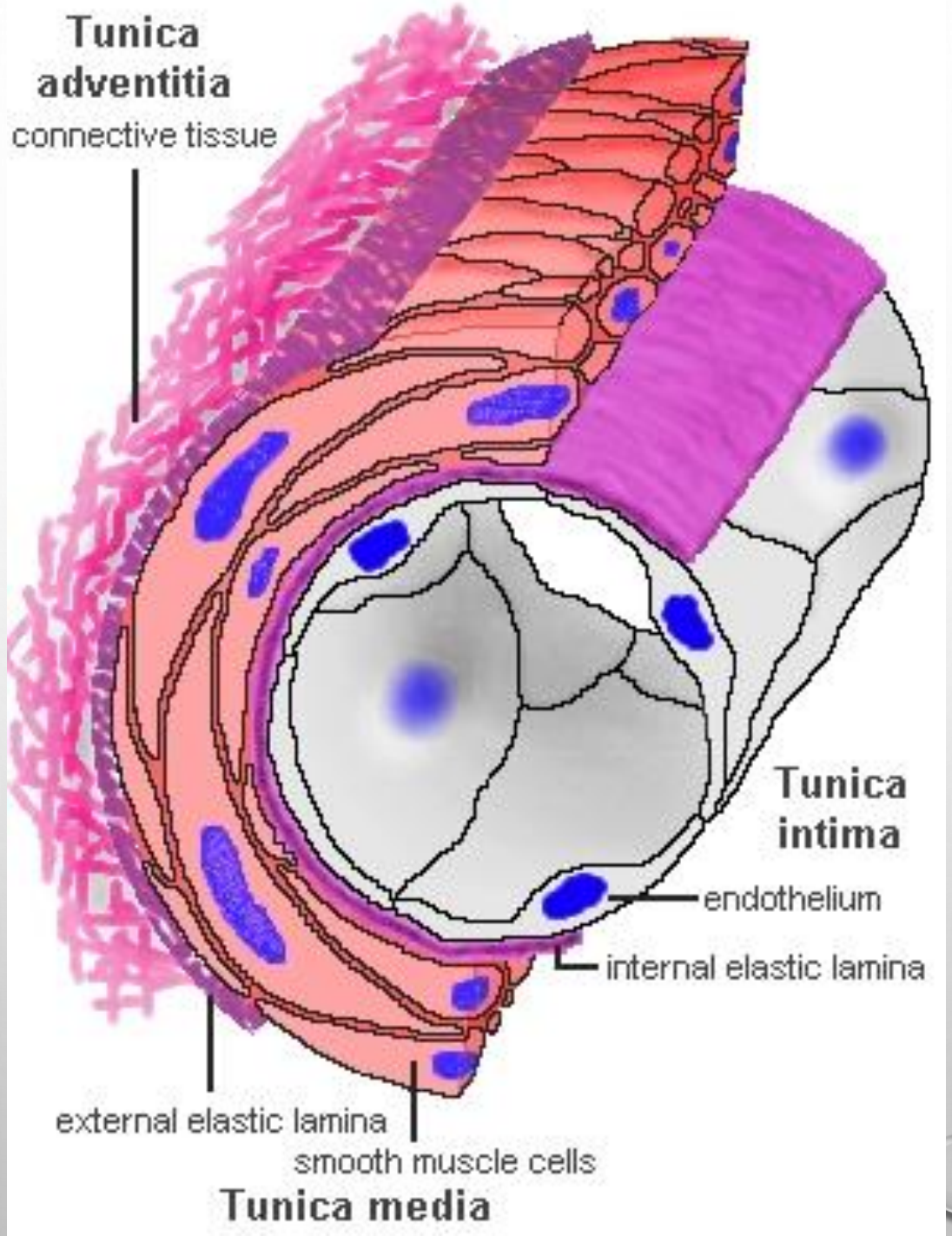
DEFINITIONS

- ABNORMAL FOCAL DILATION OF A VESSEL OF >50% DIAMETER OF ADJACENT VESSEL.
- AORTA- 2CM- ANEURYSM IF >3CM
- ECTASIA- <50% ENLARGED
- ARTRIOMEGALY- DIFFUSE, CONTINUOUS ENLARGEMENT OF MULTIPLE ARTERIAL SEGMENTS DILATED TO >50% OF NORMAL
- *ANEURYSMOSIS*- DESCRIBE MULTIPLE ANEURYSMS IN SEVERAL ANATOMIC LOCATIONS

Aneurysm	Ectasia
Diameter increase > 50% of normal expected diameter	Diameter increase < 50% of normal expected diameter

- THE PRIMARY DANGER IS FROM RUPTURE AND UNCONTROLLED HEMORRHAGE LEADING TO DEATH.

- THE RISK OF RUPTURE IS RELATED TO BOTH THE ABSOLUTE SIZE OF THE ANEURYSM AND ITS SIZE RELATIVE TO NORMAL DIAMETERS ON THE BASIS OF LOCATION, BODY SIZE, AND GENDER.


Tunica adventitia
connective tissue
Tunica intima
endothelium
internal elastic lamina
external elastic lamina
smooth muscle cells
Tunica media

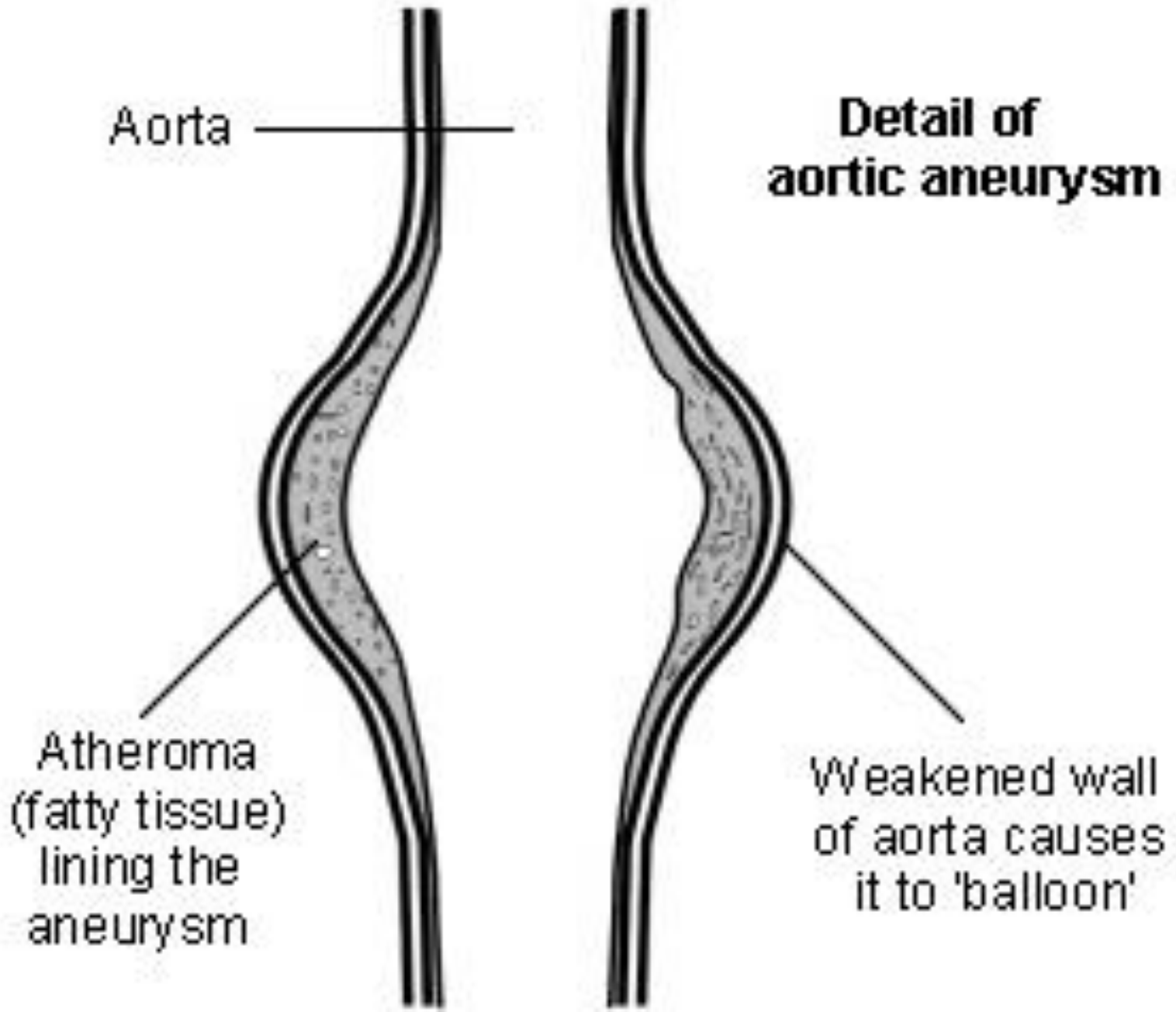
CLASSIFICATION

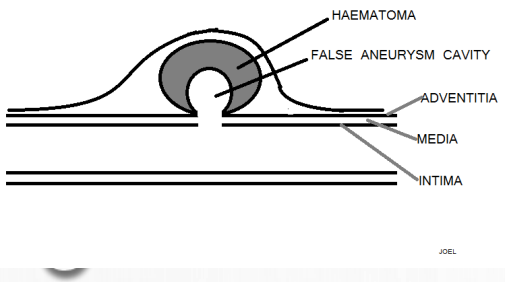
- BASED ON ANATOMY OF THE VESSEL- TRUE/FALSE
- BASED ON SHAPE- FUSIFORM/SACCULAR/ BERRY
- BASED ON LOCATION(ANATOMY)

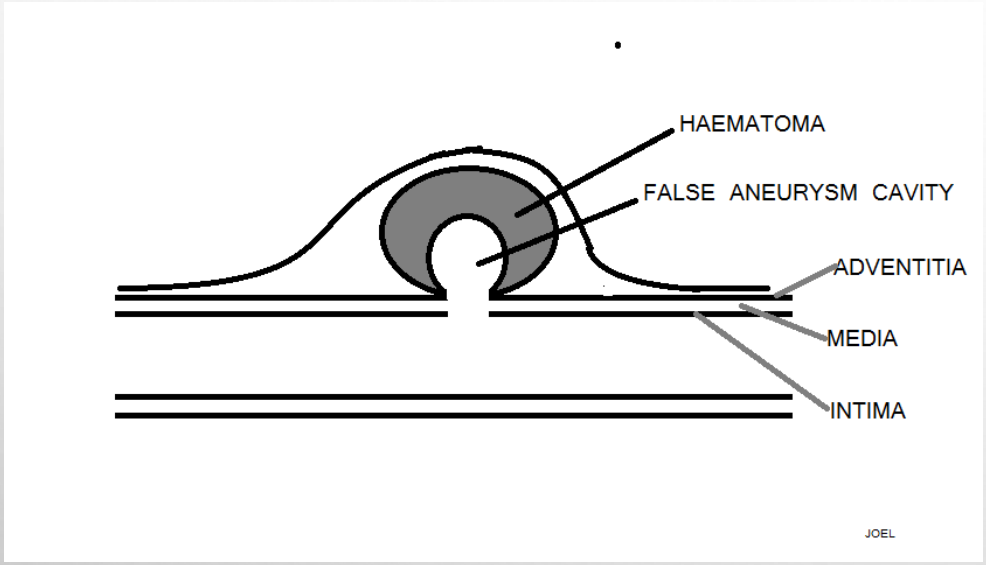
TYPES OF ANEURYSMS

- **TRUE**-3 LAYERS IN ARTERIAL WALL

- **FALSE/PSEUDOANEURYSM**
- ALL LAYERS ARE NOT INVOLVED
- WALL IS FORMED BY ORGANIZED HAEMATOMA AND CENTER HAS FLOW
- OCCUR FOLLOWING VASCULAR TRAUMA AND VESSEL WALL INFECTION (MYCOTIC).

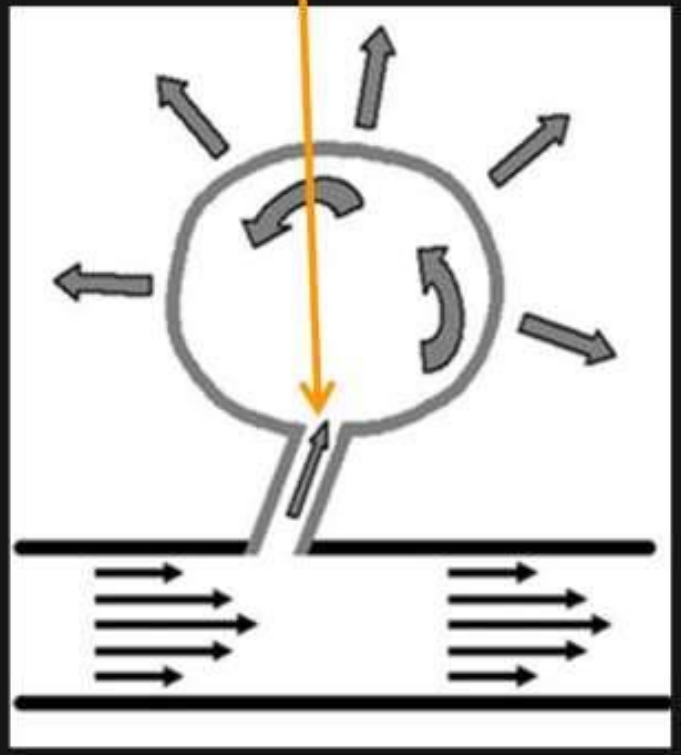

Aorta
Detail of aortic aneurysm
Atheroma (fatty tissue) lining the aneurysm
Weakened wall of aorta causes it to 'balloon'


HAEMATOMA
FALSE ANEURYSM CAVITY
ADVENTITIA
MEDIA
INTIMA
JOEL


HAEMATOMA
FALSE ANEURYSM CAVITY
ADVENTITIA
MEDIA
INTIMA
JOEL

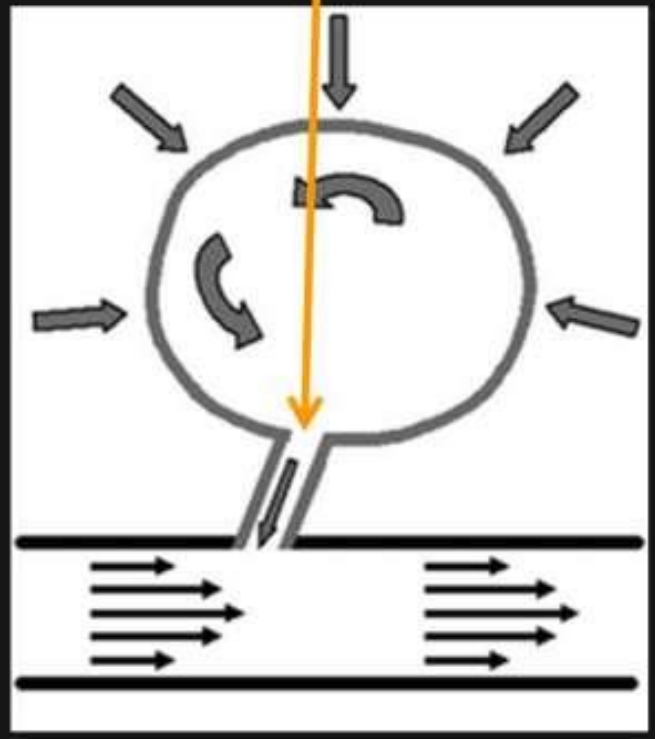
Pseudo-aneurysm

"to" flow enter via neck
Enlarge false lumen



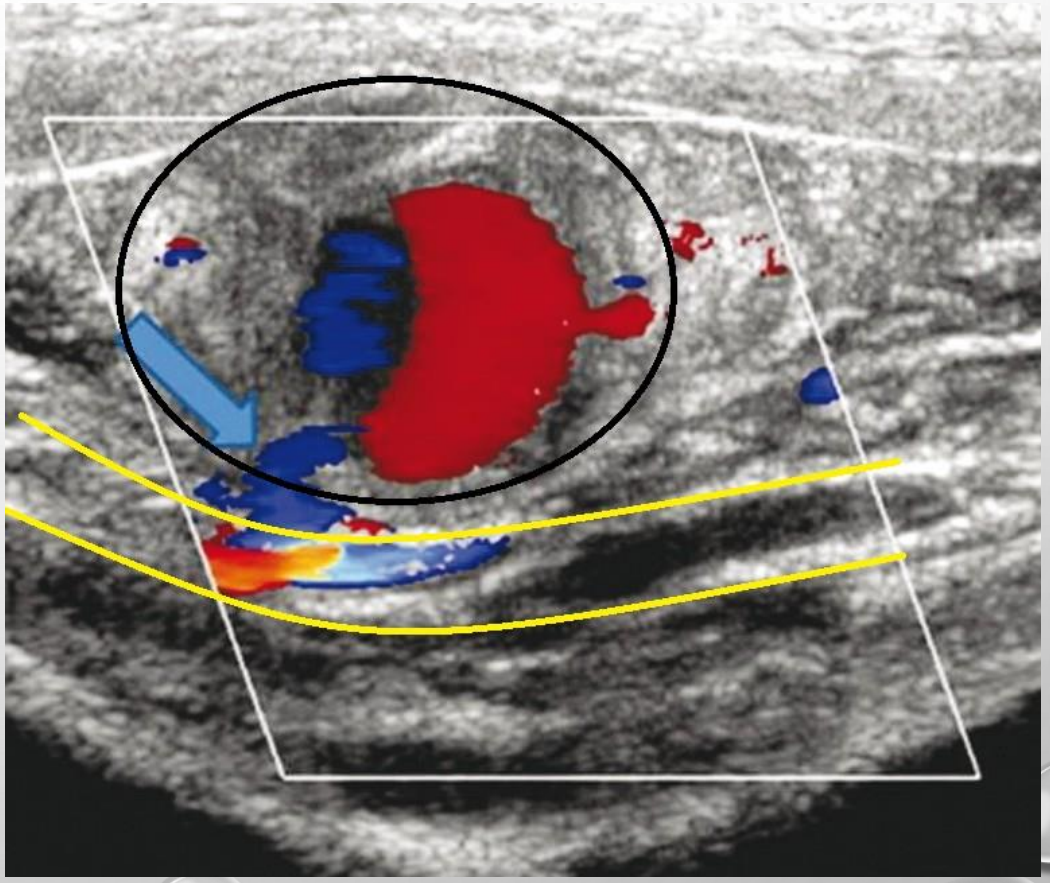
During systole

"fro" flow exit via neck
lumen contract



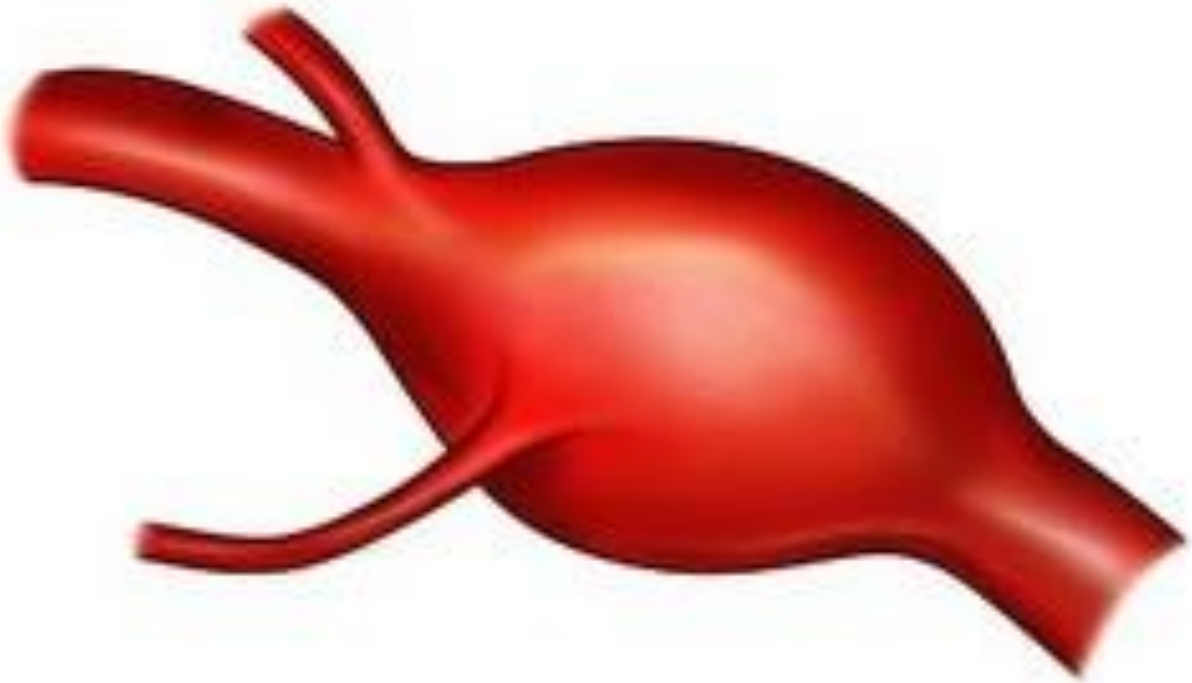
During diastole

FALSE ANEURYSM



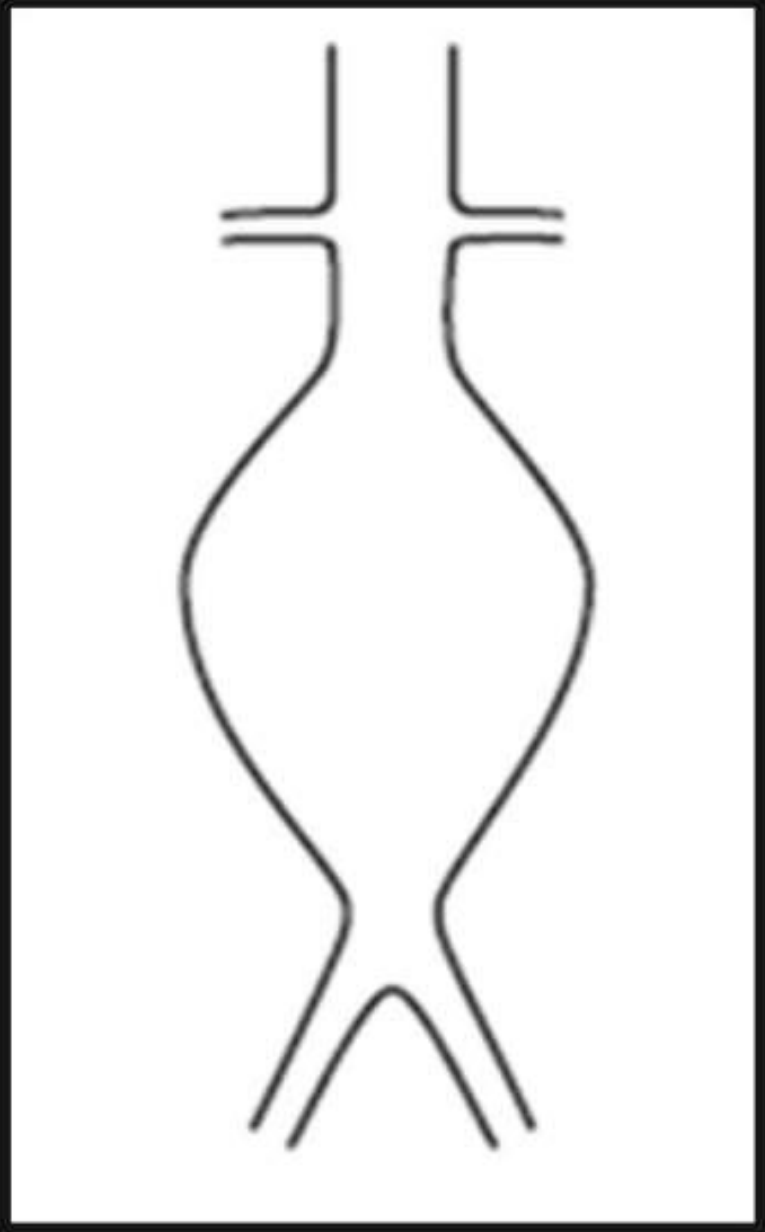
SACCULAR- ONLY INVOLVE PART OF VESSEL WALL

Saccular Aneurysm

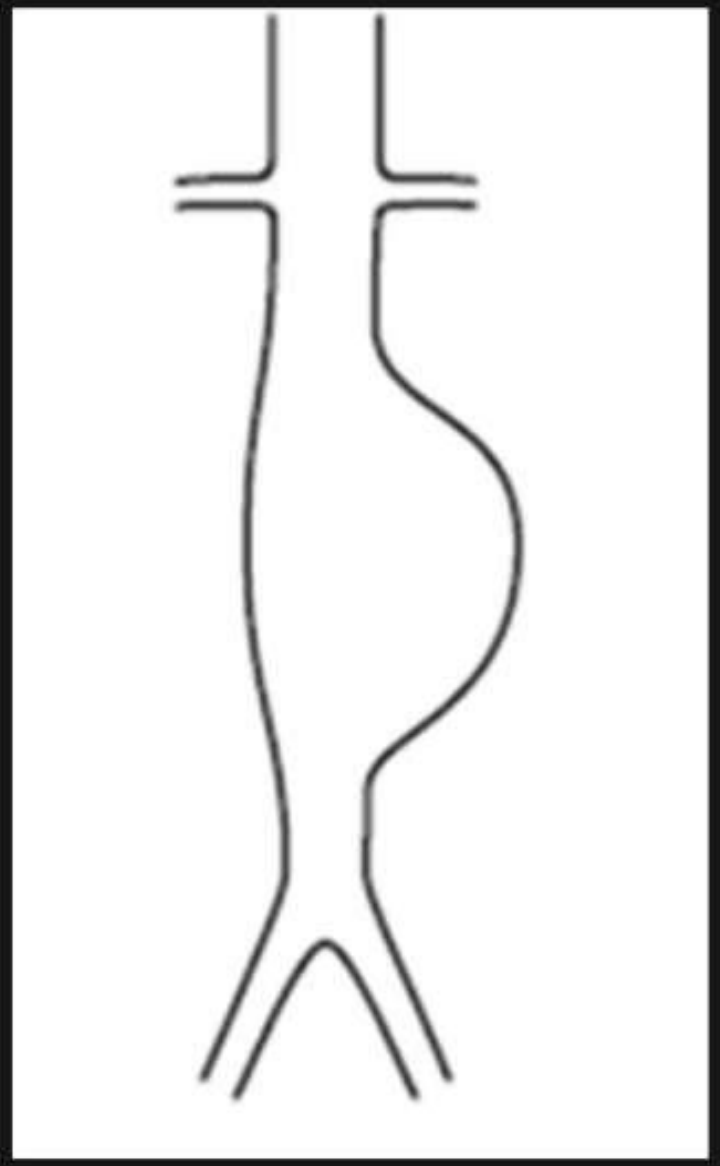


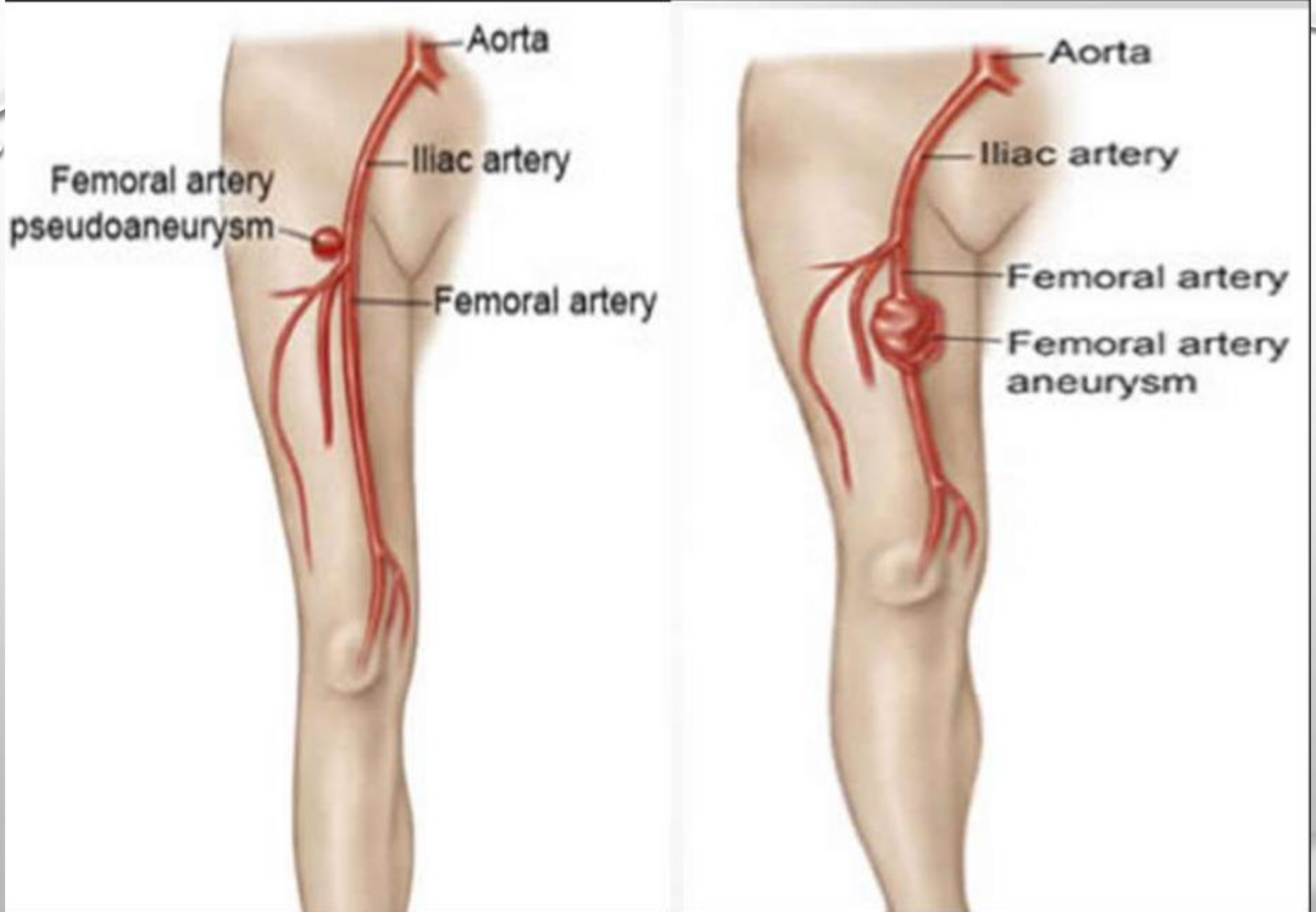
Fusiform Aneurysm

Fusiform aneurysm



Saccular aneurysm

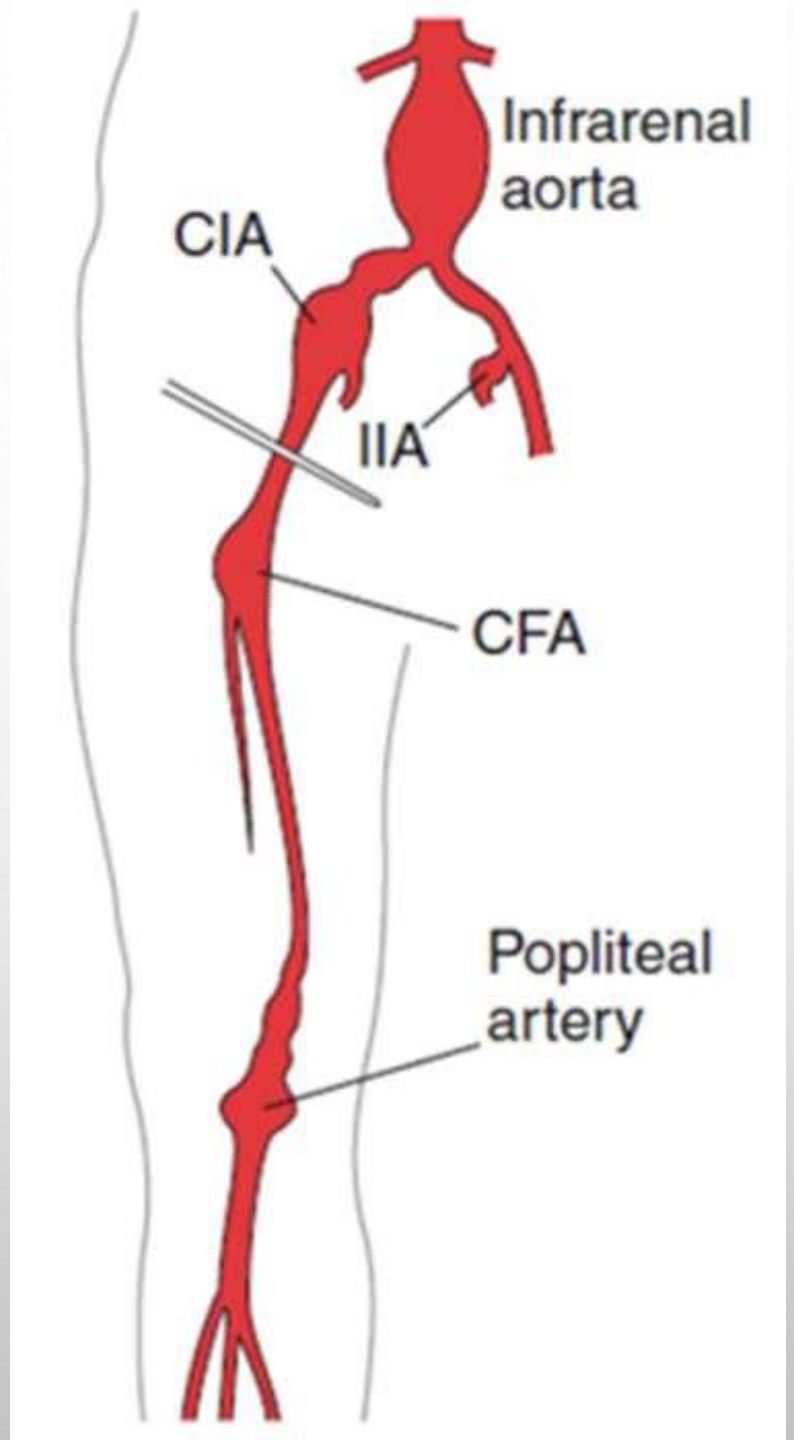



Aorta
Iliac artery
Femoral artery pseudoaneurysm
Femoral artery
Aorta
Iliac artery
Femoral artery
Femoral artery aneurysm

TYPES OF ANEURYSMS

- BASED ON LOCATIONS- ANATOMY

1. AORTIC
2. ILIAC
3. POLITEAL
4. FEMORAL, ETC


Infrarenal aorta
CIA
IIA
CFA
Popliteal artery

CAUSES

- **WALL WEAKENING –**

  ATHEROSCLEROSIS AND WEAKENING OF VESSEL WALL

  COMMONEST CAUSE

- **TRAUMA –** FALSE ANEURYSMS
- **INFECTION** - TUBERCULOSIS, AND OTHERS(MYCOTIC)
- **COLLAGEN VASCULAR DISEASE –** MARFAN'S, EHLERS- DANLOS
- **CONGENITAL WEAKNESS –** EG.BERRY **FAMILIAL**

DEVELOPMENTAL AND CONGENITAL ANOMALIES

- **PERSISTENT SCIATIC ARTERY** > 40% OF THESE PATIENTS WILL DEVELOP ANEURYSMS.

- **GENETIC**-AORTIC ANEURYSM INCREASES IN INCIDENCE FROM APPROXIMATELY 5% IN THE GENERAL POPULATION TO APPROXIMATELY **20%** TO **30%** IN MALE SIBLINGS OF AN ANEURYSM PATIENT

INFECTIOUS

- AN ECCENTRIC SACCULAR SHAPE,

- A WIDE VARIETY OF ORGANISMS INCLUDING MANY STRAINS OF BACTERIA AND FUNGI (E.G., **CANDIDA**, **ASPERGILLUS**), **TUBERCULOSIS**, AND **SYPHILIS**)

CLINICAL FEATURES

- PULSATILE MASS
- EXPANSILE
- REDNESS- IMPRESSION LIKE AN ABSCESS
- TENDERNESS+/-
- RUPTURE & BLEEDING

INVESTIGATIONS

- DUPLEX
- CT/MRI

MANAGEMENT

- **DEPENDING ON**
- SYMPTOMS/SIZE/ SITE/COMPLICATIONS(SKIN THREAT/INFECTION)
- TYPE OF ARTERY- END ARTERY VS DUAL SUPPLY(RDIAL/TIBIAL)
- TRUE/FALSE

AAA

- COMMON IN MALE(4:1), WHITE
- PREVALENCE INCREASES WITH AGE- 5-7% POPULATION OLDER THAN 60 YEARS

CLASSIFICATION

- SUPRARENAL
- JUXTARENAL
- INFRA-RENAL

PRESENTATION

- **INCIDENTAL FINDING** – ASYMPTOMATIC
- **SELF-FELT LUMP**
- **SYMPTOMATIC** – PAIN DUE TO EROSION OF VERTEBRAE INFECTION
  RAPID EXPANSION -0.5 CM/ YEAR
- **COMPLICATIONS**

1. RUPTURE
2. THROMBOSIS
3. EMBOLISM – BLUE TOE SYNDROME

- **SCREENING**

Clinical presentation

PRERUPTURE	POSTRUPTURE
Usually asymptomatic	Severe constant pain in back or abdomen
Vague epigastric discomfort	Severe hypotension tachycardia
Marked back/abdominal pain	Pulsatile abdominal mass
	Nausea vomiting

EXAMINATION

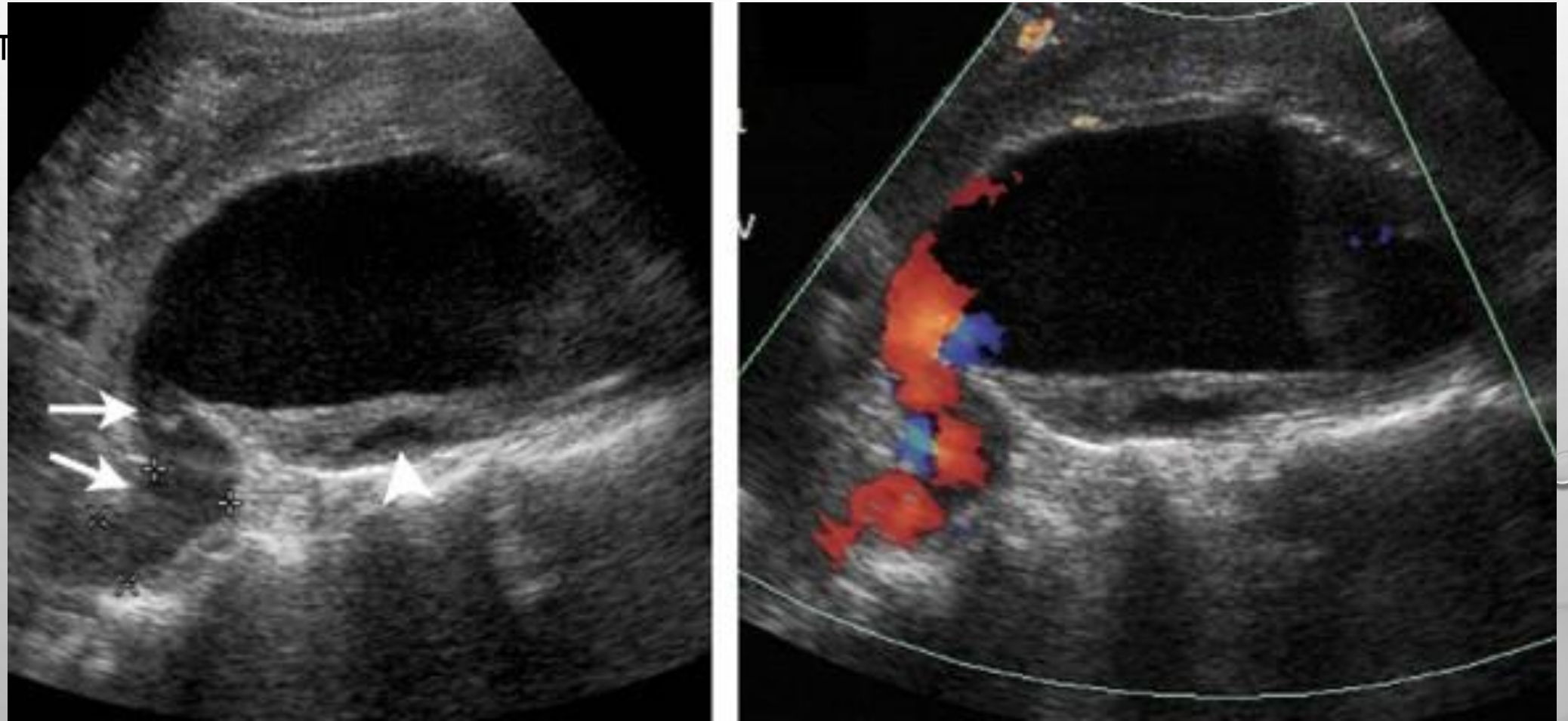
1. EXPANSILE MASS
2. AORTIC – ABOVE UMBILICUS
3. AORTO – ILIAC - BELOW UMBILICUS
4. CAN / CANNOT FEEL UPPER MARGIN - SUPRARENAL

INVESTIGATIONS

- FULL BLOOD COUNT, ELECTROLYTES, LIVER FUNCTION TESTS, COAGULATION TESTS AND BLOOD LIPID ESTIMATION SHOULD BE PERFORMED.
- 6 UNITS CROSS MATCHED
- CARDIAC AND RESPIRATORY FUNCTION TESTS
- ECG/CHEST X RY/ 2D ECHO.
- THE MORPHOLOGY OF THE ANEURYSM IS BEST ASSESSED BY CT SCAN

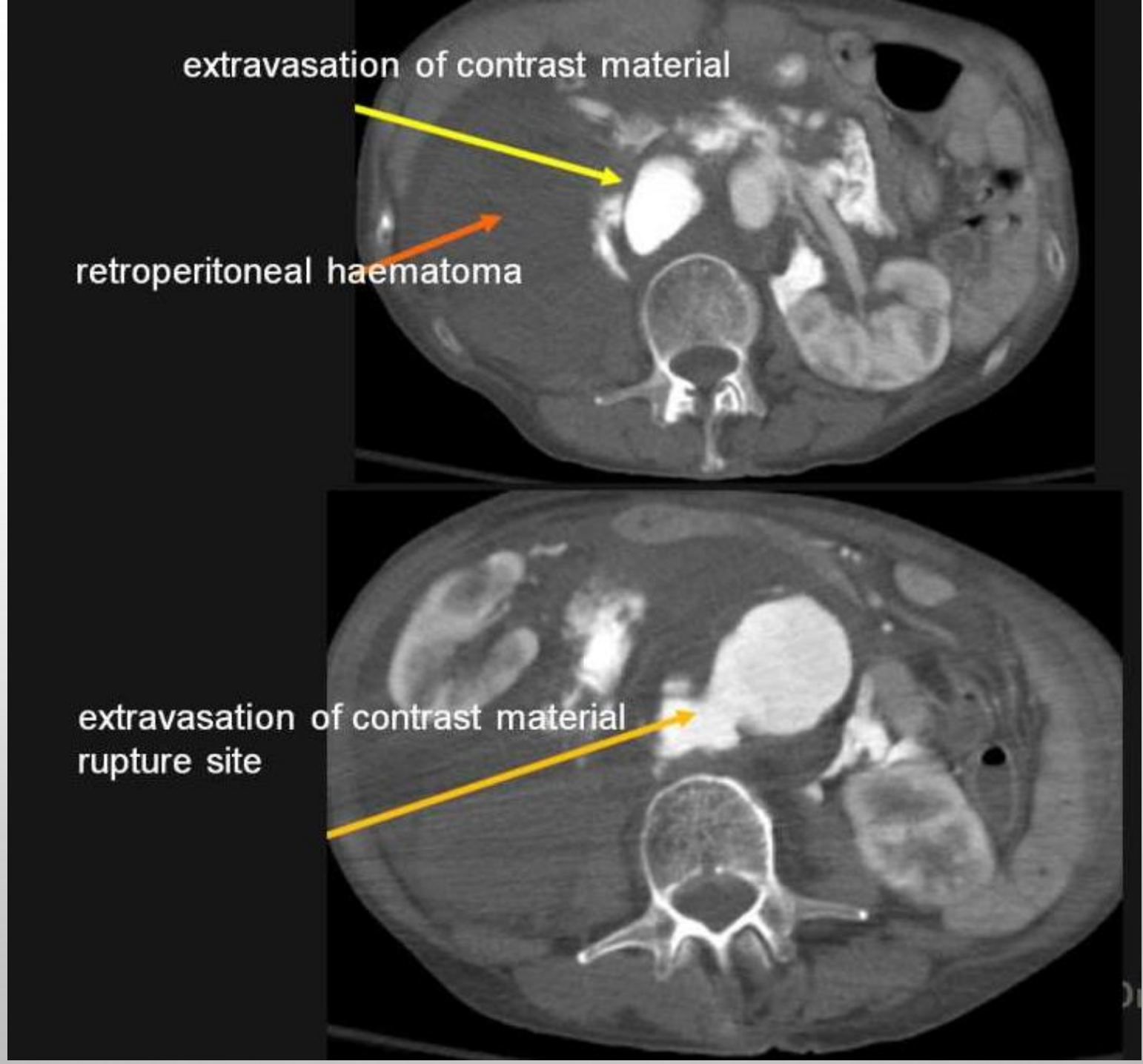
ULTRASOUND SCAN

- INIT



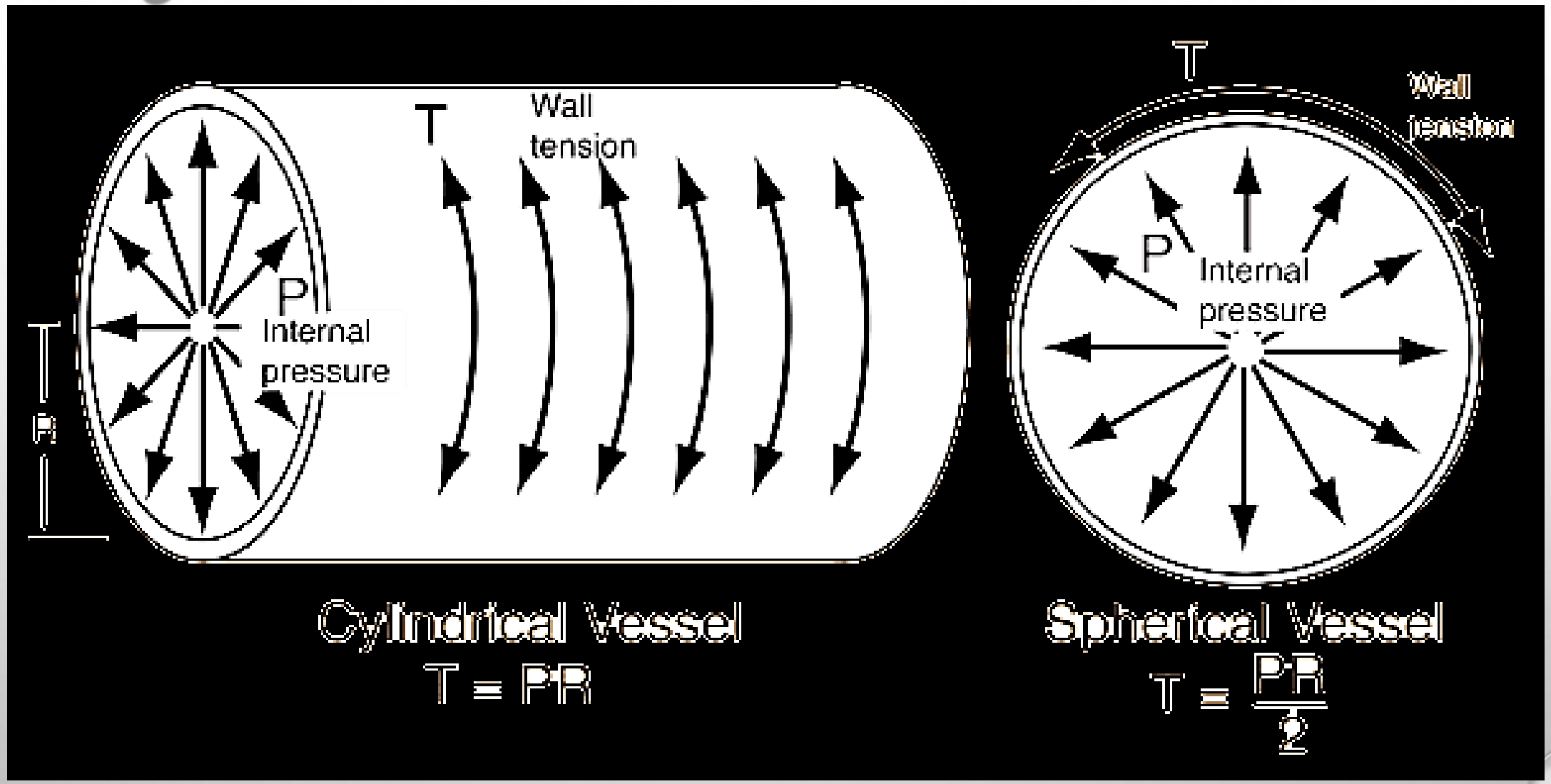
CTA

- EXACT DIAMETER OF ANEURYSM (MAXIMUM)
- THE EXTENT (SUPRA/INFRA RENAL, AORTIC, AORTO ILIAC)
- LENGTH AND ANGULATION OF NECK
- HELPS TO PLAN THE INTERVENTION – SURGICAL/ ENDOVASCULAR
- TO DETECT LEAK


extravasation of contrast material
retroperitoneal haematoma
extravasation of contrast material
rupture site

MANAGEMENT

- DIAMETER>5.5CM
- SYMPTOMATIC
- COMPLICATED-INFECTION

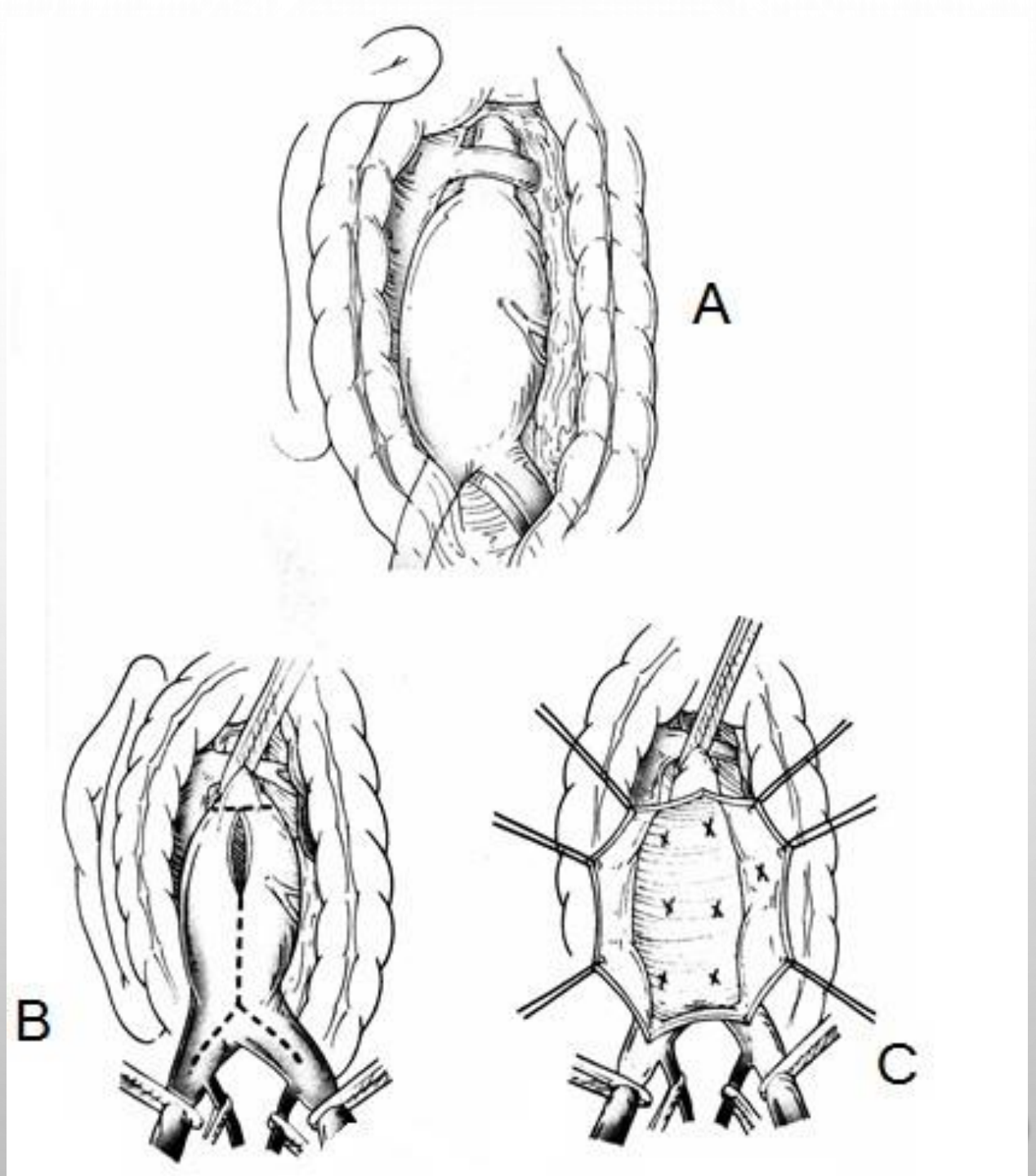

T
Wall
tension
P
Internal
pressure
T
R
Cylindrical Vessel
T = PR
T
Wall
tension
P
Internal
pressure
Spherical Vessel
T = PR/2

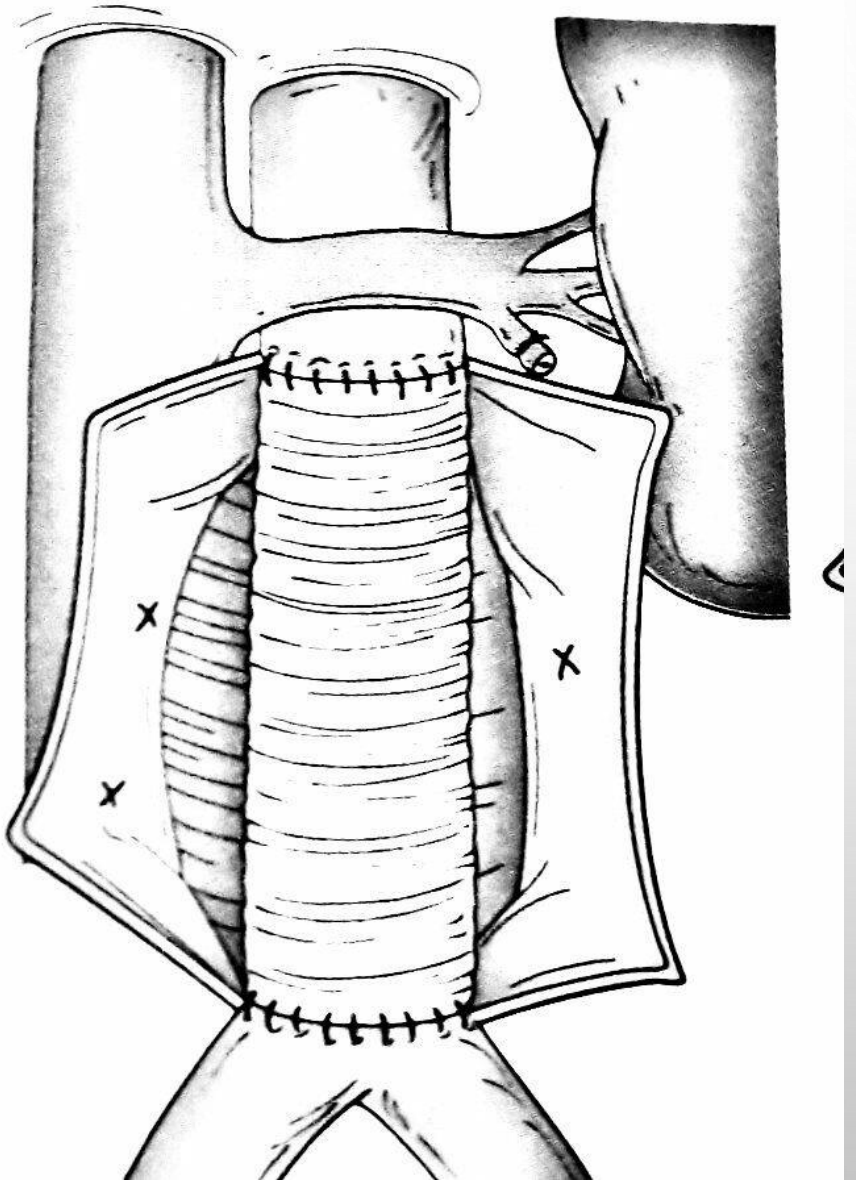
SURGICAL RISKS

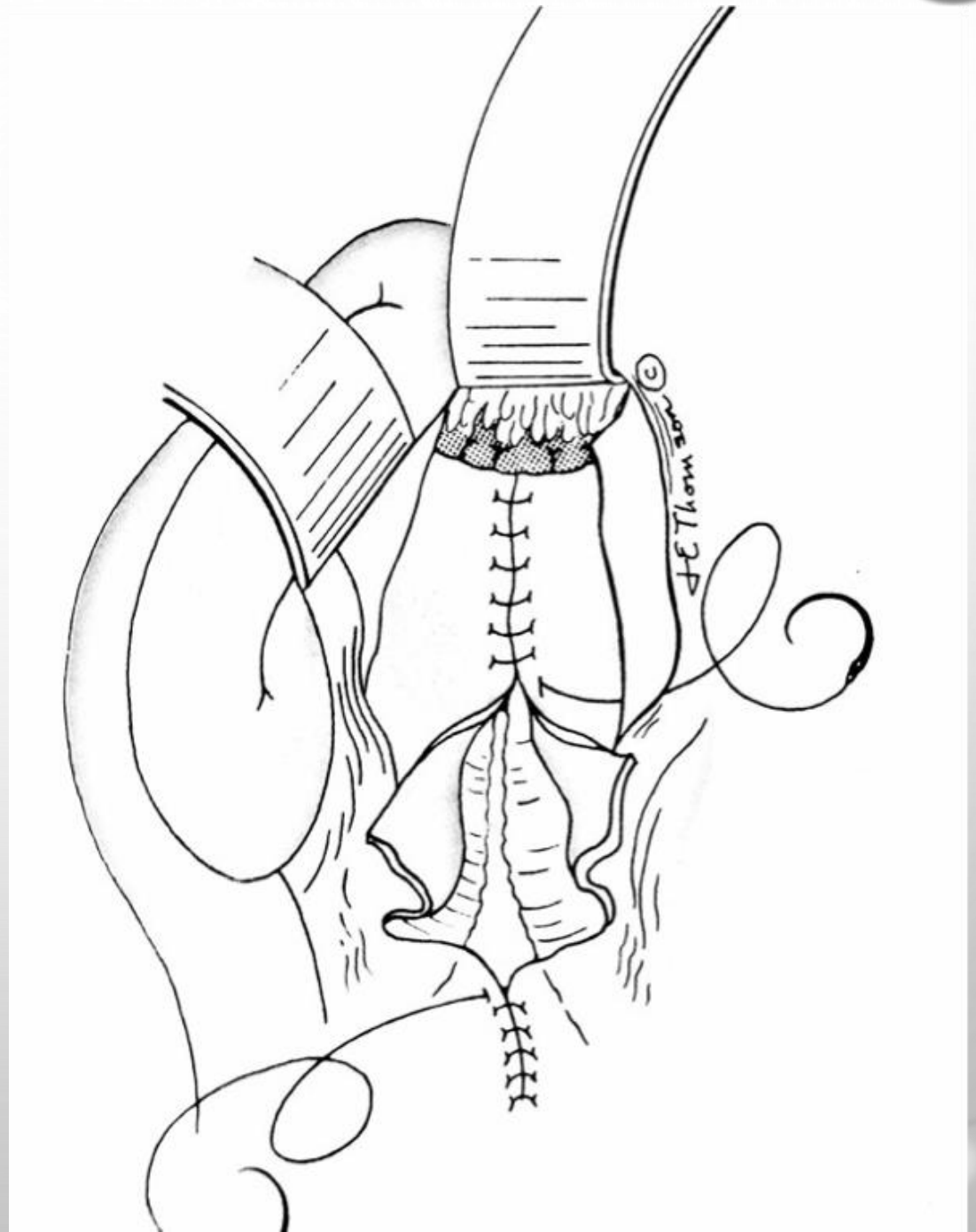
- OPEN REPAIR- 5% MORTALITY
- MORBIDITY- 5-10% CARDIAC EVENTS

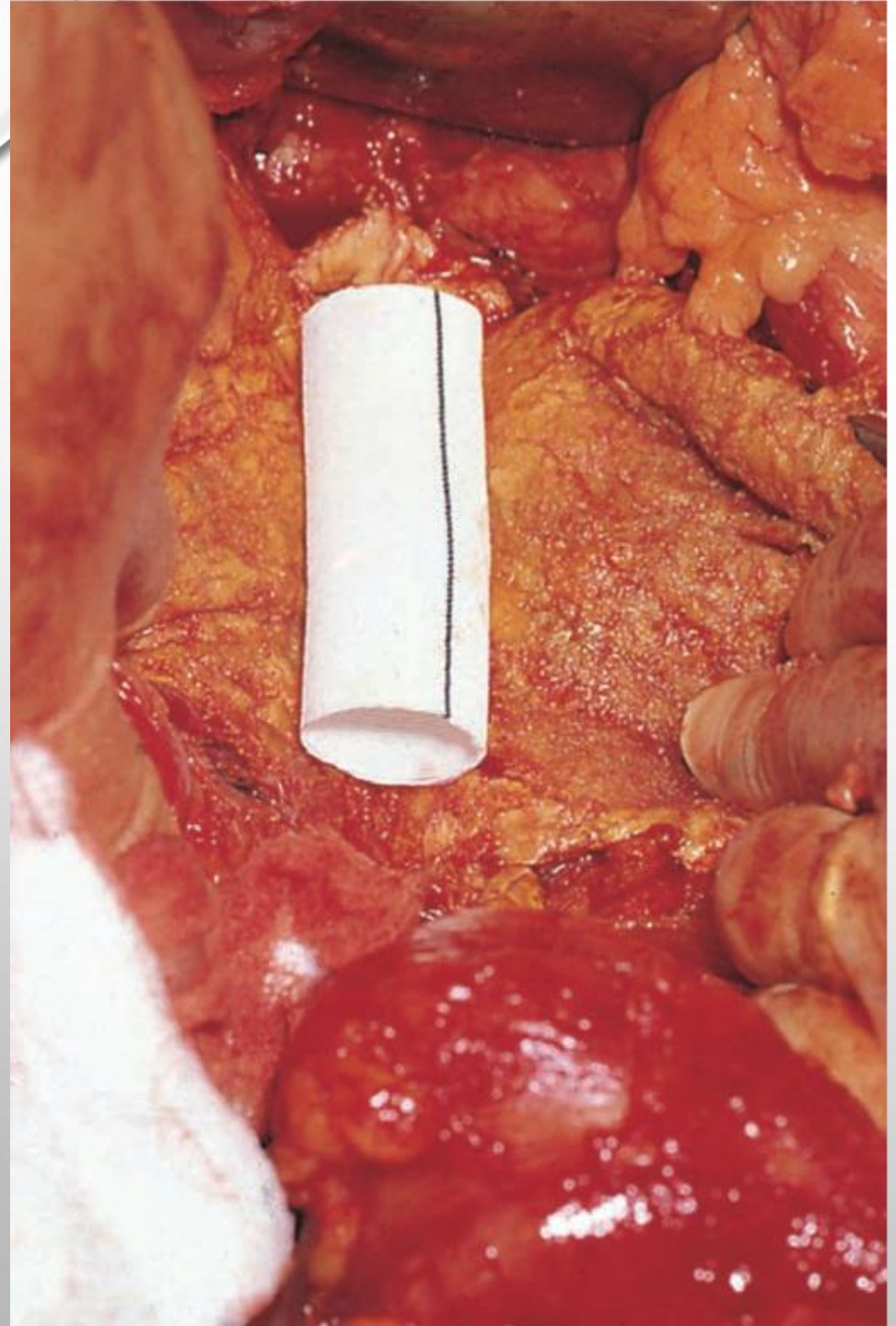
CHOICE OF OPERATION – OPEN OR ENDOVASCULAR REPAIR

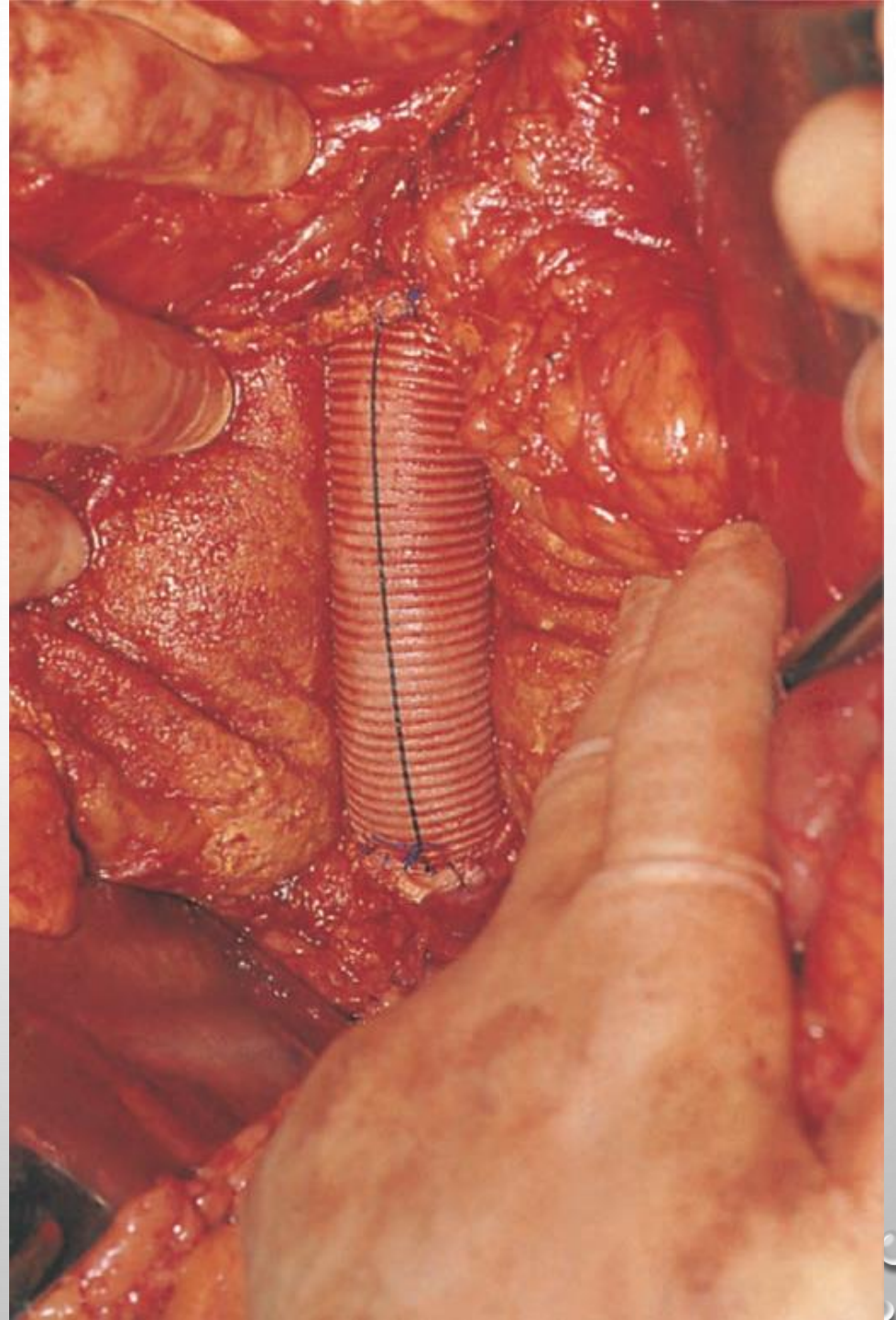
- OPEN- MIDLINE/TRANSVERSE
- ENDOVASCULAR


A
B
C





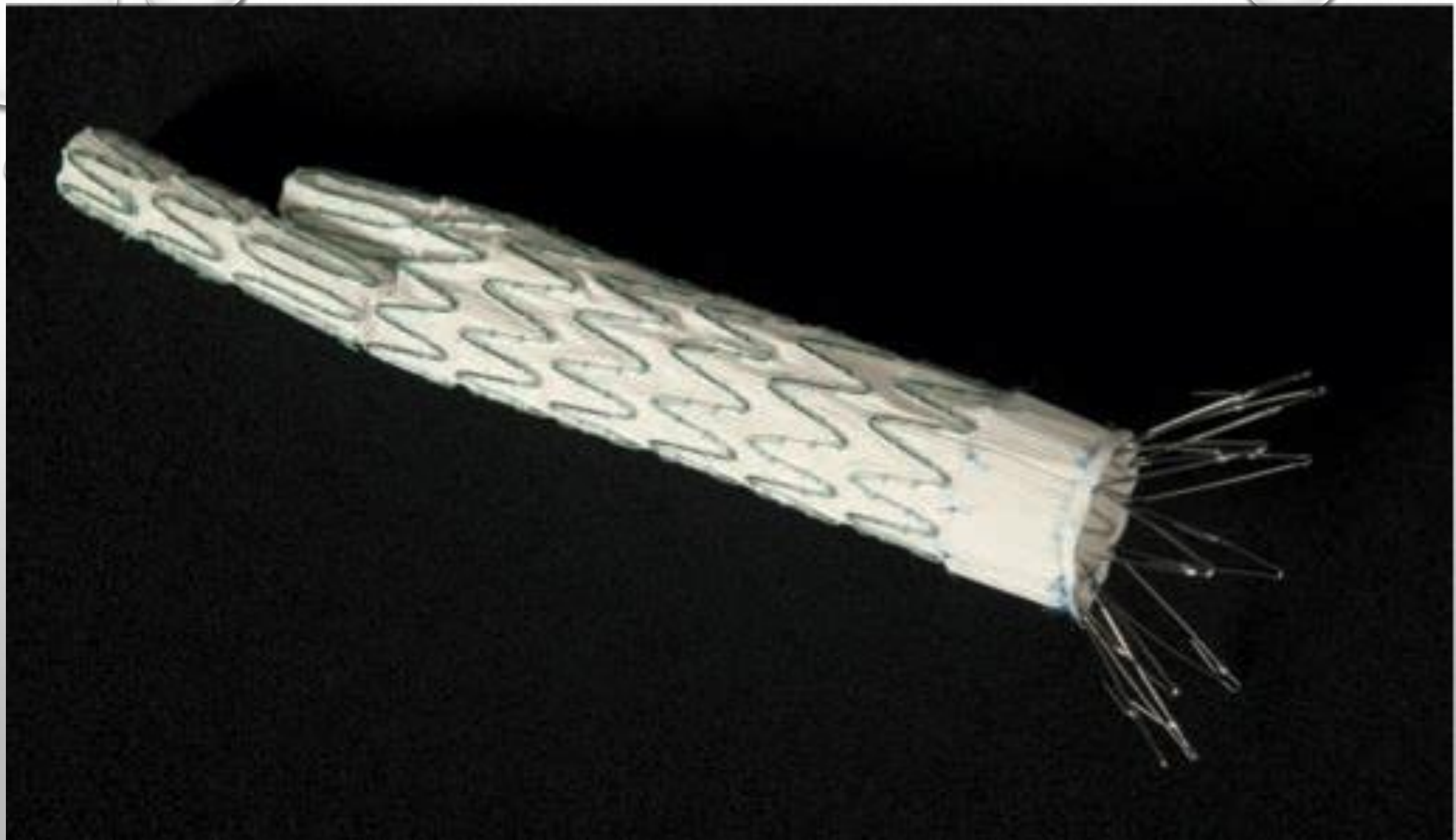




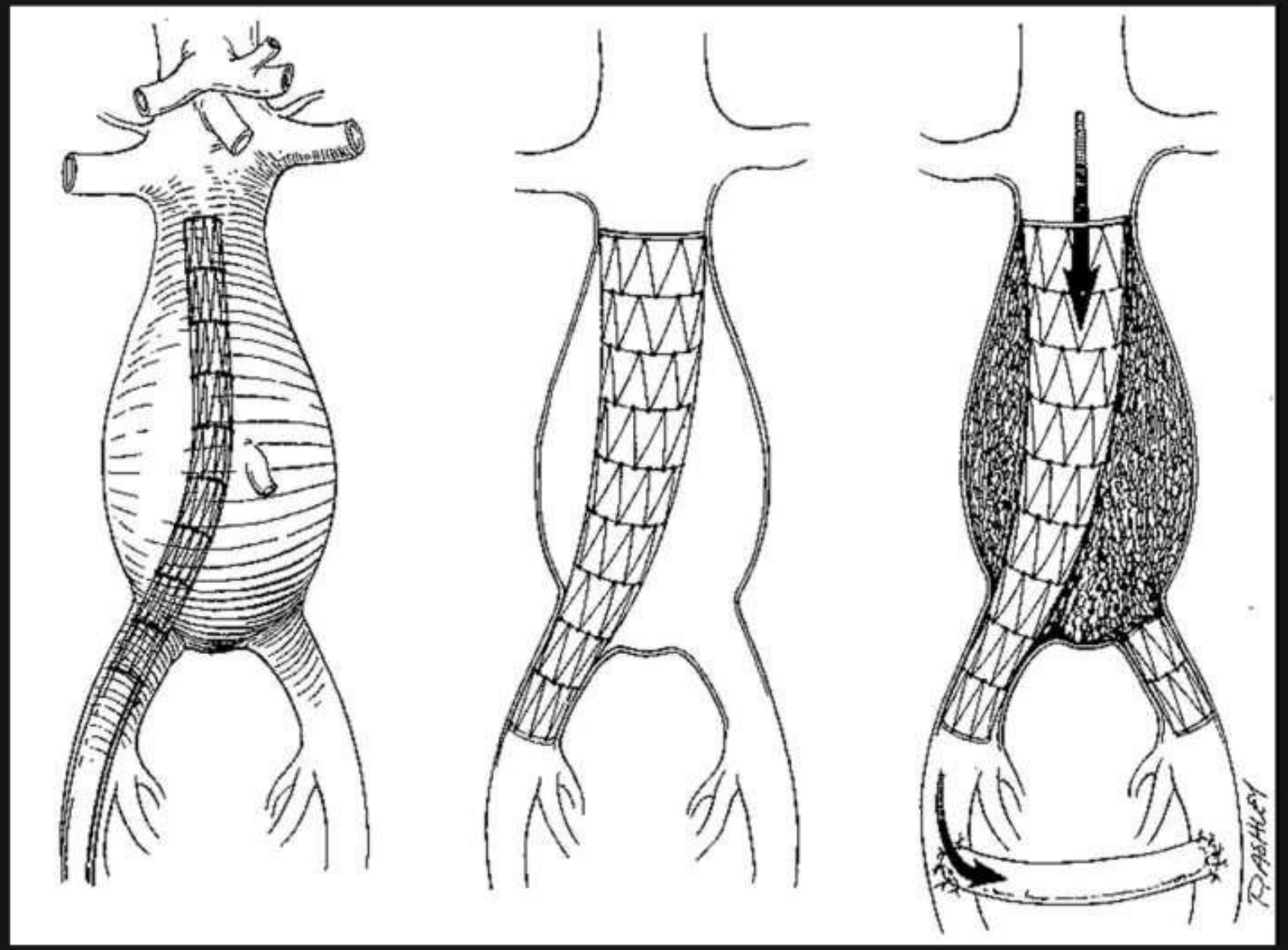
SURGICAL COMPLICATIONS

- BLEEDING
- COAGULOPATHY
- AORTIC CLAMPING
- INCREASED CARDIAC LOAD
- VISCERAL/ ORGAN ISCHAEMIA
  RENAL DYSFUNCTION
  VISCERAL ISCHEMIA
  SPINAL CORD ISCHEMIA/INJURY - THE ARTERY OF ADAMKIEWICZ
- LOWER EXTREMITY ISCHEMIA/EMBOLI

- **AORTIC CLAMP RELEASE**
- HYPOTENSION
- REPERFUSION EFFECTS
- **LATE**
- AORTO ENTERIC FISTULA



Uniiliac Endograft Placement

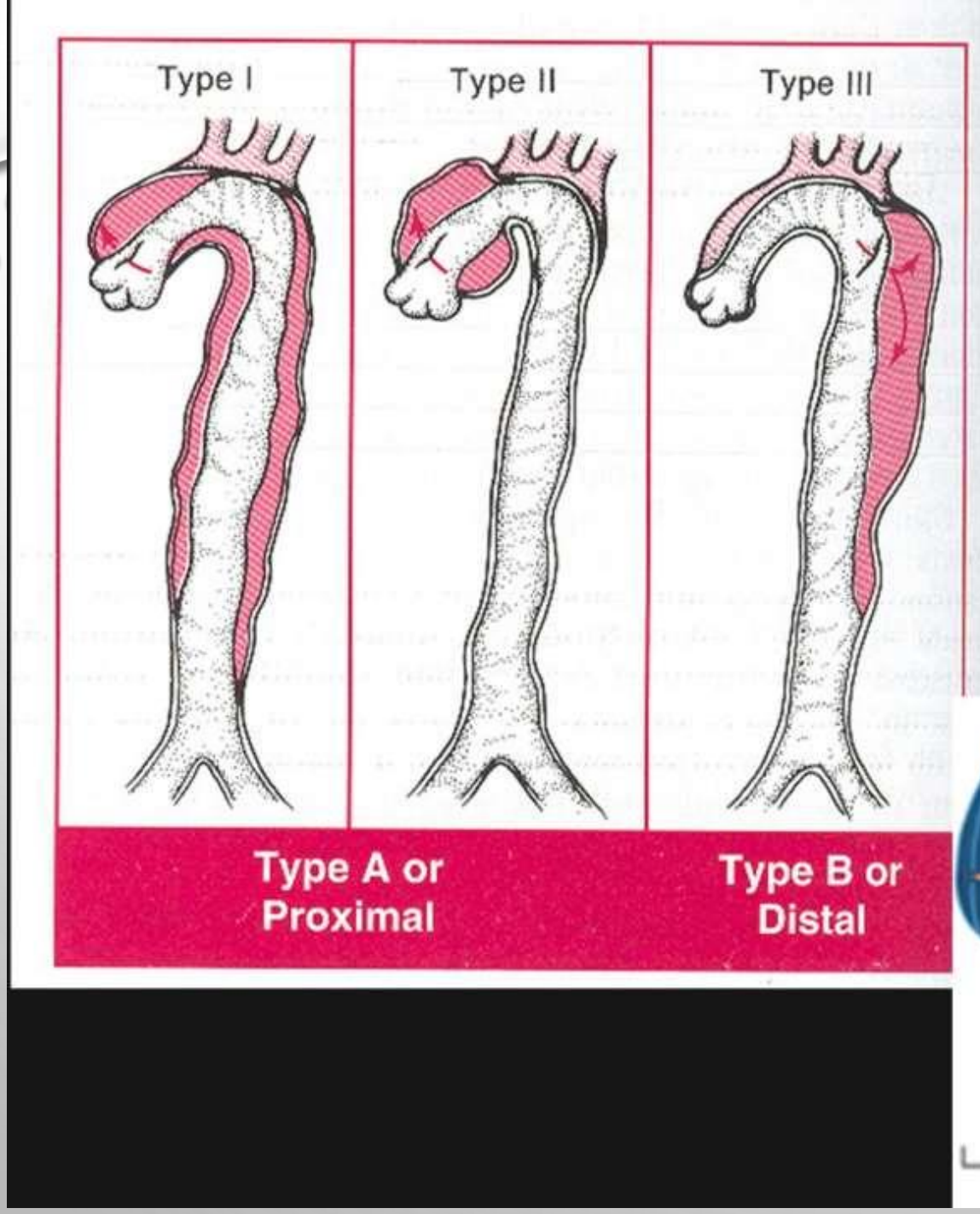


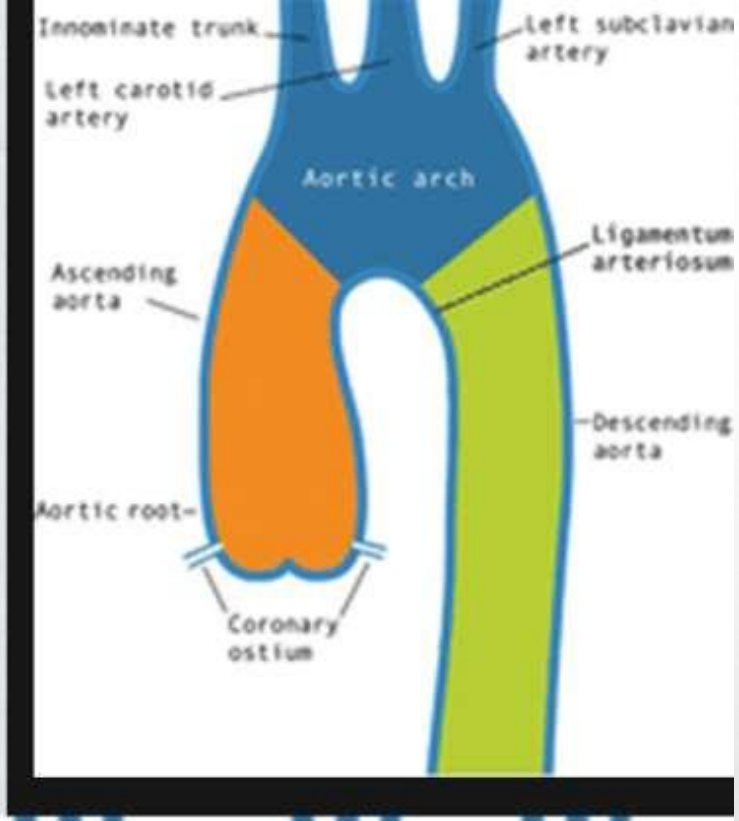
PERIPHERAL ANEURYSM
POPLITEAL ANEURYSM

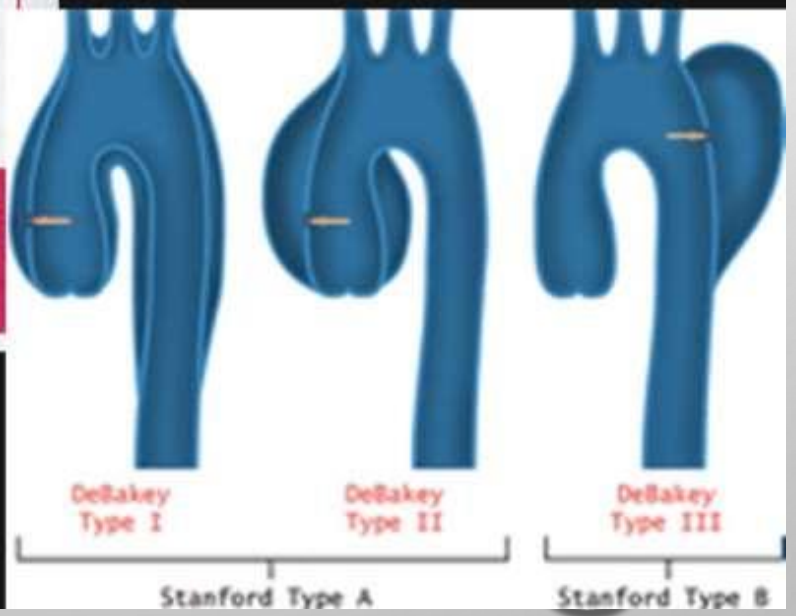
- POPLITEAL ARTERY ANEURYSM ACCOUNTS FOR **70%** OF ALL PERIPHERAL ANEURYSMS; 2/3 - BILATERAL.
- **30%** ARE ACCOMPANIED BY AORTIC ANEURYSM
- DIAGNOSIS IS USUALLY CONFIRMED WITH DUPLEX SCANNING, SUPPORTED BY CT, MR OR DSA
- AN ASYMPTOMATIC-CONSIDERED FOR ELECTIVE REPAIR >25 MM IN DIAMETER.

DISSECTING ANEURYSM

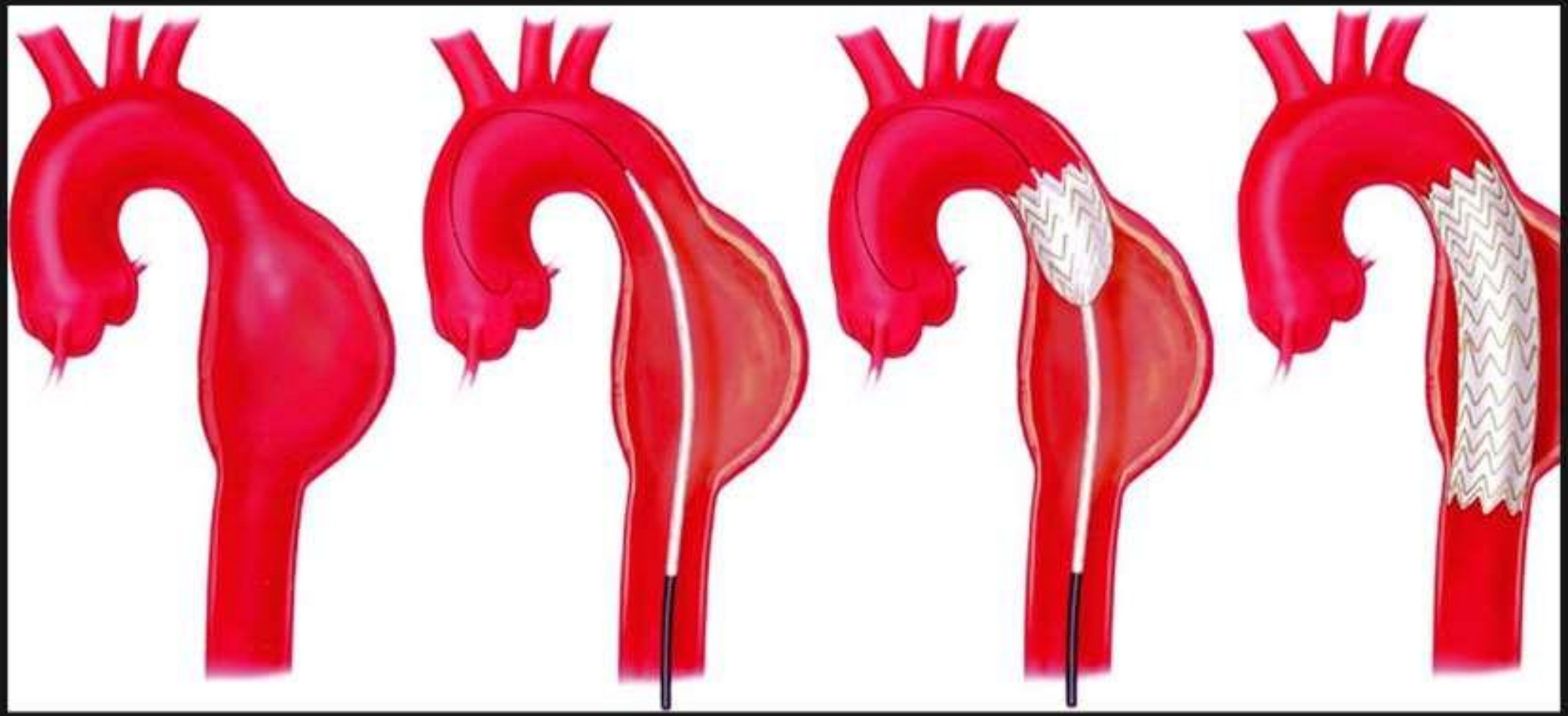
- MISNOMER
- DISSECTION OF THE MEDIA OF THE ARTERY LEADING TO TWO LUMENS

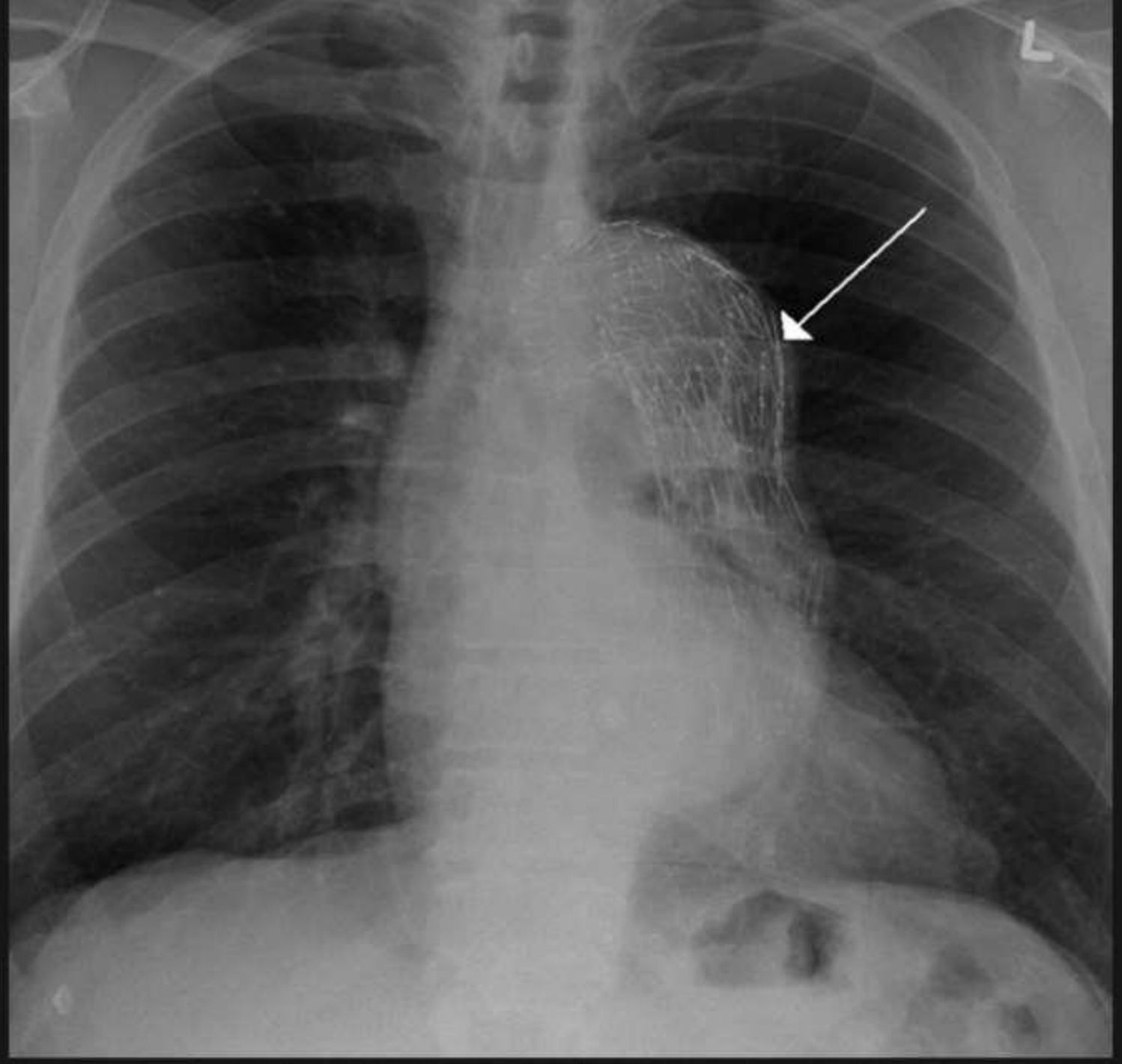

Type I
Type II
Type III
Type A or Proximal
Type B or Distal


Innominate trunk
Left carotid artery
Left subclavian artery
Aortic arch
Ligamentum arteriosum
Ascending aorta
Descending aorta
Aortic root
Coronary ostium


DeBakey Type I
DeBakey Type II
DeBakey Type III
Stanford Type A
Stanford Type B

Minimally invasive repair of a descending thoracic aortic aneurysm using a transluminally placed endovascular stent-graft.





ARTERIO-VENOUS MALFORMATION(AVM)

- DIRECT CONNECTION BETWEEN ARTERY AND VEIN BYPASSING THE CAPILLARY
- DECREASED O2 DELIVERY
- INCREASED O2 IN VENOUS BLOOD

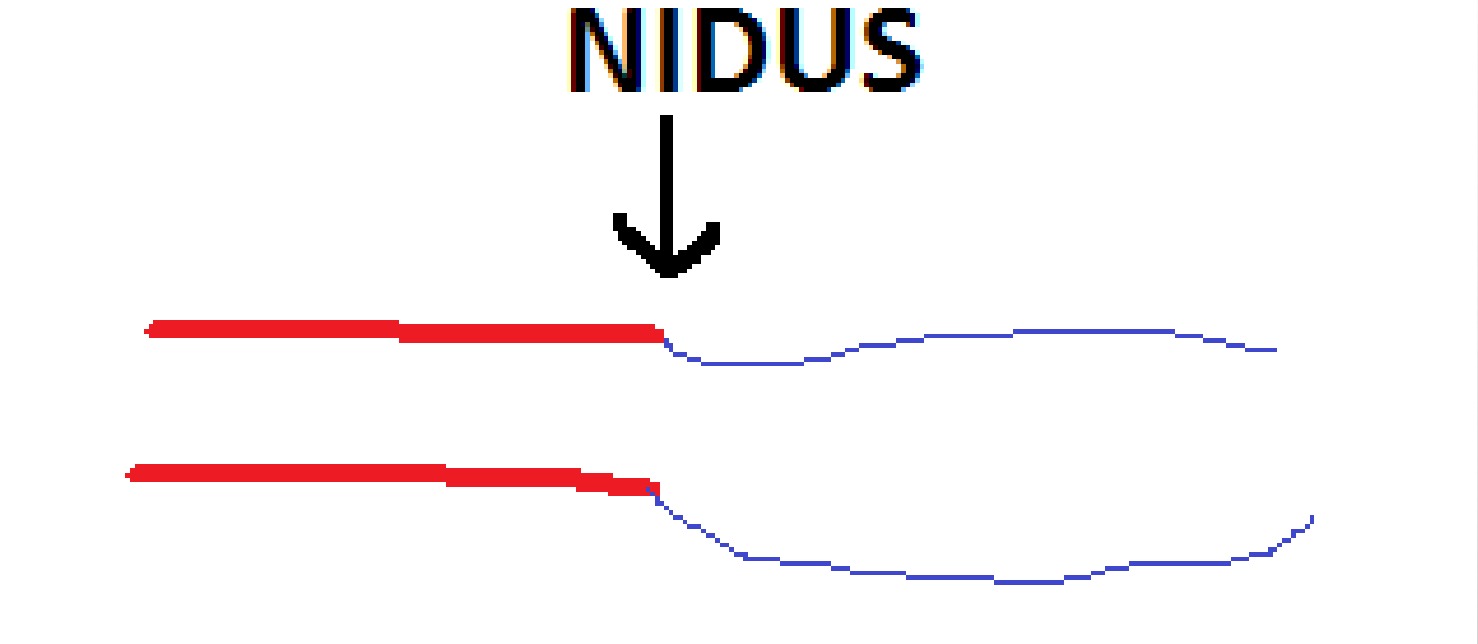
- DEPENDING ON THE FLOW
- • LOW FLOW
- • HIGH FLOW – PRIMARY

- – SECONDARY(LOW FLOW PROGRESSES TO HIGH FLOW IN ADULT)

ETIOLOGY

- CONGENITAL
- • ACQUIRED
  - THERE ARE ANGIOGRAPHICALLY OCCULT
- VASCULAR MALFORMATION

THIS NIDUS SITE IS PRONE FOR RUPTURE AS THE FLOW INCREASES THE THIN WALLED VEIN CANNOT HANDLE THE BLOOD



CLINICAL PRESENTATION

- • HEMORRHAGE(INTRAPARENCHYMAL>INTRAVENTRICULAR HEMORRHAGE >SUBARACHNOID HEMORRHAGE)
- ISCHEMIA BY STEAL
- INCREASED ICP- MASS EFFECT
-

INVESTIGATION

- DUPLEX
- CT
- MRA

MANAGEMENT

- SURGICAL RESECTION
- EMBOLIZATION

THANK YOU