

Thoracic aortic dissection

Thoracic aortic dissection is a sudden vascular event with a dramatic course, immediately life-threatening.

Pathogenesis

- The cleavage of the aortic wall caused by the penetration of blood through the crack in the intima and media.
- The rupture occurs most often above the coronary arteries or in the aortic isthmus.
- From the site of the crack, the dissection can spread peripherally and centrally, it can affect the whole circumference or only a part. The canal can also spread to the carotid or visceral branches of the aorta.
- At the end of the dissection, another reentry may occur and a communicating channel is created.

Consequences

- The canal oppresses the right aortic lumen even at intervals.
- The dissection created above the coronary arteries often spreads centrally and tears the commissures of the aortic valve, resulting in severe insufficiency.

Causes

- Degenerative media changes (cystic medionecrosis) or aneurysm in combination with hypertension, less often atherosclerosis.
- We often encounter it in Marfan's syndrome (young patients) and in other systemic connective tissue diseases (Ehlers-Danlos syndrome, Loeys-Dietz syndrome).
- Other predisposing factors include bicuspid aortic valve, aortic coarctation or trauma (falls, car accidents).

CLICK ON LINK FOR VIDEO ON AORTIC DISSECTION:

https://www.wikiskripta.eu/w/Soubor:Aortic_dissection.webm#file

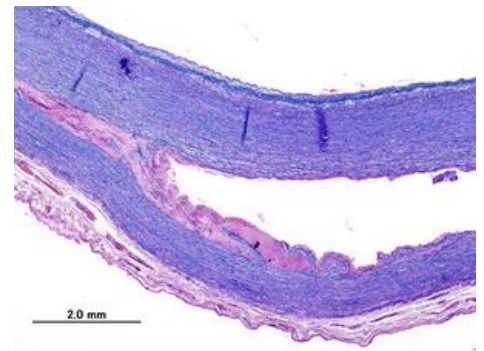
Classification

DeBakey classification

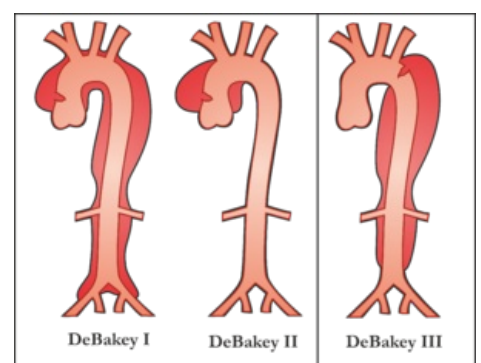
- Type I - begins in the ascending aorta and continues to the abdominal,
- Type II - bounded on the area of the ascending aorta,
- Type III - begins in the aortic isthmus and affects the descending aorta, or continues to the abdomen.

Stanford classification

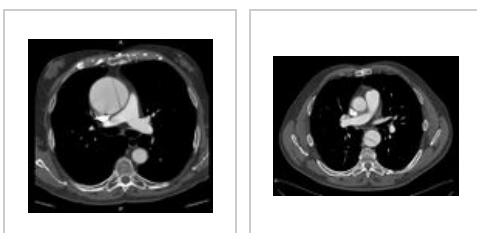
- Type A - the ascending aorta is affected (2x more common than type B),
- Type B - affected is the descending aorta.



Histopathological picture of thoracic aortic dissection in a patient without Marfan's syndrome. The damaged part of the aorta was surgically removed and replaced with a vascular prosthesis. Victoria blue and HE staining.



STANFORD A **STANFORD B**
DeBakey and Stanford classification



CT dissection of the aneurysmal ascending aorta

CT dissection of the descending aorta

Clinical picture

- **Sudden shocking pain behind the sternum and back** can progress to the abdomen.
- Sometimes a shock condition follows (bleeding , tamponade , acute heart failure) - they usually die of sudden death.
- Sometimes the symptoms gradually subside and the condition stabilizes temporarily or permanently.
- Vascular symptoms:
 - different, depending on which aortic branches are oppressed or torn off,
 - cranial arteries - unconsciousness, hemiparesis,
 - subclavia - ischemia HK,
 - upper mesenterics - intestinal ischemia,
 - renal arteries - anuria , oliguria ,
 - peripheral arteries - **deficit or asymmetry of pulsations** (typically variable over time), lateral asymmetry of pressures on HKK, etc.

Diagnosis

- **Typical history** (sudden acute pain),
- physical examination: **deficiency or asymmetry of pulsations** in peripheral arteries,
- auxiliary methods:
 - exclusion of AIM (ECG),
 - Chest X-ray - extension of the shadow of the upper mediastinum to the left,
 - ECHO , CTA , aortography.
- The sovereign method - transesophageal echocardiography - determines the diagnosis in 98%.

Indications for operation

- By type, extent, vascular disability and general condition:
 - for type A, about half of the victims die within 24 hours, the hope decreases with each passing hour → type A is **always indicated** for immediate surgical treatment,
 - for type B, we choose a predominantly conservative procedure if there is no vascular symptomatology or there is no risk of rupture.

Therapy

- Immediately after the diagnosis, we start drug treatment: antihypertensives , beta blockers and vasodilators , diuresis support . We monitor the patient, administer analgesics (insufficient pain treatment leads to antihypertensive failure). Cardiac tamponade should be ruled out by echocardiography in patients with hypotension.

Type A

Principle of operation - we try to cancel the inflow into the aneurysm, several methods:

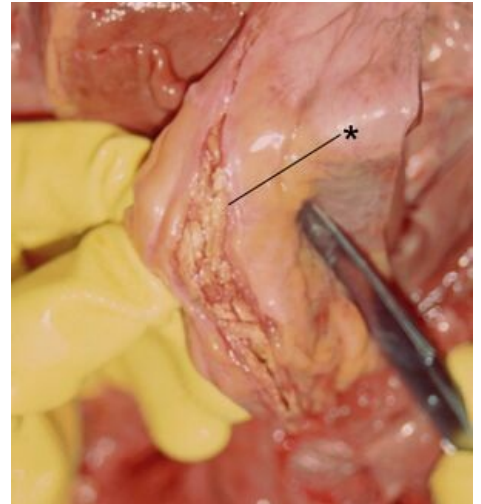
- transverse intersection of the ascending aorta at the site of the rupture, suturing of both ends of the aorta over the outer and inner meshes, subsequent suture of the aorta,
- resection of the ascending aorta, strengthening of the ends with a suture and replacement of the aorta with a prosthesis,
- Bentall's operation - replacement of the aortic valve and ascending aorta by a conduit with a valve, implantation of coronary arteries into the prosthesis,
- closing the entrance to the dissection with tissue glue with aortic suture or with a prosthesis,
- implantation of an intraluminal ring prosthesis into the ascending aorta.

Type B

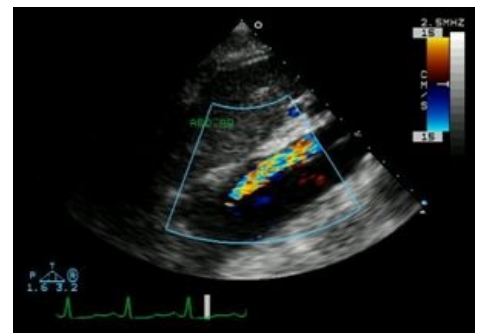
- We treat uncomplicated type B dissection conservatively (stabilization, antihypertensives).
- For complicated dissections, it is necessary to proceed to invasive treatment:
 - endovascular stent graft implantation,
 - surgical solution.

Principle of surgical treatment

- In the right flank, from a left thoracotomy, usually without ECC, a bypass is sometimes used to protect the kidneys and spinal cord from ischemia .



Autopsy finding - aortic dissection



ECHO (longitudinal section) finding of aortic dissection

- Resection of a section with a crack, replacement with a prosthesis, or implantation of an intraluminal prosthesis - this will cancel the entry and it will close with thrombosis. The operation is more complicated when the visceral arteries leave the dissection canal - a laparotomy must be performed and those arteries reconnected to the aorta.

Complication

Stanford A dissection can cause acute aortic insufficiency, heart failure, hypotension. Closure of the coronary arteries by dissection leads to AIM (most often a diaphragmatic infarction occurs by occlusion of the ACD). Rupture of the pericardial dissection creates a cardiac tamponade.

Stanford B dissection can be complicated by spinal, visceral, renal or limb ischemia.

Links

related articles

- Thoracic aortic surgery
- Aneurysm
- Aortic dissection / case report

External links

- Aortic dissection (<https://www.youtube.com/watch?v=vrbsxsadiwl>) - video on youtube.com NEFČNÍ

References

- ZEMAN, Miroslav, et al. *Special surgery*. 2nd edition. Prague: Galén, 2006. 575 pp. ISBN 80-7262-260-9 .
- ČEŠKA, Richard, ŠTULC, Tomáš, Vladimír TESAŘ and Milan LUKÁŠ, et al. *Internal*. 3rd edition. Prague: Stanislav Juhaňák - Triton, 2020. 964 pp. ISBN 978-80-7553-780-5 .

Source

- BENEŠ, Jiří. *Study materials* [online]. [feeling. 5/17/2010]. < <http://jirben.wz.cz> >.





CT 3D dissection angiography - right and
false lumen