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Aortic Aneurysms

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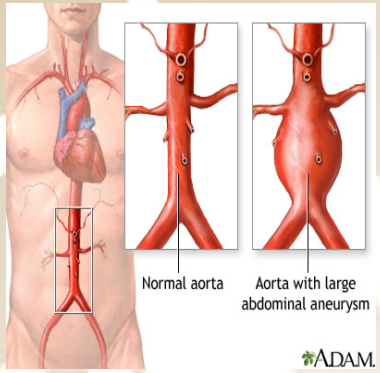
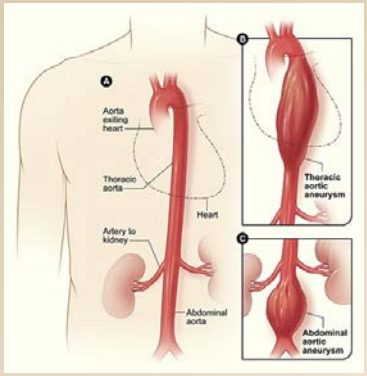
What is an aneurysm?

- Aortic aneurysms are characterized by local inflammation with degeneration around the aorta, which leads to weakening and widening of the vessel.
- Can be congenital or acquired and occur at different locations of the thoracic or abdominal wall
- Wall rupture is ultimately a mechanical failure that occurs when intramural stresses exceed wall strength



Why Aneurysm

- Working in a cardiac surgery intensive care has allowed me to take care of patients with aneurysm repairs and it generated an interest to learn more behind the pathophysiology of their making.



Pathophysiological process

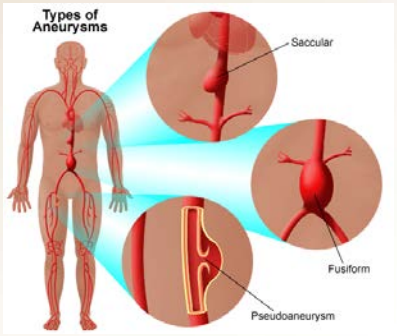
- IL-6 has already been suggested as prognostic biomarker for AAA
- Elastic strength and displacement under stress depend on the smooth muscle cells in the aortic wall
- In the early stage of aneurysm, endothelial cells, under hemodynamic shear stress, secrete major attractant protein, MCP-1, and IL-6
- This triggers recruitment of monocytes from the blood into the media layer of the arterial wall
- The monocytes mature into macrophages
- Macrophages from the adventitia are also chemoattracted by MCP-1, IL-6 and IL-8
- T cells are activated by contact with macrophages in the presence of IL-12, and macrophages are activated by IFN-γ produced by the T cells
- Fibro- blasts produce collagen, and the collection of MMP, TIMP and collagen weaken the ability of the adventitia layer to withstand stress.
- Macrophages are known to cause apoptosis in SMCs, and this leads to reduction in elastin, thus weakening the elastic strength of the media.

Significance of pathophysiology

- Fatal hemorrhage, paraplegia caused by interruption of anterior spinal artery, abdominal ischemia stroke, myocardial ischemia, lower extremity ischemia, renal failure, impotence, and cardiac tamponade.

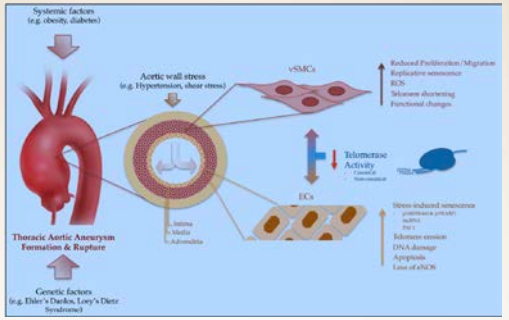
Signs and symptoms

- Sudden, intense and persistent abdominal or back pain, which can be described as a tearing sensation
- Pain that radiates to your back or legs
- Sweatiness
- Clamminess
- Dizziness
- Nausea
- Vomiting
- Low blood pressure
- Fast pulse



Nursing Interventions

- Monitor for signs and symptoms of spinal cord ischemia such as pain, numbness, paresthesia, and weakness caused by dissection.
- Monitor for signs of stroke or cardiac tamponade caused by dissection.
- Check extremities for sensation, temperature, pulses, color, capillary refill, and petechiae.
- Monitor for bleeding from the wound and for signs of hemorrhage, hypotension, tachycardia, pallor, and diaphoresis.
- Monitor urinary output hourly.
- Administer antibiotics, if ordered, to prevent infection.
- Administer pain medication, as ordered, or monitor patient-controlled analgesia.
- Teach the patient about blood pressure medications and the importance of taking them as prescribed.
- Teach the patient to recognize and report signs and symptoms of an expanding aneurysm or rupture.



Risk Factors/ findings

- The central histological findings in non-syndromic Abdominal thoracic aortic aneurysm (ATAA) analyses are the loss of smooth muscle cells (media degeneration) and the alteration of elastic fiber structures
- Major factors are: the MMP2/9-TIMP system, smooth muscle stress and cell death, aging processes (telomere length), alterations in genes and protein expression and function
- The major risk factor for non-syndromic ATAA formation is hypertension, and anti-hyper- tensive therapy is a *gold standard* in the treatment of ATAA patients.

Conclusion

- Aortic aneurysms result from degeneration of the medial wall, which occurs as a normal part of the aging process as well as with hypertension, atherosclerosis, trauma or infection, immunologic conditions, and as a complication of Marfan Syndrome
- Thoracoabdominal aortic aneurysm may originate in the ascending aorta and aortic arch (frequent site of dissection) or in the lower descending thoracic aorta and upper abdominal aorta.
- Aortic aneurysms develop by various pathophysiological processes and is clinically significant for life.
- Surgical Intervention is the only way to fix these processes once a certain circumference develops.

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