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7-25-2018

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Vonallman, Dereck, "Aortic Stenosis" (2018). *Nursing Student Class Projects (Formerly MSN)*. 328.
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Aortic Stenosis

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Overview

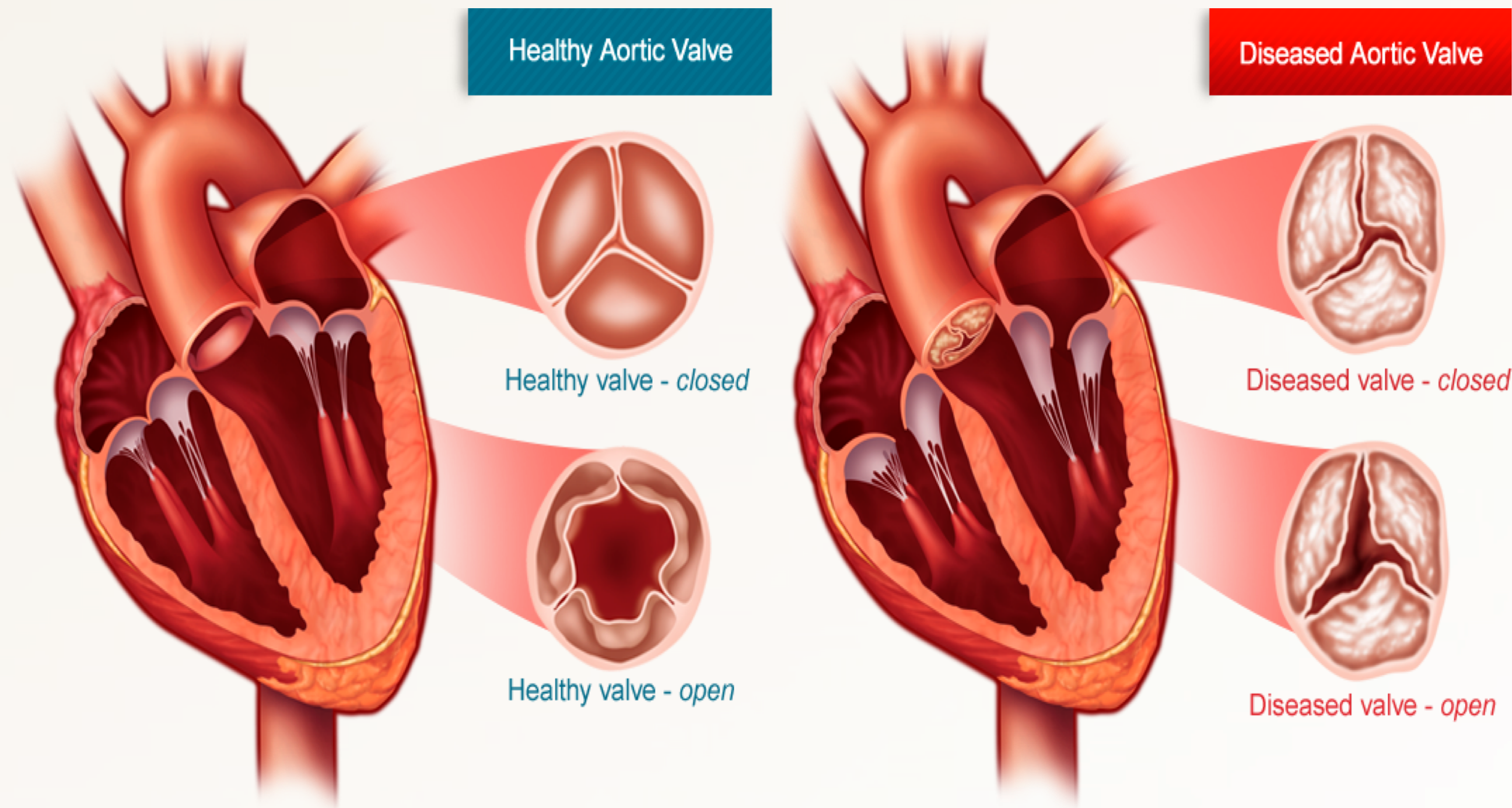
- Aortic stenosis (AS) or aortic valve stenosis is a narrowing of the aortic valve in the heart.
- This narrowing decreases blood flow from the heart to the rest of the body.
- Aortic stenosis increases work load of the heart along with myocardial oxygen demand
- Topic was chosen in order to gain a more in depth understanding of the pathophysiology of the disease.
- This gained knowledge on aortic stenosis will lead to the proper management of the hemodynamics of a patient who has AS in the operating room as a future anesthetist.

Case Presentation

- Aortic stenosis influences how the nurse anesthetist manages hypotension in the operating room.
- A 54 year old women is anesthetized for a splenectomy. She becomes hypotensive 30 minutes into the procedure with unknown etiology.
- Patient has severe aortic stenosis. The nurse anesthetist is aware of her AS and selects the proper medication for the situation.
- The surgical case continues and ends without additional complications.
- The CRNA was able to correct the hypotension and the surgeon was able to continue with the case due to the anesthesia provider’s understanding of the pathophysiology of aortic stenosis.

Causes

- Aortic stenosis may be caused by a congenital heart defect. In some patients the aortic valve was formed wrong intrauterine with only 2 cusps instead of the typical 3 leaflets that create the aortic valve.
- Rheumatic fever originates from a untreated strep infection. In Rheumatic fever the innate antibodies are sent to fight the strep infection but can end up attacking valves in the heart and causing scarring. This scarring can inhibit valve function or lead to a rough surface, which allows calcium to deposits to attach more easily.
- Calcium deposits can lead to aortic valve stenosis and is associated with age. Blood flows through the heart and passes the heart valves. As it passes the aortic valve some of the calcium can attach to the leaflets and stiffen them. This decreases compliance and leads to narrowing.



Advance Pathophysiology

Aortic stenosis causes restriction of blood flow through the heart. This restriction requires the heart pump harder to overcome this impedance. Intraventricular pressure increases causing myocyte hypertrophy over time. This leads to valvular hypertrophic cardiomyopathy. Hypertrophic cardiomyopathy is the thickening of the heart muscle and in this case would primarily be thickening of the left ventricle. Since myocytes are unable to regenerate or perform mitosis, hypertrophy is their only answer to the increased myocardial work demand. The hypertrophied myocardium causes a decrease in ventricle volume. Cardiac output is stroke volume x heart rate. If the heart has a decreased stroke volume it must compensate by increasing its rate to maintain an adequate cardiac output. This can progress into a type 2 (mismatch) infarction as the myocardium has an increased oxygen demand due to it’s size and rate, a decrease cardiac output which leads to ineffective perfusion of all organ systems including the heart itself.

Significance

Pathophysiological findings apply directly to the management of hypotension in the OR when a patient suffers from AS and possible hypertrophic cardiomyopathy. The use of a strict Alpha 1 adrenergic agonist must be used with caution as increasing afterload without increasing inotropy will lead to an even larger decrease in systemic perfusion.

Signs and Symptoms Nursing Considerations

- Shortness of breath
- Chest pain “angina”
- Lightheadedness
- Syncopal episodes
- Fatigue
- Heart palpitations
- Heart murmur

Diagnosing

- Echocardiogram
- Magnetic resonance imaging (MRI)
- Heart catheterization
- Computerized Tomography
- Stress test- used to identify if a patient is symptomatic.

Treatment

- Mild aortic stenosis may only be monitored until its becomes more symptomatic.
- In children or the critically ill, a valvuloplasty can be performed. This entails a physician guiding a catheter through a artery until it reaches the aortic valve. A balloon then is inflated and the valve is expanded. This is typically only a temporary fix.
- Aortic valve replacement. The stenosis can be so severe that the valve itself needs replaced. A mechanical or biological valve can be used in place for the diseased valve. Open heart surgery is required or some patients may be more suited for a transcatheter aortic valve replacement (TAVR) where complications from open heart surgery are too probable.

Conclusion

- Aortic stenosis is a inherited malformation of the valve, scar tissue caused by rheumatic fever and or calcification of the aortic valve over time.
- Causes shortness of breath, heart murmur and increase myocardial o2 demand.
- Diagnosed with echocardiogram, MRI or heart cath.
- Restricts blood flow through the heart.
- Causes increase left ventricle and atrium pressures.
- Leads to valvular hypertrophic cardiomyopathy.
- Requires the anesthesia provider to administer the correct medications during a hypotensive emergency to maintain perfusion and not exacerbate the situation.

References

Czarny, M. J., & Resar, J. R. (2014). Diagnosis and Management of Valvular Aortic Stenosis. *Clinical Medicine Insights: Cardiology*, 8s1. doi:10.4137/cmc.s15716

Lindman, B. R., Bonow, R. O., & Otto, C. M. (2013). Current Management of Calcific Aortic Stenosis. *Circulation Research*, 113(2), 223-237. doi:10.1161/circresaha.111.300084

Mahmod, M., Francis, J. M., Pal, N., Lewis, A., Dass, S., Silva, R. D., . . . Karamitsos, T. D. (2014). Myocardial perfusion and oxygenation are impaired during stress in severe aortic stenosis and correlate with impaired energetics and subclinical left ventricular dysfunction. *Journal of Cardiovascular Magnetic Resonance*, 16(1), 29. doi:10.1186/1532-429x-16-29

Saikrishnan, N., Kumar, G., Sawaya, F. J., Lerakis, S., & Yoganathan, A. P. (2014). Accurate Assessment of Aortic Stenosis. *Circulation*, 129(2), 244-253. doi:10.1161/circulationaha.113.002310

Samarendra, P., & Mangione, M. P. (2015). Aortic Stenosis and Perioperative Risk With Noncardiac Surgery. *Journal of the American College of Cardiology*, 65(3), 295-302. doi:10.1016/j.jacc.2014.10.051

Varma, P., Raman, S., & Neema, P. (2014). Hypertrophic cardiomyopathy part II - Anesthetic and surgical considerations. *Annals of Cardiac Anaesthesia*, 17(3), 211. doi:10.4103/0971-9784.135852

