Abdominal Aortic Aneurysm: A Silent Killer

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**Abdominal Aortic Aneurysm: A Silent Killer**

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### Why AAA?

Rupture of an abdominal aortic aneurysm (AAA) is a significant cause of mortality in the United States. Often asymptomatic, AAA is considered a silent killer because it frequently remains undiagnosed until the time of rupture or the patient’s death (Gordon & Tourkomanis, 2014). A major problem faced by healthcare professionals, being aware of the pathophysiology, risk factors and symptoms influencing AAA becomes critical in early diagnosis and treatment, helping to reduce mortality rates and mortality rates of those affected.

### Significance and Underlying Pathophysiology

The aorta is the largest artery in the body and it originates from the left ventricle of the heart, supplying all of the body’s arteries with oxygenated blood. Three layers comprise the wall of the aorta (Fig. 1). The tunica adventitia, the outermost layer is a fibrous covering composed of connective and fibrous tissue that help to support the vessel. The middle layer known as the tunica media, is composed of smooth muscle and elastin suspended on the inner layer known as the tunica intima, with a layer of endothelial cells bordering the blood (Irwin, 2007; Woodrow, 2011). The hemodynamics properties of the cardiovascular system and its stressful forces can put the aorta at risk of a true aneurysm, affecting all three of these layers (Patel & Arora 2008).

“An AAA is a permanent localized dilation of the abdominal aorta, beginning at the level of the diaphragm and extending to its bifurcation into the common iliac arteries...that when this diameter exceeds 5 cm or is greater than three times normal” (Li & D’A, p. 1).

The primary risk factor for AAA formation is potential differences in aortic structure, biology and stress along the length of the aorta. There is a natural reduction in the number of elastic layers in the aortic wall, with about half as many layers found in the infra-renal aneuroma compared to the proximal thoracic aorta (Fig. 2). This is biologically relevant, since diminished elastin is associated with aortic dilation while collagen degradation predisposes to aortic rupture” (DiMarchi & Upchurch, p. 1).  

The formation of aneurysm involves a multifaceted process of destruction of the aortic media and supporting lamina through degradation of the extracellular matrix (Fig. 3). Over the years, the smooth muscle cells become activated and secretes cytokines that contribute to the aortic matrix degradation (Baird, Keen, Swearingen, 2005). The tunica adventitia becomes weakened and infiltrated by inflammatory cells due to the presence of cytokines (Stergiopulos, 2005).

The abundance of carbon monoxide in arterial blood leads to the formation of nitric oxide (NO), which is a potent vasodilator (Goldfarb, Tatem, Hemmila, Holubec, & Redinbo, 2012). Endothelial cells secrete NO, which diffuses into adjacent smooth muscle cells, stimulating the release of cyclic guanosine monophosphate (cGMP), a second messenger that relaxes these cells (Byrne & Rees, 1991).

### Implications for Nursing Care

The goal from a nursing perspective is to recognize, manage and prevent aneurysm rupture. A considerable amount of interest has been improving on interventions such as surgery; however, this cannot benefit those with an undetected aneurysm and certainly those who’s aneurysm rupture and been reaching the hospital (Smit, R., 2007). Major risk factors include history of smoking, age, race, male sex, atherosclerosis, hypertension, family history and genetic conditions such as Marfan syndrome (Gordon & Tourkomanis, 2014). Because AAs are difficult to diagnose, it is important as healthcare professionals to be aware of these risk factors.

Aneurysm diameter remains the most important clinical determinant for risk of rupture. Due to high mortality rates with surgical intervention, people with elevated BMI over the age of 55 with chronic hypertension, coronary artery disease, peripheral vascular disease or diabetes mellitus should be routinely screened by ultrasound (Crawford et al., 2000). If an aneurysm is less than 4.7 cm in diameter, it can be monitored every one to two years and if it's greater than 4 cm, monitoring should occur every six months to a year for safety (Kobata & Teranishi, 2012). Ruptured abdominal aneurysm

### References