I:ascending aorta essay sample

Health & Medicine, Disease

An aortic aneurysm is a pathological dilatation of the aorta. Aneurysms can be subdivided into true aneurysms, which involve all the layers of the vessel wall, and pseduoaneurysms, which involve only the adventitia. Furthermore, an aneurysm can be designated by its overall appearance as fusiform or saccular. The former is where the entire circumference of the vessel is affected and the latter is when there is only a small pocket from the vessel wall. Finally, an aortic aneurysm can also be identified by its location along the vessel (Harrisons, 2008, p. 1564).

Aneurysms can be caused by a litany of disease types, including inherited diseases, infections, vasculitis, trauma, or degenerative break down of the vessel. Immune processes may contribute to the degradation of the vessel wall and its ability to adjust to the normal cardiac pulsations. Risk factors for aneurysm include age, smoking, hypercholesterolemia, male gender, and genetic disposition. Furthermore, aneurysm is a particular risk in people with Marfan syndrome, Ehlers-Danlos syndrome, hypertension, and congenital bicuspid aortic valves (Harrisons, 2008, p. 1564). An additional risk factor for aortic aneurysm is low levels of vitamin D. In a groundbreaking study by Wong, et al., 311 men with aortic aneurysms larger than 30mm were studied 2013). They concluded that there was a relationship between low levels of vitamin D and larger aneurysms independent of all other risk factors.

Aortic aneurysms can occur at any part of the vessel length (Figure 1) and different locations have different risk factors and symptom clusters. Abdominal aortic aneurysms have a higher frequency in males and affect 1-2% of men older than 50. More than 90% of these aneurysms are a result of

atherosclerosis and the majority occur below the level of the renal arteries (Harrisons, 2008, p. 1564).

II: aortic arch

III: descending aorta

1: brachiocephalic trunk

2: right subclavian artery

3: right common carotid artery

4: left common carotid artery

5: left subclavian artery

6: aortic isthmus

IIIa: thoracic aorta

IIIb: abdominal aorta

7: posterior intercostal arteries

8: infereior phrenic artery

9: superior suprarenal arteries

10: lumbar arteries

11: median sacral artery

12: celiac trunk

13: left gastric artery

14: common hepatic artery

15: splenic artery

16: superior mesenteric artery

17: inferior mesenteric artery

18: middle suprarenal artery

19: gonadal artery

20: aortic bifurcation

21: common iliac arteries

22: external iliac artery

23: internal iliac artery

As the size of the aneurysm increases, so does the risk of rupture. Left untreated the risk of rupture for an aneurysm > 5cm is between 20-40%. Abdominal aneurysms usually are indolent and produce no notable symptoms (Harrisons, 2008, p. 1565). It is usually an incidental finding during an abdominal exam and is palpated as a pulsating, non-tender mass. However, as they increase in size, some pain may be felt. Patients may complain of palpations in the abdomen, but may also complain of diffuse pain in the chest, lower back, or pelvic area. Pain is usually a warning sign of an imminent rupture and is a medical emergency. With the rupture there is severe acute pain and marked hypotension that requires emergency surgical intervention (Harrisons, 2008, p. 1565).

If the aneurysm is calcified it may be visualized on x-ray, however a large number of aneurysms are not calcified. Abdominal ultrasound is the imaging modality of choice and can visualize the dimensions of the aneurysm and detect any thrombi that may have formed within the wall of the aneurysm. Indications for an abdominal ultrasound screening of patients are: a palpable or pulsatile mass, lower back, flank, or abdominal pain, follow up of a previously diagnosed aneurysm, follow up of a patient with an aortic stent and this should be conducted on men over 65 years old, women over 65 with cardiovascular risk factors, patients 50 years or older with a family history of disease, and patients with a history of aneurysms (AIUM, 2010). Small

aneurysms, those smaller than 50 mm, are usually managed with serial ultrasound surveillance. Echo-tracking ultrasonography appears to be the most accurate and reliable method of studying the diameter of an abdominal aneurysm (Lanne, at al, 1997).

Treatment of aortic aneurysm is operative repair. Insertion of a graft is indicated for any aneurysm that is expanding and associated with symptoms. Asymptomatic aneurysms are operated upon when their diameter's are greater than 55mm. Percutaneous stents are also available for the treatment of aneurysms and is associated with lower short-term morbidity and comparable long term mortality to open surgical procedures (Harrison, 2008, p. 1565).

Endovascular aortic aneurysm repair was introduced in 1991 and the procedure involves placing a stent-graft in the aorta anchored to the non-diseased portion of the aorta (Stavropoulus & Charagundla, 2007). The grafts, in effect, take over the role of the segment of damaged vessel and prevent the consequences of pressure against the wall of the dilated area of the aorta. This procedure is differentiated from classical open-surgery insofar as patients are required to go through life-long imaging surveillance in order to guard against an expanding aneurysm which may occur regardless of the graft placement (Corriere, et al., 2004). Another complication that is guarded against is the endoleak, which is a blood flow that occurs outside the graft and into the aneurysm sac. Endoleaks are classified into 5 categories, a type 1 leak is a failure at the grafts attachment site, a type 2 leak is a leak in a collateral vessel, a type 3 leak is graft failure, type 4 is a graft-wall porosity, and a type 5 leak is caused by endotension – which is an expansion of the

aneurysm without an actual leak. Finally, leaks can be termed primary leaks if they occur within 30 days of the implantation, or secondary if they occur after 30 days and after one negative imaging finding (Stavropoulus & Charagundla, 2007).

Imaging is performed to detect an endoleak immediately after the procedure and then at 1 and 6 months afterwards. If the stent appears stable, then imagery is performed every six months to look for abnormalities. Delayed leaks do occur in some patients including one cited by Stavropoulus & Charagundla, which occurred seven years after the intial transplant (2007).

CT angiography is the gold-standard modality for leak detection and the excellent image detail makes it the preferred modality despite the risks associated with the contrast material and the high radiation dose.

In sum, abdominal aortic aneurysms have the potential to be catastrophic diseases if not caught early or not managed properly. Patients that fit the profile and are suspected to have aneurysms must be brought to ultrasound quickly in order to screen for the disease. With proper surveillance or proper surgical or percutaneous repair, abdominal aneurysms are survivable events that should be properly followed up with afterwards.

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