

peer reviewed **CASE REPORT****A chronic aortic dissection presenting with acute complications**

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ABSTRACT

A dissection of the aorta is a common medical emergency condition and may be considered fatal in the majority of patients. Prognosis is determined by the type and extent of the dissection, as well as the presence of accompanying complications. This case report is of a chronic aortic dissection diagnosed in a 75 year-old male patient who presented with acute cardiovascular and peripheral vascular complications. His clinical history, radiological findings, and management, are discussed as well as the epidemiology, aetiology and treatment options associated with the pathology.

Keywords computerised tomography, vascular, angiogram

LAY ABSTRACT

This case report is about a tear in the aorta of an elderly male who also had other complications in the vessels in his heart and legs. The diagnosis was made using injected dye to show his aorta and vessels by means of computer tomography scans.

CASE REPORT

A 75 year-old male presented to the emergency department at a tertiary hospital complaining of pain, weakness and coldness in both his legs. He had difficulty walking and was dependant on a wheelchair for transportation. He also experienced chest pain, shortness of breath and regular intervals whereby he would lose consciousness. He had been previously diagnosed with a chronic dissecting aorta and was treated with heparin infusion to relieve his symptoms. His medical history revealed that he was hypertensive which was controlled with medication. Previous surgical history included a total right hip replacement. No family history of malignancy or vascular disease were recorded.

His blood pressure was raised, resulting in an increased heart rate. His lower limbs appeared to be cold with decreased sensation. Based on the clinical findings, and medical history, he was admitted and referred for a peripheral computer tomography (CT) angiogram to exclude peripheral vascular disease. He also had a CT angiogram of his chest to monitor and classify his previously diagnosed aortic dissection.

CT 5mm interval scans were obtained using 120 ml of iodinated contrast media (Omnipaque 350 mg), administered intravenously by means of a power-injector for both studies.

The CT peripheral angiogram (Figures 1 and 2) demonstrated a distal abdominal aortic intimal flap with a true and false lumen, extending into the common iliac arteries. The false lumen appeared significantly larger and was compressing the true lumen. The contrast in the arterial system appeared diluted in both legs; the majority of the arteries supplying the lower limbs were either occluded and/or absent.

The CT chest angiogram (Figures 3 and 4) confirmed a progressively worsening, Stanford type A aortic dissection with a thrombosed false lumen originating from the ascending aorta. Two acute complications were evident: a brachiocephalic artery aneurysmal dilation with the dissection extending into the proximal vessel; and a dilated aortic root. Contrast leaks were not visible, and the likelihood of a rupture was excluded.

The radiological findings of both CT angiograms confirmed a previously diagnosed, chronic aortic dissection that had progressively worsened into a Stanford type A aortic dissection. Acute complications associated with the dissection, included cardiovascular and peripheral symptoms. His initial treatment involved medication to control his hypertension and surgical treatment was being investigated.

DISCUSSION

A dissection of the aorta is a common medical emergency condition whereby

there is a separation of the intima and adventitia layers.^[1] Although considered fatal in most cases, the prognosis is generally determined by the type and extent of the dissection, as well as the presence of accompanying complications.^[2] Possible complications may include aneurysms and peripheral arterial occlusions.^[3]

Peripheral arterial occlusive disease is a common disorder whereby the arterial vasculature supplying the lower extremities are obstructed.^[4,5] Symptoms may include pain and coldness in the legs.^[6] Aortic dissections and peripheral arterial occlusions are commonly found in older patients with high blood pressure.^[2,7,8] CT angiography has a proven track record for being the most reliable diagnostic tool for patients with aortic dissections and peripheral arterial occlusions.^[9]

The aorta is a complex organ consisting of a lumen, the intima (inner layer), the media (middle layer) and the adventitia (outer layer).^[10] Dissection of the aorta occurs when there is a separation of blood flow into two areas. These areas are known as true and false lumens.^[8] A true lumen represents the normal aortic lumen as opposed to a false lumen, which represents the area where blood has entered via the intima and/or media layer(s). It is important that the size of the false lumen be measured and compared with that of the true lumen to evaluate the degree of compression.^[1] The CT images of the pa-

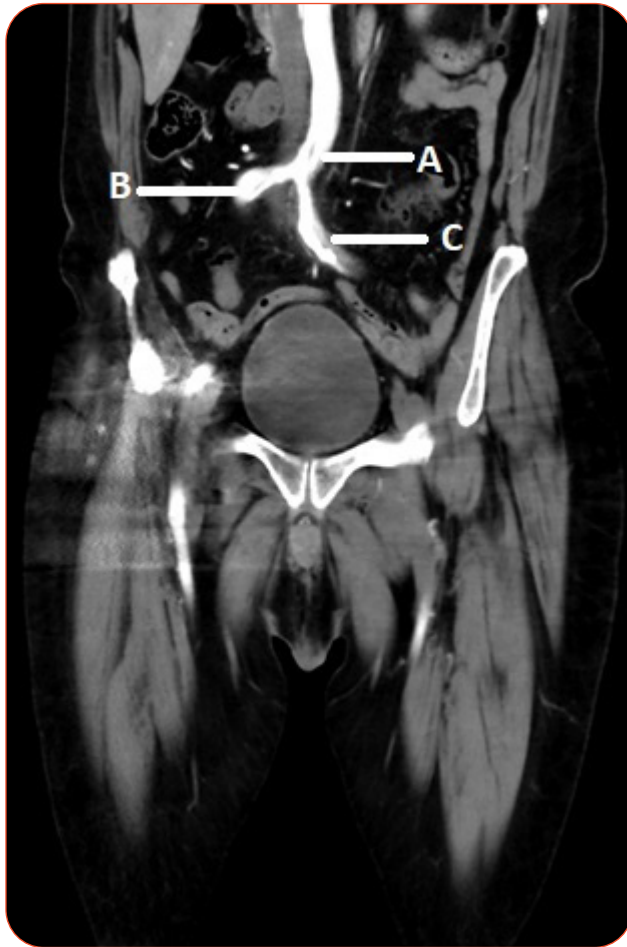


Figure 1. Coronal CT view demonstrating the distal aortic intimal flap (A) extending into both common iliac arteries (B = right and C = left).



Figure 2. Three-dimensional CT view demonstrating the restricted peripheral arterial blood supply. Right deep femoral artery (white arrow). Right superficial femoral artery (red arrow). Occluded and/or absent bilateral peripheral arteries (A).

tient in the case report also consisted of a false and true lumen.

Risk factors associated with aortic dissections may include any condition that contributes towards the weakening of the arterial wall. Risk factors include hypertension; atherosclerosis; high intensity weight lifting/exercise; the use of tobacco; genetic diseases; connective tissue disorders; and blunt trauma to the chest.^[2,7,8,10] The only risk factor associated with this patient included hypertension.

Symptoms associated with aortic dissections may include shortness of breath, chest, back and/or abdominal pain; it is also possible for the pain to migrate to the lower extremities, which is in keeping with the patient in this case report.^[2] Patients may also experience a loss of consciousness without any history of prior neurological conditions.^[11] This patient experienced such symptoms, possibly indicating insufficient blood flow to his brain as the result of an acute complication to his brachiocephalic artery.^[11]

Patients diagnosed with a dissection of the ascending and descending aorta are generally >60 years. Men are more likely to present with an onset of acute complications compared to women.^[7,10]

Chest radiographs, electrocardiograms and CT are often used for diagnosing an aortic dissection.^[12] Chest radiographs are less reliable as they have been reported to be normal in up to 40% of patients identified with positive aortic dissections. Electrocardiograms may also appear normal unless the coronary arteries have been compromised.^[11] CT is considered the modality of choice due to its availability, short scanning times, high accuracy, sensitivity and specificity.^[1,2,7,8,9]

Aortic dissections are generally classified as acute, subacute and/or chronic. An acute aortic dissection occurs within two weeks of its associated symptoms; subacute between two and six weeks; and chronic after more than six weeks.^[9,10] This patient was previously diagnosed with a chronic aortic dissection. Aortic dissec-

tions can further be classified by means of two systems: DeBakey and Stanford.^[9,10] As per this patient's radiological findings use was made of the more recent Stanford system. It portrays two types of aortic dissections: A and B, whereby the type of dissection is based purely on the involvement of the ascending aorta. Type A includes the involvement of the ascending aorta; type B does not.^[9] In this case diagnosis was made with type A aortic dissection as it involved both the ascending and descending aorta.

Treatment options for aortic dissections include an immediate intervention to decrease a patient's blood pressure and surgery. Decreasing a patient's blood pressure can lower the stress on the aortic wall, which, in return, prevents the likelihood of acute complications from occurring.^[1,2,7,9] Lifelong imaging at regular time intervals is recommended to monitor and evaluate aortic dissections.^[2]

CONCLUSION

From the literature reviewed, CT is con-

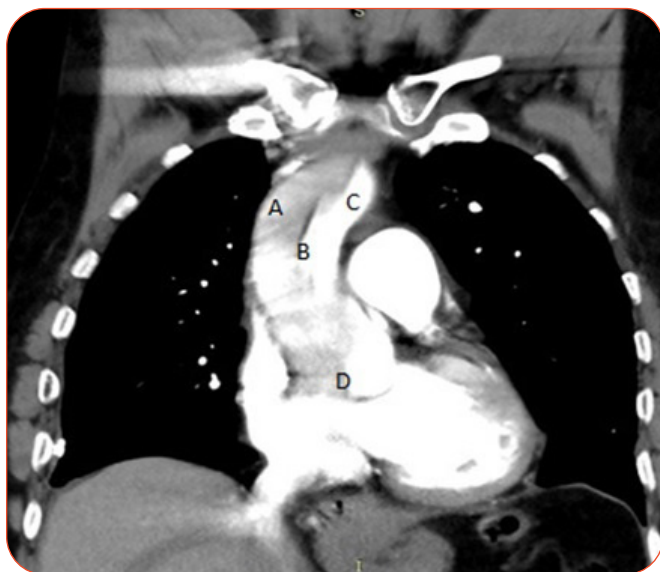


Figure 3. Coronal CT view of the chest demonstrating the false lumen (A), dissection (B) and true lumen (C) of the ascending aorta associated with the aortic root dilatation (D).

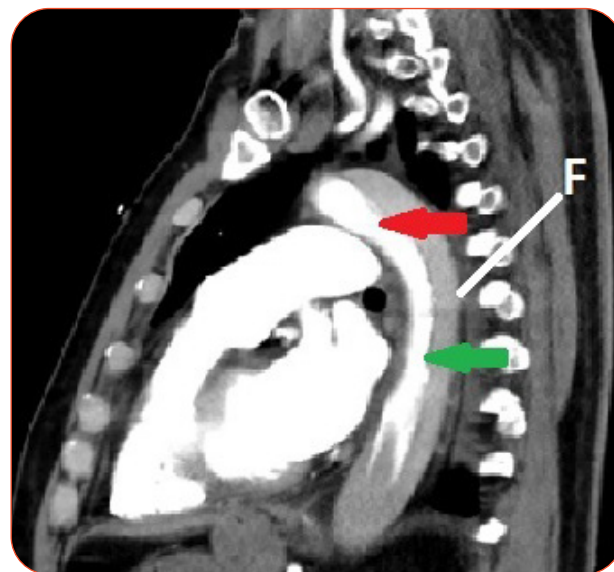


Figure 4. Sagittal CT view of the chest demonstrating the descending aortic dissection: red arrow = true lumen; F = false lumen; green arrow = dissection descending aorta.

considered to be the most accurate, sensitive and specific imaging modality to diagnose both aortic dissections and peripheral arterial occlusive disease. This patient was treated for hypertension and was awaiting surgical intervention.

ETHICAL CONSIDERATIONS

Permission to present this case report was obtained; the identity and details of the patient were omitted to ensure his right to privacy and confidentiality.

REFERENCES

- McMahon MA, Squirrell CA. Multi-detector CT of aortic dissection: a pictorial review. *RadioGraphics*, 2010; 30(3): 445-460. [Cited 2019 August 22]. Available: <https://pubs.rsna.org/doi/pdf/10.1148/rg.302095104>
- Braverman AC. Acute aortic dissection. *Clinician Update*, 2010; 122(2): 184-188. [Cited 2019 August 23]. Available: <https://www.ncbi.nlm.nih.gov/pubmed/20625143>
- Fann JJ, Sarris GE, Mitchell RS, Shumway NE, Stinson EB et al. Treatment of patients with aortic dissection presenting with peripheral vascular complications. *Annals of Surgery*, 1990; 212(6): 705-713. [Cited 2019 August 23]. Available: <https://www.ncbi.nlm.nih.gov/pubmed/2256762>
- Lezzi R, Santoro M, Marano R, Di Stasi C, Dattesi R et al. Low-dose multidetector CT angiography in the evaluation of infrarenal aorta and peripheral arterial occlusive disease. *Radiology*, 2012; 263(1): 287-298. [Cited 2019 August 23] Available: <https://www.ncbi.nlm.nih.gov/pubmed/22332067>
- Napoli A, Anzidei M, Zaccagna F, Marincola BC, Zini C, Brachetti, G et al. Peripheral arterial occlusive disease: diagnostic performance and effect on therapeutic management of 64-section CT angiography. *Radiology*, 2011; 261(30): 976-986. [Cited August 2019 23]. Available: <https://www.ncbi.nlm.nih.gov/pubmed/21969664>
- Leonard J. What to know about peripheral vascular disease. *Medical News Today*, 2019. [Cited 2019 August 23]. Available: <https://www.medicalnewstoday.com/articles/322182.php>
- Al'Aref SJ, Girardi LN, Devereux R, Lau C, Ghosh BD, Swaminathan RV et al. Contemporary review of acute aortic dissection. *Open Access Emergency Medicine*, 2015; 5(5): 1-10. [Cited 2019 August 23]. Available: <https://www.longdom.org/open-access/a-contemporary-review-of-acute-aortic-dissection-2165-7548-1000274.pdf>
- Barman M. Acute aortic dissection. *E-Journal of the European Society of Cardiology*, 2014; 12(1). [Cited 2019 August 23]. Available: <https://www.escardio.org/Journals/E-Journal-of-Cardiology-Practice/Volume-12/Acute-aortic-dissection>
- Fukui T. Management of acute aortic dissection and thoracic aortic rupture. *Journal of Intensive Care*, 2018; 6(15): 1-8. [Cited 2019 August 23]. Available: <https://jintensivecare.biomedcentral.com/articles/10.1186/s40560-018-0287-7>
- Criado FJ. Aortic dissection: a 250-year perspective. *Texas Heart Institute Journal*, 2011; 38(6): 694-700. [Cited 2019 August 23]. Available: <https://www.ncbi.nlm.nih.gov/pubmed/22199439>
- Meriam-Webster. Definition of Syncope, 2019. [Cited 2019 August 25]. Available: <https://www.merriam-webster.com/dictionary/syncope>
- Shiga T, Wajima Z, Apfel CC, Inoue T, Ohe Y. Diagnostic accuracy of transoesophageal echocardiography, helical computed tomography and magnetic resonance imaging for suspected thoracic aortic dissection. *Archives of Internal Medicine*, 2006; 166(13): 1350-1356. [Cited 2019 August 26]. Available: <https://www.ncbi.nlm.nih.gov/pubmed/16831999>