CASE REPORT

Discrepancy in blood pressure between the left and right arms - importance of clinical diagnosis and role of radiological imaging

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SUMMARY

Introduction: Differences in systolic blood pressure reading between arms are common but could signal trouble if the discrepancy is significant. Early detection of aortic dissection could invariably determine patient's survivability. Hence, a high index of suspicion with prompt diagnostic imaging is vital for accurate diagnosis. Case Presentation: A previously healthy 35-year-old lady was referred from district hospital for hypertensive cardiomyopathy complicated by acute pulmonary oedema. After being admitted to the Intensive Care Unit, the mean arterial pressure on the left arm was noted to be significant higher. On physical examination, both lower limbs were dusky in appearance because of poor perfusion. Investigations: Computed Tomography Angiography showed extensive arch and abdominal aorta dissection extending to the proximal common carotid artery. There was distal abdominal aorta thrombosis with partial left renal infarction. Echocardiogram showed global hypokinesia, presence of intimal flap, aortic regurgitation and mild pericardial effusion. Supine chest X-ray showed apparent cardiomegaly. Treatment: Repair of the ascending aortic dissection and suspension of the aortic valve by the cardiothoracic team on Day 2 of admission. The vascular team did bilateral high above knee amputation on Day 9 of admission. Outcome: Patient passed away on Day 10 of admission. Discussion: With the absence of classical features of aortic dissection, establishing the diagnosis can be challenging and requires both good clinical judgment and prompt radiological imaging, such that early treatment can be initiated. Conclusion: A high index of suspicion and good clinical judgment is needed in cases of significant blood pressure discrepancy between arms.

KEY WORDS:
Aortic dissection; Blood pressure discrepancy; Clinical judgement; Diagnostic imaging

INTRODUCTION

A difference in systolic blood pressure between and right and left arms is common but could be problematic if the discrepancy is significant (≥ 10 mmHg). Differential diagnosis includes peripheral vascular disease, subclavian stenosis and more alarmingly, aortic dissection.[1] The latter may be life threatening and necessitates urgent treatment as the mortality index increases exponentially with time.[2] Early detection of aortic dissection may invariably determine patient's survivability. Hence, a high index of suspicion and prompt diagnostic imaging is vital to confirm its diagnosis. Aortic dissection is divided into two types based on the Stanford Classification; type A involves the ascending aorta and type B does not. This is important for determining the mode of treatment because type A dissections require urgent surgical intervention whereas type B dissections can be managed conservatively under most conditions. Computed tomography angiography (CTA) is currently the best diagnostic tool for acute aortic dissection, with a sensitivity of near 100% and a specificity of 98%. It allows accurate imaging of the Stanford Classification type, the extent of dissection and the branch vessels.[3]

CASE REPORT

A previously healthy 35-year-old lady was intubated for respiratory distress in a district hospital. She was then referred to Sarawak General Hospital for further management of hypertensive cardiomyopathy, which was complicated with acute pulmonary oedema. She was admitted to the hospital with a three day history of generalised weakness, palpitations and sweating. After admission to the intensive care unit, significant mean arterial blood pressure discrepancy between the two arms was noted, with the reading in the left arm being 156/47mmHg, while that in the right arm was 87/57mmHg. Upon physical examination, pulses palpated were stronger on the left arm compared to the right arm. Both lower limbs were dusky in appearance and were poorly perfused.

Initial chest radiograph in the supine position revealed apparent cardiomegaly. No widened mediastinum was noted. Lung fields were otherwise clear.

Emergency CTA showed extensive ascending, aortic arch, descending and abdominal aorta dissection up until the bifurcation, extending superiorly to the proximal right common carotid artery (Stanford A). There was presence of distal abdominal aorta and iliac veins thrombosis. The left

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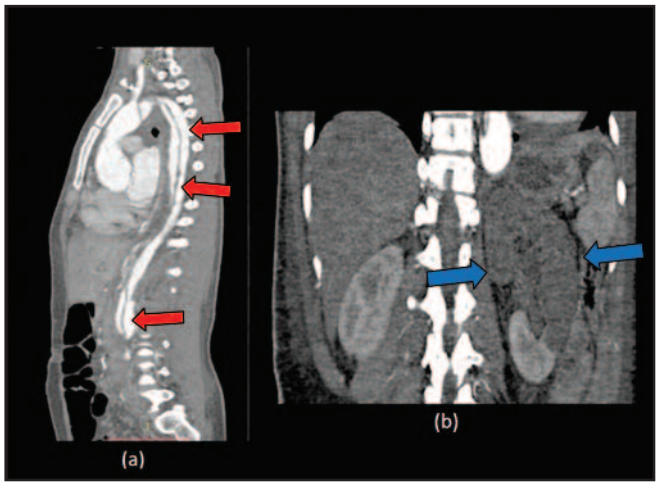

Fig. 1: Computed tomography angiography showing (a) intimal flap (red arrow) which indicates the extensive aortic dissection from the arch until the distal abdominal aorta, (b) poorly enhanced left renal parenchymal (blue arrow) in keeping with partially infarcted left kidney.

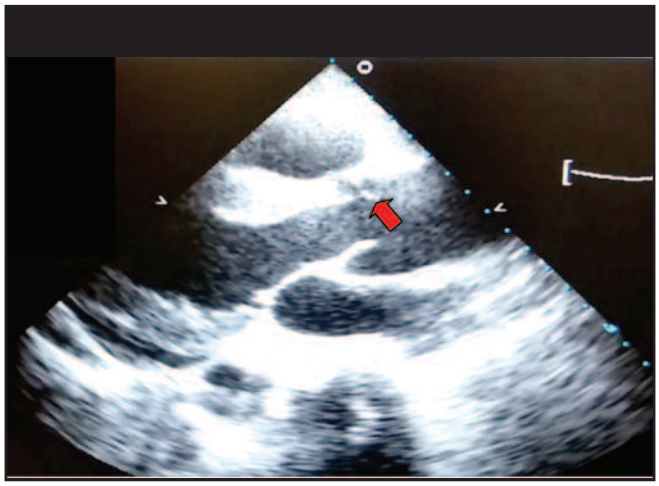

Fig. 2: Echocardiogram showing intimal flap in the ascending aorta.

kidney was partially infarcted. There was also pericardial effusion with a maximum thickness of 1.7cm.

Echocardiogram showed an ejection fraction of 35-45% with global hypokinesia and mild asymmetric left ventricular hypertrophy. There were also presence of moderate to severe aortic regurgitation and mild pericardial effusion. As shown by the red arrow in Figure 2, the intimal flap visualised in the ascending aorta was consistent with the diagnosis of aortic dissection.

Other significant blood investigations were an elevated serum creatinine level of 202 mmol/L and hypokalaemia. The two sets of cardiac enzymes (taken at 1st hour and 22nd hour) showed raised levels. Coagulation profile was normal. Electrocardiogram demonstrated right bundle branch block with T wave inversion over V1 to V3.

The patient was evaluated by the vascular and cardiothoracic teams before being transferred to other facilities for emergency operation. The patient underwent repair of ascending aortic dissection with ascending aortic, hemi-arch replacement and suspension of the aortic valve. She also required bilateral high above knee amputation on Day 9 of admission. However, her condition continued to deteriorate and was complicated with disseminated intravascular coagulation (DIVC), severe sepsis and acidosis. The patient eventually succumbed to multi-organ failure on Day 10 of admission.

DISCUSSION

Classical presentation of aortic dissection includes acute onset of severe chest pain (e.g. sharp, tearing or gripping, possibly migrating pain and worst at onset). However, our patient showed a short history of failure symptoms. Due to the absence of classical features, establishing the diagnosis can be challenging and delayed. Undiagnosed preexisting hypertension is found to be the most important predisposing factor for acute aortic dissection (reported in 70% of the patients with aortic dissection).[3]

One of the leading points to early diagnosis of aortic dissection in this case report was the detection of blood pressure discrepancies in the two upper limbs, which led us to suspect the diagnosis of aortic dissection. Physical examination which revealed dusky appearance and poor perfusion of the lower limbs further reinforced our suspicion of aortic dissection.

Initial investigations including chest radiograph were not suggestive or classical of acute dissection. There was no widened mediastinum, double or irregular aortic contour, or displacement of the atherosclerotic calcification. However, a normal chest radiograph does not rule out aortic dissection.[4] The mortality rate of aortic dissection increases by 1-2 % per hour in the first 24-48 hours.[5] The overall outcome of aortic dissection is determined by the type, extend of dissection and its associated complications.[4] In this case report, the patient was classified Stanford A, which warranted urgent surgical intervention as it involved the ascending aorta. It was also complicated with renal infarction and iliac veins thrombosis (for which there were no identifiable risk factors based on available blood parameters).

Computed tomography angiography remains the gold standard with high sensitivity, providing excellent imaging detail in a timely manner.[4] The visualisation of the true or false lumen, and whether it involves the side branches, is crucial for the management and prognosis of the patient.

CONCLUSION

The diagnosis of aortic dissection can be challenging. It requires a high index of suspicion with good clinical judgment and prompt radiological imaging, especially in cases of significant blood pressure discrepancy between the two arms.

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REFERENCES

1. Clark CE, Taylor RS, Shore AC, Ukoumunne OC, Campbell JL. Association of a difference in systolic blood pressure between arms with vascular disease and mortality: a systematic review and meta-analysis. Lancet 2012; 379 (9819): 905-14.
2. A significant difference in blood pressure of both arms may indicate circulatory problem. 2015 [accessed June 2015]. Available from: http://www.health.harvard.edu/blog/different-blood-pressure-in-right-and-left-arms-could-signal-trouble-201202014174.
3. Barman M. Acute aortic dissection. European Society of Cardiology Journal 2014; 12 (25).
4. McMahon MA, Squirrell CA. Multidetector CT of aortic dissection: A pictorial review. Radiographics 2010; 30(2): 445-60.
5. Criado FJ. Aortic Dissection: A 250-Year Perspective. Texas Heart Institute Journal. 2011; 38(6): 694-700.