Case study

Saddle Shaped Thrombus at Subclavian-Vertebral Artery Junction

ABSTRACT

Acute upper limb ischemia is an uncommon but dreaded cardiovascular emergency. Severity of symptoms is dependent upon the site of the arterial occlusion and the extent of the collateral blood supply in the shoulder and elbow region. The most common cause is thromboembolic occlusion. Rheolyticpharmaco mechanical thrombectomy is an effective modality to manage heavy thrombus.

Keywords: Acute upper limb ischemia, saddle thrombus, revascularization, pharmaco mechanical thrombectomy.

1. INTRODUCTION

Acute upper limb ischemia (AULI) is an uncommon cardiovascular emergency with dreaded consequences if it can't be diagnosed timely and treated successfully. Clinical features of AULI are like acute lower limb ischemia. There is an average lag period of about 6 hours from onset of symptoms to institution of limb saving treatment. The distribution of ischemic changes, severity of ischemia and symptoms are dependent upon the site of the arterial occlusion and the efficacy of the collateral blood supply in the shoulder and elbow region [1,2].

2. PRESENTATION OF CASE

A 63- year- old gentleman had pain in left shoulder and arm along with numbness of finger tips for one day. Apart from well controlled hypertension, his medical history was unremarkable. Upon examination the blood pressure was 146/82 and 126/74 mm of Hg in right and left arm respectively with the regular pulse rate of 60 bpm. Electrocardiogram was unremarkable with normal findings in 2 D echocardiography. Subsequently, he underwent CT angiography which revealed luminal filling defect in the left subclavian artery causing > 90% luminal diameter narrowing across the origin of left vertebral artery (figure 1a, b).

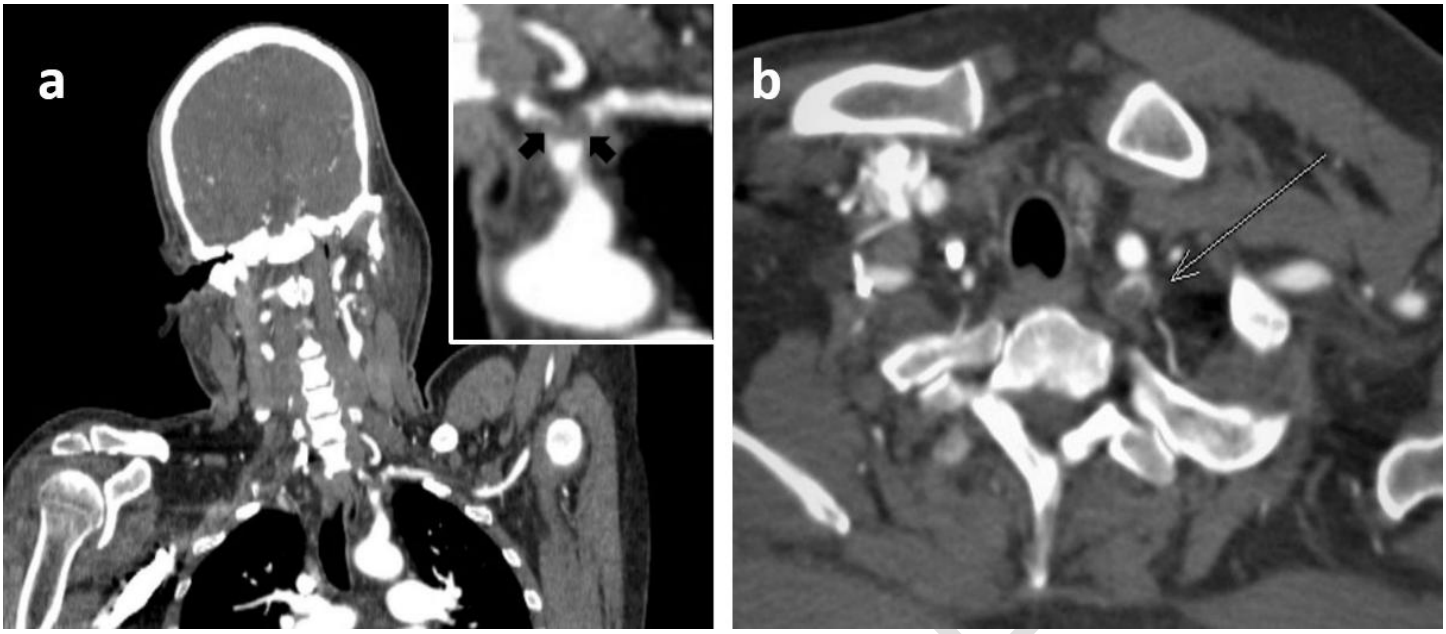

Figure 1. Coronal view in CT angiography showed saddle shaped luminal filling defect (black arrows) involving the left subclavian artery and the vertebral artery (zoomed-in inset) (a).Transverse view showed luminal filling defect (marked by arrow) in left subclavian artery causing >90% luminal diameter obstruction (b).

The patient was admitted and underwent coronary and peripheral angiography. Coronary angiography revealed single vessel disease (60% luminal diameter stenosis in mid left anterior descending artery) and digital subtraction angiography (DSA) of the left subclavian artery showed saddle shaped large thrombus extending into ostio-proximal segment of the left vertebral artery (figure 2a).

After detailed counselling pertaining to diagnosis, etiology, management options and prognosis including risk of posterior circulation stroke, pharmaco-mechanical thrombectomy was planned. Loading doses of aspirin and clopidogrel were administered. Right (6 F) and left (8 F) trans femoral arterial accesses were obtained. Through right sided access a 0.014" x 190 cm Hi-Torque BMW wire (Abbott Vascular, Santa Clara, USA) was advanced in the left vertebral artery and 6 F SpiderFX embolic protection device (ev3, Inc., Plymouth, MN) was deployed in the cervical part of the left vertebral artery (video 2). Through left trans femoral access, over 0.035" J tip PTFE guidewire, 6 F JR 4.0 guiding catheter was advanced in the left subclavian artery and was exchanged with 0.035"x 300 cm Supra Core wire (Abbott Vascular Inc., Redwood City, California) with soft atraumatic tip which was gently advanced up to the brachial artery. Thrombus extraction was performed with Angiojet peripheral thrombectomy catheter (figure 2b). Complete extraction the thrombus was achieved (figure 2c-d;).

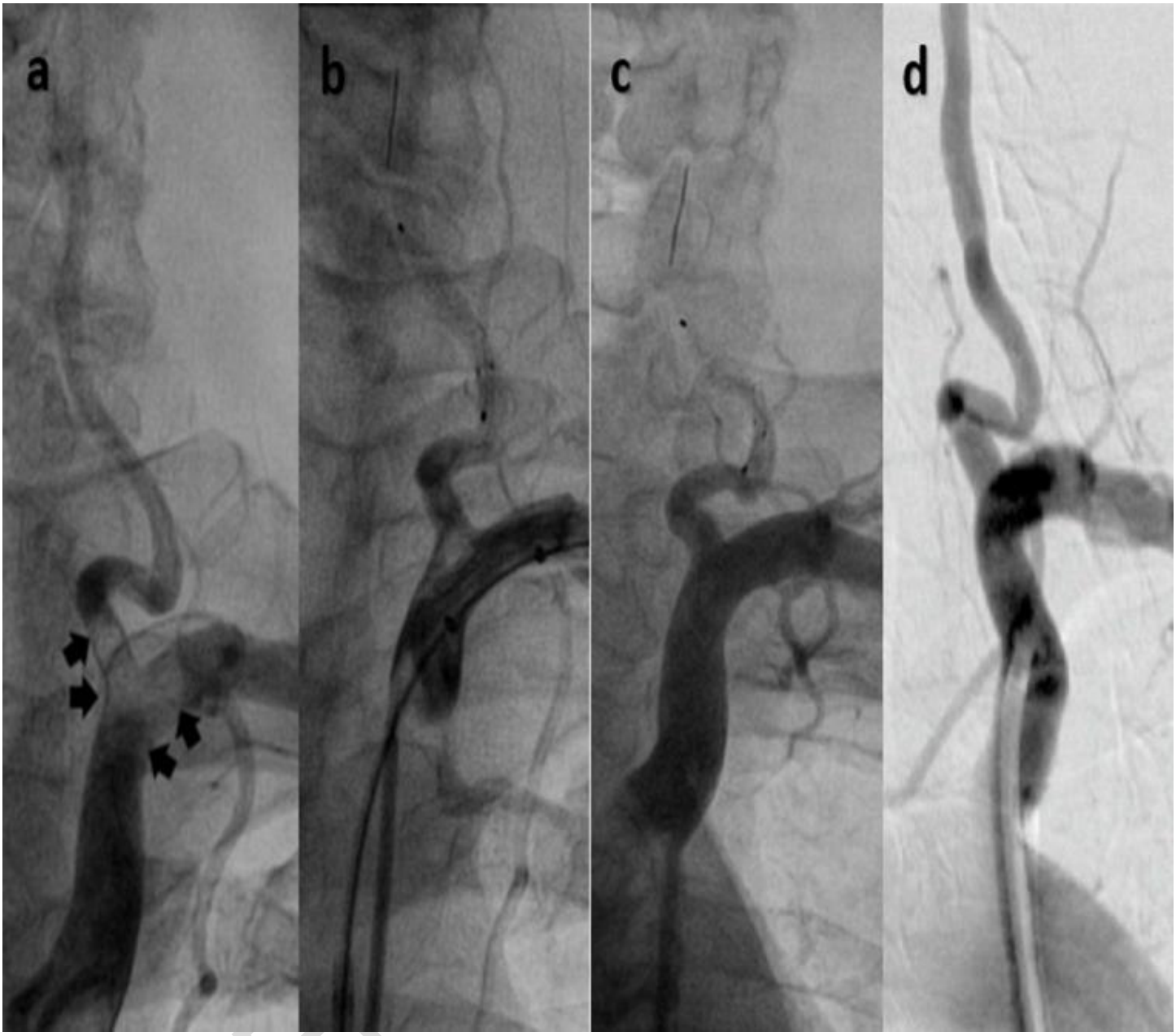

Figure 2. Still images of cineangiograms performed by injecting contrast with JR guide catheter showed (a) saddle shaped filling defect invloving the left subclavian artery and the ostioproximal vertebral artery, (b) partial thrombus extraction after first run of rheolytic thrombectomy along with spiderFX embolic protection device in the vertebral artery, (c) complete thrombus removal after three runs of thrombectomy catheter, (d) complete patency of the subclavian and the vertebral arteries without any residual stenosis after retrieval of embolic protection device.

He was given heparin infusion. In the night patient developed gross hematuria so heparin was stopped. In the morning patient had massive hematemesis and was managed with packed red blood cell transfusion, parenteral proton pump inhibitor and other supportive measures while aspirin was stopped. Subsequently, upper gastrointestinal endoscopy revealed antral gastritis. Patient also developed acute kidney injury with maximum serum creatinine value of 5.8 mg% and neutrophilic leukocytosis (total leucocyte count of 31,100/ mm^3). He was successfully managed for sepsis and volume depletion. Meanwhile only clopidogrel was continued. After normalization of renal function, patient was discharged on single antiplatelet and high intensity statin therapy. Four weeks later CT angiography was performed which revealed no residual thrombus or stenosis (figure 3a, b).

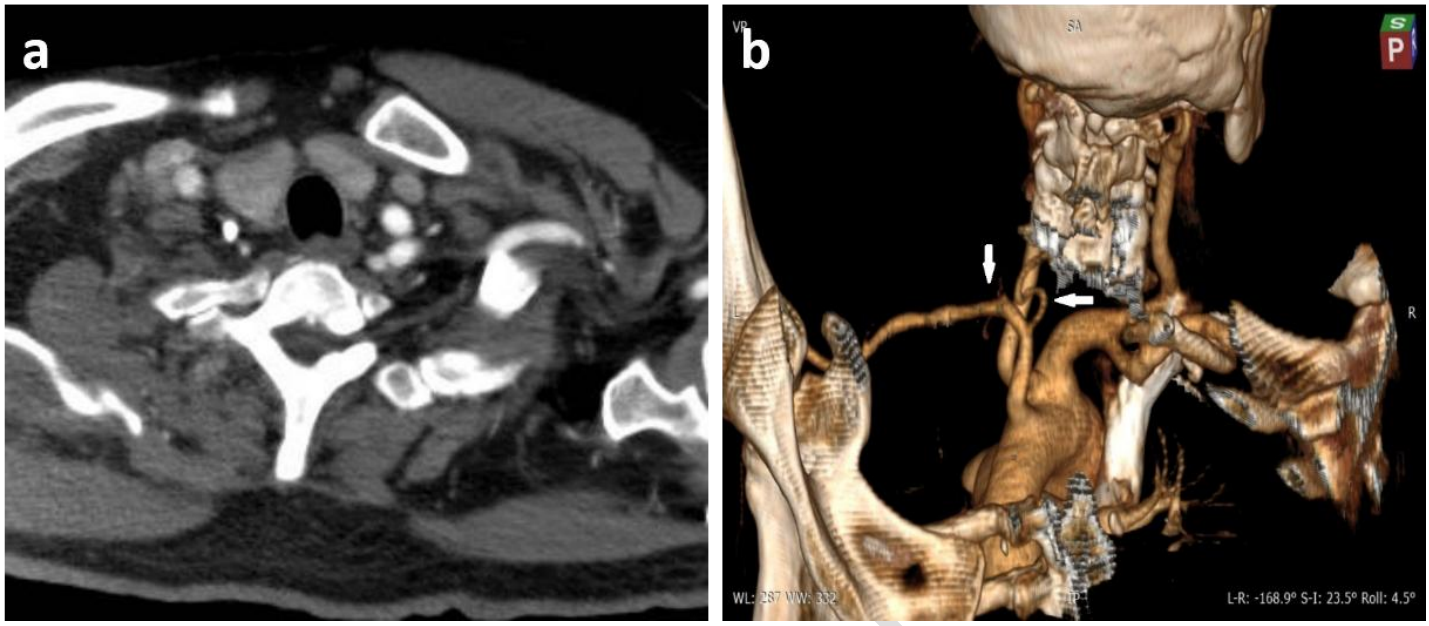

Figure 3. Transverse view in CT angiography, performed 4 week after discharge, revealed complete opacification of left the subclavian artery without any residual stenosis (a). Volume redered image of the arch and its major branches from posterosuperior aspect, showed patent left subclavian artery and vertebral artery (b).

3. DISCUSSION

Acute limb ischemia is a vascular emergency [1]. Among all these cases, lower limb ischemic events are at least four fold more common than upper limb ischemic events [3]. Etiology of AULI is highly varied. Embolic cases account for the most followed by thrombotic and traumatic.Most emboli originate from the heart, caused by atrial fibrillation, recent myocardial infarction, and valvular heart disease. The most common site of embolic occlusion is brachial artery before bifurcating into radial and ulnar arteries. Subclavian artery being the large vessel, is most common site for atherosclerotic disease and atherothrombotic occlusion. Atherosclerosis is unusual in brachial artery [4]. The most likely etiology of thrombotic occlusion of left subclavian artery seems to be atherothrombotic.

The shoulder and elbow appears to be much more tolerant to ischemia by virtue of extensive collaterals, and it is therefore more common to observe ischemic symptoms below the elbow. However, in the index patient the presence of more extensive pain around the shoulder, can be partly explained by occlusion of subclavian artery before giving origin to any major branch as well as ostial vertebral artery involvement precluding craniocaudal blood flow as an important rescue mechanism.

The various available options to manage AULI include surgical management (including embolectomy &/or bypass grafting), thrombolysis (either catheter directed or systemic), percutaneous therapeutic modalities including pharmaco mechanical thrombectomy (PMT) and/ or stenting and conservative management with anticoagulation alone. Anticoagulation alone was not considered in view of threatened limb ischemia. Thrombolysis was also not preferred due to ostio-proximal vertebral artery involvement posing high risk of acute embolic stroke. Between remaining two options rheolytic thrombectomy was opted along with the application of embolic protection device to prevent disabling stoke [5]. The Angiojet thrombectomy system is a rheolytic PMT device utilizing high pressure saline jets to generate a localized low-pressure zone (Bernoulli principle) that results in fragmentation of the thrombus at the distal tip of the catheter. The saline jets also provide the driving force through which the macerated thrombus particles are removed from the lesion site via the catheter. It provides a rapid reperfusion to the extremity with reduced procedure time, and an acceptable risk profile without compromising limb salvage [6]. Fortunately, three runs of thrombectomy in the subclavian artery completely

removed the thrombus not only from the subclavian artery but also from the vertebral artery without distal embolization. There was no residual stenosis precluding the need of stent placement.

4. CONCLUSION

Acute upper limb ischemia is an uncommon but dreaded cardiovascular emergency. Prompt treatment is warranted to minimize the irreversible damage and complications. Angiojetpharmaco mechanical thrombectomy alone or in combination is an effective treatment modality for heavy thrombus burden.

7. CONSENT

Written informed consent was obtained from the patients for publication of this case report and any accompanying images.

8. REFERENCES

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