
CASE REPORT

Brachial Artery Transection Following Closed Elbow Dislocation Without Accompanying Fracture

YY Cheuk¹, KWM Yang²

¹Department of Radiology, Kwong Wah Hospital; and ²Department of Radiology, United Christian Hospital, Hong Kong

ABSTRACT

Simple elbow dislocation is one of the most common joint dislocations and has a good prognosis. Complete transection of the brachial artery rarely ensues without an associated fracture. This case report describes this rare complication and its imaging findings in a 27-year-old man suffering from such a simple elbow dislocation. The diagnosis was made by computed tomographic angiography and duplex ultrasound. The brachial artery was repaired with a saphenous vein graft and the distal circulation was restored.

Key Words: Angiography; Brachial artery; Dislocations; Elbow joint; Ultrasonography, Doppler, duplex

中文摘要

單純性肘關節脫臼導致肱動脈斷裂

卓元怡、楊國偉

單純性肘關節脫臼是最常見的關節脫臼之一，大多數病例都復原良好。在沒有骨折的情況下，因肘關節脫臼而導致肱動脈完全斷裂十分罕見。本文報告一名27歲男性因肘關節脫臼而出現此罕見併發症的病例及其影像診斷的應用。這病例應用了電腦斷層掃描血管造影及多普勒超聲波作為診斷工具。最後肱動脈成功由隱靜脈移植修補，末端的血液循環恢復良好。

INTRODUCTION

Elbow dislocations are the most frequently encountered dislocations after shoulder and finger dislocations. Vascular injury following elbow dislocation is an uncommon complication and most are associated with fracture. Complete transection of brachial artery is very rare in closed elbow dislocation.¹ We report such a case following closed posterior elbow dislocation.

CASE REPORT

A 27-year-old man injured his left elbow during a basketball game in March 2010. The patient was brought to the accident and emergency department

immediately after the injury and found to have closed elbow dislocation.

X-ray showed posterior elbow dislocation with no fracture (Figure 1a, 1b). He was treated with close reduction in the emergency department. Successful reduction was confirmed by a post-treatment radiograph (Figure 1c). Subsequent physical examination revealed a weak radial pulse in the affected limb but without signs or symptoms of critical ischaemia. An urgent computed tomographic (CT) angiogram was performed with a fixed timing technique. A total 80 ml of non-ionic iodinated contrast was given intravenously at a rate of

Correspondence: Dr YY Cheuk, Department of Radiology, Kwong Wah Hospital, 25 Waterloo Road, Kowloon, Hong Kong. Tel: (852) 3517 8328; Fax: (852) 3517 5454; Email: yycheuk@hotmail.com

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3 ml/s. The CT angiogram showed a 6-cm segment of disruption in flow proximal to the bifurcation of the brachial artery. Distal flow was reconstituted by collateral arteries from muscular branches (Figure 2).

A duplex ultrasonographic (USG) scan was also performed to evaluate the cause of arterial disruption. Focal brachial artery discontinuity suggesting complete transection (Figure 3) was detected. There was a 3-cm gap between the 2 ends of transected brachial artery and each end had 1 to 2 cm of occluding thrombi. This explained the absence of contrast extravasation on CT angiogram. The involved length was about 7 cm in total, which matched the CT and subsequent operative findings. The patient underwent emergency vascular repair entailing a saphenous venous graft (in view of the long length of the affected arterial segment).

DISCUSSION

Closed posterior elbow dislocation is a common condition. The usual mechanism is a fall on the outstretched hand with the arm in extension. Closed posterior dislocations are not commonly associated with neurovascular injury. Most cases are treated on an outpatient basis and have a good prognosis.

Complete transection of brachial artery is extremely

rare^{2,3} in closed elbow dislocation without an accompanying fracture. In a review series of 634 uncomplicated elbow dislocations,¹ the brachial artery was injured in only 3 (0.5%) of the patients. Clinically, it may present as acute upper limb ischaemia and/or a weak radial pulse on the affected side. Occult cases are not uncommon however, owing to a rich collateral flow.⁴

Due to the rarity of this complication and the variable clinical presentation, early diagnosis depends on a high index of suspicion. The presence of distal pulses is not proof of an intact artery. This complication has to be considered if there is significant physical force of injury, massive swelling, or wide joint separation on physical or radiological examination.

Conventional or digital subtraction angiography is considered the gold standard in delineating vascular anatomy. With the advent of multi-slice CT, CT angiography is more commonly used for this purpose, as it is less invasive and readily available. CT angiography has its own limitations, however. In the presence of a metallic foreign body near the region of interests or if the patient has poor cardiac function or severe pre-existing peripheral vascular disease, image quality could be compromised. In these cases, conventional



Figure 1. (a, b) Pre-reduction and (c) post-reduction elbow radiographs showing posterior elbow dislocation with successful reduction.

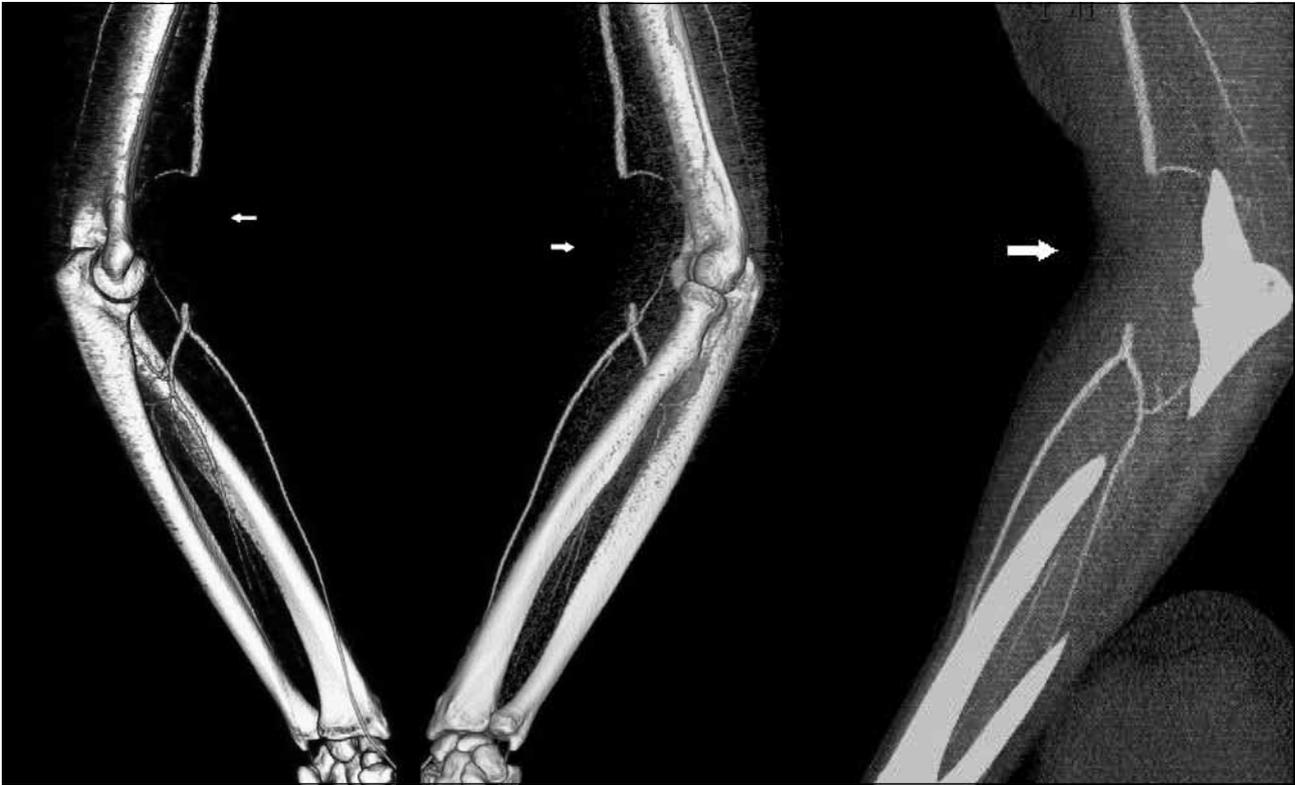


Figure 2. 3-Dimensional volume-rendered computed tomographic angiography image and reconstructed image in maximal intensity projection showing truncated brachial artery above the bifurcation (arrows) with reconstitution of distal flows by collateral branches.

angiography would be a better option.

The typical angiographic findings include a long segment of abruptly occluded flow above the bifurcation of brachial artery. The site of transection is

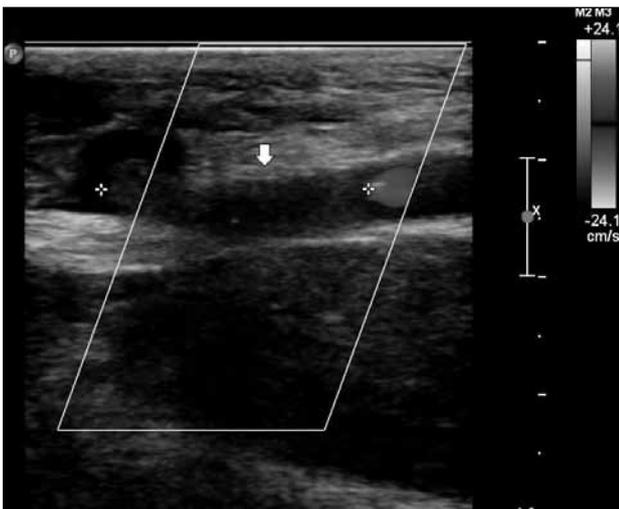


Figure 3. Doppler ultrasonography shows cessation of flow of brachial artery with hypoechoic intraluminal thrombus (arrow) and discontinuity of brachial artery.

usually about 5 to 6 cm above elbow, above or at the level of aponeurotic expansion of the biceps. Active contrast extravasations may not be present due to the intraluminal thrombi. Collateral flow is variable, depending on the extent of injury. It is postulated that the brachial artery is transected by the bony edges of humeral condyle during posterior dislocation and the transected ends may be impacted and impinged on by the bone and swollen soft tissues leading to sluggish blood flow and arterial thrombosis. This may explain the absence of significant extravasation revealed by CT which therefore does not preclude the possibility of arterial transection.

Duplex USG has been shown to be accurate for detecting significant vascular injuries. In one series, a Doppler-determined arterial pressure index of less than 0.90 was associated with a 95% sensitivity and a 97% specificity.⁵ In addition, duplex USG can differentiate arterial transection from entrapment or thrombosis by detecting the gap between two transected ends. It is superior to CT in differentiating diseased arterial wall from the adjacent soft tissue swelling and haematoma. It also provides useful preoperative information including

the length of any gap. However, it is not easy to perform duplex examinations in an injured limb and is more operator-dependent than other techniques.

Saphenous vein graft, synthetic vein graft, brachial ligation, and endovascular intervention have been described in literature as other treatment options. Saphenous vein graft is more commonly used nowadays.

In summary, brachial artery transection is a rare complication following closed elbow dislocation. For early diagnosis, a high index of suspicion is necessary. Both CT angiography and USG are useful for confirming the diagnosis and delineating the extent

of the vascular insult. Emergent vascular repair is important to prevent long-term complications.

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