

## Axillary artery pseudoaneurysm and distal ulnar embolization in collegiate pitcher: a case report and review

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### ABSTRACT

Twenty five-year-old pitcher presented with acute right middle and index finger numbness and coolness. Angiogram showed a 5mm axillary pseudoaneurysm and near complete occlusion of ulnar and common interosseous artery, ulnar side of the palmar arch, and ulnar digital artery. Patient deferred surgery, treatment with tPA and heparin succeeded in reperfusion.

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### KEYWORDS

Pseudo aneurysm; axillary artery; embolization; ischemia; reperfusion; tPA

### Introduction

Repeated overhead pitching places extreme demand on the shoulder, causing adaptive changes to the glenohumeral joint, including external rotation, increased retroversion and anterior capsular laxity [1]. These anatomical changes can pose a risk to the arms musculo-skeletal and vascular system.

A baseball pitcher can generate internal rotational velocities up to 7510 degrees/second which places up to 1100 N of compressive force on the shoulder [1]. Studies have demonstrated that even repetitive sub-maximal forces can cause anterior capsular laxity and potential for injury [1]. Common shoulder problems in these athletes include rotator cuff injury, secondary impingement, internal impingement and superior labrum injuries [2–6]. Less frequently, patients may present with nerve injuries to the scapular, long thoracic, axillary nerves (quadrilateral space syndrome) and vascular changes to the axillary artery, vein or thoracic outlet syndrome [7–18]. While cocking during a pitch, the humeral head translates anteriorly, which can cause compression of the axillary artery [19]. In addition, hyperabduction of the pectorals major during winding adds to the axillary artery compression [19]. Chronic intermittent compression places the pitcher at a risk for aneurysm and thrombosis of the axillary artery [19,20].

Aneurysms of the axillary artery can present with a variety of symptoms, some of which are subtle but

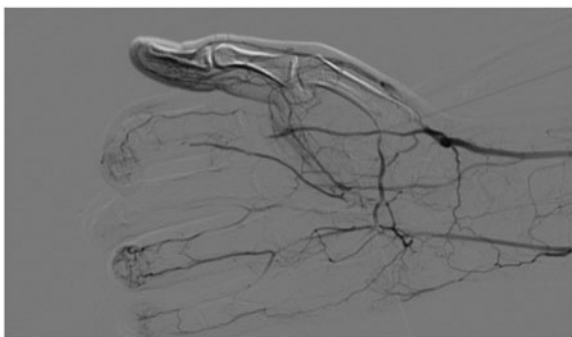
usually related to ischaemia [21]. These symptoms can include paresthesias of the hand, claudication, and arm fatigue. Significant embolisation and reduced flow can account for the symptoms of temperature change and numbness. Although embolisation may have occurred, loss of pulses may not always be detected on physical examination [19].

Here we report a pseudoaneurysm of the axillary artery and near complete occlusions of the ulnar and common interosseous artery and ulnar digital vessels of the superficial palmar arch in a collegiate baseball pitcher.

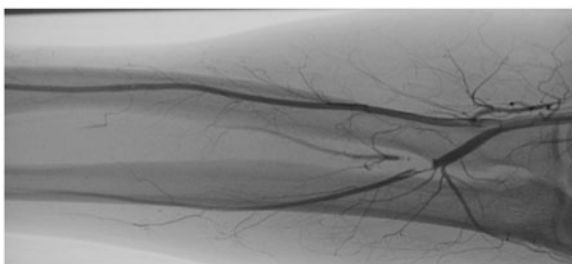
### Results

A 25-year-old right hand dominant collegiate pitcher with no significant past medical history presented to the emergency department of Yale New Haven Hospital after developing right middle finger numbness and coolness while pitching during a baseball game. His symptoms presented acutely and had not happened previously. Physical exam revealed right middle finger and index finger pallor and coolness without audible Doppler signals in these fingers distal to the PIP joint.

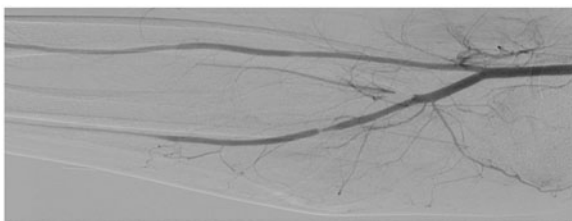
Non-invasive and invasive studies of the right upper extremity were performed. On angiogram, the patient was found to have near complete occlusions of the ulnar and common interosseous artery and ulnar



**Figure 1.** Pre-treatment angiography showing lack of perfusion to the middle finger.



**Figure 2.** Pre-treatment angiography showing obstruction of Ulnar & Common Interosseous arteries.



**Figure 3.** Post-treatment improvement in Ulnar artery obstruction.

digital vessels of the superficial palmar arch. Interventional radiology was consulted to attempt aspiration of the emboli, which was unsuccessful. Trans-thoracic echocardiography was performed to investigate possible cardiogenic source of the patient's emboli, which was negative. Hematological studies were performed, and a hypercoagulable state was ruled out. Right upper extremity CTA showed a 5 mm axillary pseudoaneurysm, and it was hypothesised that the origin of the emboli to his distal hand was from this axillary pseudoaneurysm (Figures 1 and 2). The patient was started on tissue plasminogen activator (tPA) and heparin infusions through a brachial artery sheath. Non-operative management was only partially successful at improving perfusion as the ulnar artery and common interosseous artery opened, but the superficial palmar arch and digital vessels remained

occluded (Figure 3). Doppler signal was detected throughout his right upper extremity, including his ulnar artery at the wrist and into the palmar arch and ulnar digital arteries. Radial and ulnar pulses were palpable. Surgery was then proposed, both for improving perfusion to the hand (thrombectomy, embolectomy, and potential vascular bypass), and for eliminating the presumed source of the initial embolus (axillary artery reconstruction).

Despite being counselled on the serious risks of delaying surgery, the patient refused surgical intervention, as he did not want to stop playing baseball in his final collegiate season. Treatment with tPA (1 mg/hour) and heparin (800 units/hour) was continued, and the patient no longer complained of paresthesias in his right middle and index fingers. Our patient was again advised on the risks of deferring surgery and a return to baseball with both a known pseudoaneurysm, and while on anticoagulation, which included permanent injury, limb loss, and death. Patient was lost to follow-up and did not answer out repeated attempts to reach him.

## Discussion

Roughly 4% to 9% of patients with upper limb embolisation receive amputation or have residual claudication as a result of ischaemic changes [22,23]. Furthermore, a delay in treatment may increase the showering of emboli, and lead to occlusion of the brachial artery, gangrene and rupture of the aneurysm [20,24,25]. Given the potential for irreversible damage, it is important for practitioners to maintain a high index of suspicion, and to be able to address these changes. Anticoagulation, embolectomy, or lysis is indicated with a success rate of 75–90% [22,26,27].

There exist case reports which document the presence of axillary artery aneurysm in pitchers, but few have shown aneurysms in conjunction with embolisation of the hand as seen in our patient [28]. By far the most common cause of embolisation of the upper extremity, which occurs in only 15% of cases, is atrial fibrillation [22,23,29–31]. Pathologies such as Raynaud's syndrome a medical condition where arterial spasm reduces blood flow can present similarly and should be part of the differential diagnosis. However, the finding of a pseudoaneurysm in our patient without a cardiogenic or hematological source increased our suspicion that his distal hand emboli originated from his axillary pseudoaneurysm. It is difficult to predict the patient's long-term prognosis for recurrence of his symptoms. However, we strongly believe that

surgical correction of his pseudoaneurysm would greatly reduce the likelihood of recurrence.

## Conclusions

Axillary artery pseudoaneurysms can develop in individuals who sustain repetitive submaximal forces on their glenohumeral joint potentially leading to distal embolisation and hand ischaemia. Given the potential for irreversible damage it is important for practitioners to maintain a high degree of suspicion for pseudoaneurysms in these situations and to address them appropriately. Imaging involves either catheter based or contrast-enhanced MR/CT and treatment includes anticoagulation, embolectomy, lysis and/or excision and ligation of the pseudoaneurysm.

## Statement of Human and Animal Rights

This article does not contain any studies with human or animal subjects.

## Statement of Informed Consent

Informed consent was obtained from all individual participants included in the study.

## Disclosure statement

The authors report no conflicts of interest.

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