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A case of delayed axillary artery aneurysm after reverse shoulder arthroplasty for a shoulder fracture dislocation: a case report

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Injury to the axillary artery (AA) after proximal humerus fracture is extremely uncommon.⁸ Furthermore, AA injury has been rarely described during shoulder arthroplasty.³ We present a case of delayed AA pseudoaneurysm after reverse shoulder arthroplasty (RSA) for a comminuted proximal humerus fracture.

Case

We present the case of a 76-year-old woman with a history of schizophrenia. She presented to the emergency department after falling onto an outstretched hand. She complained of left shoulder pain. The initial examination revealed no neurological or vascular deficits; the mobility of the hand and fingers was normal with no sensory loss.

Her blood pressure was 164/98 mmHg and her heart rate was 100 bpm. Radiography and computed tomography (CT) of the shoulder confirmed a comminuted proximal humeral fracture (PHF; 4 parts in accordance with Neer's classification; [Figures 1 and 2](#)).

Two days after the injury, we performed RSA (Zimmer Biomet; Japan Medical Materials, Tokyo, Japan; [Figure 3](#)). The fracture site was exposed through a deltopectoral incision. During the operation, no abnormal bleeding from the surgical field was observed. After the operation, she had no complaints about any neurological

disorder of the surgical arm. She then underwent postoperative rehabilitation; the affected arm was kept in a sling for 4 weeks. After that, self-assisted passive range of motion exercises were started, such as forward flexion in the supine position and table sliding/stretching exercise, preferably during or after a hot bath or shower. After 6 weeks, self-assisted active exercises were started. Isotonic strengthening exercises using an elastic band were started 2 months postoperatively. The patients were allowed to gradually return to their daily living activities. She stayed in hospital one month after surgery because her mental condition was not good and she passively had physical therapy during her stay.

After discharge, at 2 months after the operation, she was transported to the emergency department in a state of shock. Her blood pressure was 83/55mmHg and her heart rate was 120 bpm. On physical examination, her left shoulder was swollen. Contrast-enhanced CT revealed a huge AA aneurysm and extravasation from the left AA ([Fig. 4](#)). On the same day, a cardiovascular surgeon who was consulted from our institute resected the AA pseudoaneurysm and performed angioplasty of the lesion ([Fig. 5](#)). During the operation, we could not view the RSA from the surgical field. Although she recovered her general condition completely, her left shoulder range of motion 1 year after the second operation was restricted severely owing to her mental illness.

Discussion

Reports about AA injury after RSA for PHF are rare. A cross-sectional study by Menendez et al showed that the incidence of AA injury with PHF was 0.085% (331 cases in 388,676 persons).⁸

Institutional review board approval was not required for this case report.

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Figure 1 A comminuted proximal humeral fracture (4 parts in accordance with Neer's classification).



Figure 3 Reverse shoulder arthroplasty (Zimmer Biomet; Japan Medical Materials, Tokyo, Japan).



Figure 2 Surface-rendered computed tomography image showing a comminuted proximal humeral fracture (4 parts in accordance with Neer's classification).

We found 14 case reports about AA injury with PHF.¹⁰ In most cases, ischemic symptoms and severe pain in the upper limbs appeared immediately after trauma or surgery, and the pathology of the AA injury was considered an excessive medial shift of the sharp fracture stump of the proximal humeral shaft, which might have damaged the arterial wall of the AA and then blocked the flow. On the other hand, Guvener et al reported cases of anterior-inferior

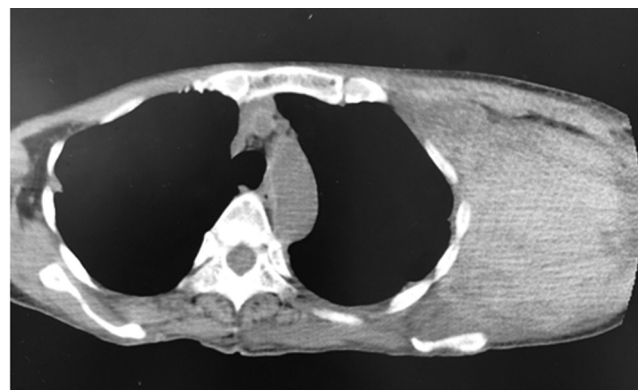


Figure 4 Contrast-enhanced computed tomography image showing an axillary artery aneurysm and extravasation from the left axillary artery.

dislocation of the humeral head induced by blunt trauma to the vulnerable arterial wall in the elderly.⁶ The AA has been suggested to be more susceptible to injury from shoulder trauma or surgery in patients aged >50 years owing to atherosclerosis and loss of arterial elasticity.^{1,2,4}

Two reports have been published about AA injury after RSA for PHF.^{5,12} Omar et al reported a case complicated by AA obstruction 2 months after RSA for PHF, and Wingert et al experienced a case treated with blood vascular reconstruction surgery for AA avulsion during RSA. Upper rim length extension was one of the features caused by RSA,¹¹ and this change might have damaged the AA in elderly patients with weak blood vessel walls.

In our case, the dislocated shaft might have damaged the AA, and then the change in the arterial wall tension by surgical

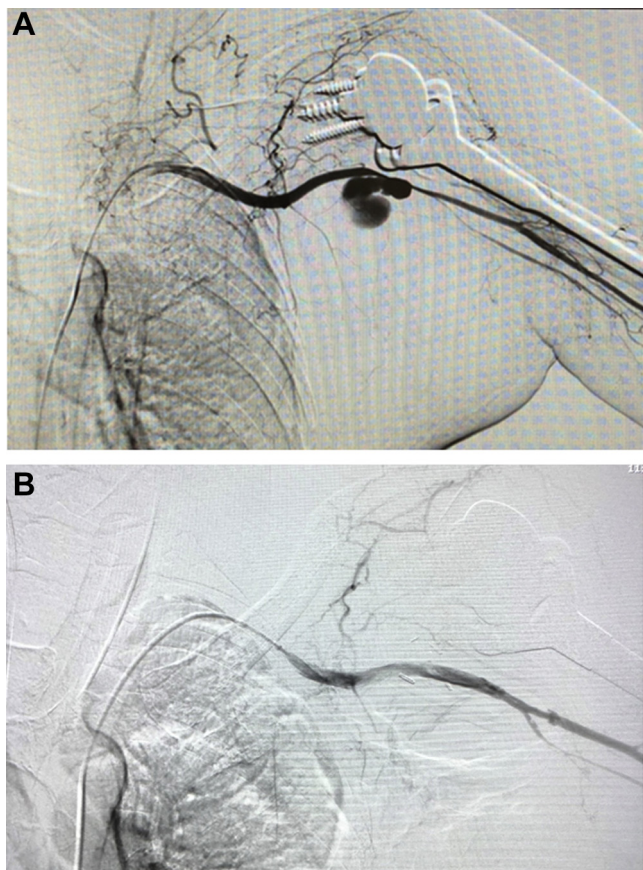


Figure 5 (A) Angiogram showing an axillary artery aneurysm and extravasation from the left axillary artery (Fig. 4). (B) Angiogram showing an axillary artery after the resection of the axillary artery aneurysm and angioplasty of the lesion.

intervention might have exacerbated the vascular wall damage. Moreover, the remarkable point of our case was the late onset. The loss of outpatient care due to the patient's mental illness delayed the diagnosis of the AA pseudoaneurysm.

Angiographic examination was considered the most reliable assessment tool for early diagnosis of AA injury⁷ because the pulse defect in the peripheral arteries or axillary swelling and pain did not always appear during physical examinations.⁹ However, it is not common to take CT angiography routinely for the patients with PHF. If the severe dislocation of PHF is seen by X-ray, we may need to consider CT angiography as an option to detect AA injury.

In conclusion, AA injury is one of the serious complications when RSA is performed.

We also must remember that there is a possibility that AA aneurysm may occur later after RSA.

Conclusion

We experienced a rare case of axillary artery aneurysm developed later after RSA. RSA for PHF may have a risk of arterial injury, so we need to check labs and symptoms of vessel injury carefully in both acute and late phase. Moreover, if the severe dislocation of PHF is seen, we may need to consider CT angiography preoperatively.

Disclaimer

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