CASE REPORT

Unusual subclavian artery injury following clavicle fracture resulting from epileptic fit

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The clavicle is an S-shaped bone that connects the shoulder girdle to the trunk and protects the major underlying neurovascular structures as they pass from neck to axilla. Fracture of the clavicle is common, accounting for 5—12% of all fractures and up to 44% of injuries to the shoulder girdle. Fortunately, clavicle injuries with associated significant neurovascular injuries are rare. Penetrating injuries of the clavicle are more commonly associated with vascular injuries following clavicle fractures as compared to blunt trauma.

The common mechanism of injuries is direct or indirect trauma associated with contact sports and stick sports or due to fall on outstretched arm and onto the lateral border of the shoulder.

The purpose of this report is to present a case of closed comminuted clavicle fracture following epileptic fit leading to subclavian artery injury that presented as critical ischaemia of the upper limb and was successfully treated by reversed vein graft. To our knowledge this has not been reported in English language literature.

Case report

Seventy years old man presented in A&E with pain and swelling of right shoulder and numbness in right arm after an attack of epileptic fit. There was no radial and brachial pulse on examination and had critical ischaemia of the right upper limb. He was known to suffer from complex partial seizures with generalisation. X-ray of the right shoulder (Fig. 1) revealed comminuted fracture of the clavicle with a large butterfly fragment. Angiogram (Fig. 2) showed sharp cut off of the right subclavian artery at 2 cm from origin. There was no contrast leak presumably due to tamponade by the haematoma.

Patient was taken to theatre and explored. Subclavian artery was controlled and supraclavicular to brachial reversed vein grafting was performed after plating of the clavicle fracture (Fig. 3). The graft was passed over the clavicle as it was compressed and patency was doubtful when positioned under the clavicle. Good pulses were established at the end of the procedure. There was superficial wound infection in the vein graft donor site in thigh that was treated by appropriate antibiotics.

The neurophysician reviewed the patient and antiepileptic drugs were changed and dose optimised for better control of the fit.

At 3 months follow-up the arterial graft was working well but the shoulder movements were...
restricted. The patient was getting ischaemic pain in certain position of shoulder. The clavicle fracture was not united.

At 7 months postoperation he presented in A&E with painful, cold and white arm due to embolism of brachial artery that was successfully treated with brachial embolectomy and good distal circulation was established.

The symptom of positional intermittent arterial insufficiency of upper limb continued. The repeat angiogram showed focal stenosis in subclavian graft at the site of clavicle. It was thought that the arterial graft was being kinked at certain position of the arm due to the supraclavicular position leading to ischaemia of the upper limb. After 11 months, the plate from the clavicle was removed and middle one-third of the clavicle (Fig. 4) was excised to create more room for the subclavian arterial graft.

The ischaemic symptoms of the upper limb disappeared. Subsequent duplex scan of the bypass arterial graft showed focal stenosis at the old clavicle excision site with good velocity of the blood flow across the stenosis. The patient achieved good pain-free movement of shoulder and was back to his favourite sports—golf. He was discharged from clinic after 2 years of injury.

Discussion

The comminuted clavicle fracture is usually high-energy injury sustained following sporting injuries such as hockey, football, martial arts, gymnastics, weight lifting, wrestling and squash. The reported incidence of clavicle injuries ranges between 0 and 0.23 per 1000 athletic exposures depending on the sports.

The other common mechanism is heavy fall on to the shoulder that can lead to comminuted fracture of clavicle.

The epilepsy population is at increased risk of metabolic bone disease such as osteomalacia, osteopenia and osteoporosis as a consequence of the use of hepatic enzyme inducing antiepileptic drugs including phenytoin, phenobarbital and carbamazepine. Uni and bilateral dislocations as well as fracture-dislocations of the shoulder, bilateral femoral neck fractures, acetabular fractures and vertebral fractures have been reported following convulsive episodes in epileptics. Other common injuries are jaw fracture, teeth injury, tongue bite, bruises, lacerations and sprains, etc. Closed comminuted fracture of clavicle leading to complete transection of subclavian artery causing critical limb ischaemia following a fit is not reported. The neurologist saw this gentleman and his antiepileptic medications were altered to achieve better control.

Clavicle fracture has been traditionally treated conservatively with variable results. The range of movement and shoulder strength recover well. Recent studies have critically looked at the results and malunion, residual pain and some brachial plexus irritation as well as cosmetic complaints in case of severely displaced fracture that showed final

Figure 1  X ray showing comminuted displaced fracture of right clavicle.
shortening of 20 mm or more to be the most important factor of unsatisfactory result. It has lead to the recommendation of open reduction and internal fixation in severely displaced fracture. Any associated neurovascular deficit usually requires stabilisation of the fracture.

Blunt subclavian artery injury is relatively uncommon and the presenting signs can be subtle. High suspicion and early use of arteriography and prompt surgical correction by a variety of vascular techniques can save the limb and give good results. Early diagnosis was made in this patient as there were obvious signs of ischaemia and it was confirmed by prompt arteriography.

Most of the reported blunt subclavian artery injuries are associated with high-energy trauma such as road traffic accident, direct trauma or heavy falls but the present patient had epileptic fit and high suspicion is necessary for prompt diagnosis.

A tension free, end-to-end primary anastomosis is the preferred method of repair in blunt subclavian artery injury. If a primary repair is not feasible then a saphenous vein graft is the second option. In the present case, reversed saphenous vein graft was positioned over the clavicle after plate fixation. This supraclavicular position of the graft was causing positional transient ischaemia in the limb and lead to thromboembolism of brachial artery that required embolectomy. Subsequently it was treated by excision of the middle-third of the clavicle to create more space for the artery.

Frequently in blunt trauma with associated clavicle fracture, the medial portion of the clavicle is excised for better exposure of the subclavian artery.

Figure 2  Angiogram showing blockade of the right subclavian artery at the fracture site.
Figure 3  X ray showing plate fixation of clavicle fracture.

Figure 4  X ray showing excision of middle one-third clavicle.
during repair and it also solves the problem of subsequent compression of the graft. This patient became asymptomatic after excision of middle-third of the clavicle. Gehman et al. reported no functional problem after partial excision of the clavicle in cervicothoracic approach for removal of desmoid tumour of thoracic outlet.\(^3\)

In summary, the key point of early diagnosis is a high index of suspicion, recognising that the signs of subclavian arterial trauma may be subtle because of the excellent collateral circulation to the upper limb. Epileptic fit can lead to comminuted fracture of clavicle leading to vascular injury and if treated promptly, good function can be achieved. In vascular injury associated with clavicle fracture it is advisable to remove the part of the clavicle for better exposure and to avoid subsequent pressure over the graft and its complications.

References