Unusual segmental fracture of the clavicle associated with rib fractures and pneumothorax

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Abstract

Segmental fracture of the clavicle is an extremely rare injury with only 4 cases being previously published in the English literature. We report an unusual case of a segmental clavicle fracture associated with ipsilateral rib fractures and pneumothorax. The available literature is also reviewed and the management of these injuries is discussed.

CASE REPORT

A 50 year old male sustained an accidental fall down 14 steps in his home whilst intoxicated. His only past medical history was peptic ulceration. He presented to the Accident and Emergency department the next day with pain and decreased range of movement in the left shoulder. Plain Radiographs revealed a segmental fracture of the left clavicle with a proximal component between the middle and medial third of the shaft of the clavicle and a lateral end fracture distally to the coracocavicular ligaments (Fig 1). He was given a broad arm sling, analgesia and referred to the next day's fracture clinic.

On examination at the fracture clinic, it was noted that there was obvious deformity, bruising at the anterior margin of the left axilla and significant shortening of left clavicular length (Fig 2). Measurement of the distance between the Acromio-clavicular and the sterno-claviclar joints was 10cm on the left side, 4 cm shorter than the right. Tenderness was elicited along the entire length of the clavicle. Shoulder movement was preserved but limited by pain. No neurovascular deficit was found.

After radiological reporting it was noted that there was also fractures of the left 1st and 2nd ribs associated with a small pneumothorax.

The patient was admitted and underwent open reduction and internal fixation 2 days later with two anatomical pre contoured clavicular plates (Acumed, Portland), through an infraclavicular approach . There were no complications and rehabilitation was started. Immediate active assisted mobilisation commenced for 6 weeks and strengthening and resistance exercises after this period. At follow up radiograph at 12 weeks bony union was observed (fig 3) the patient achieved full range of movement. He was getting minimal pain due to one of the screws that was long and was impinging on the coracoid process. The plates were removed a 9 months post operative to avoid the presence of a stress riser point between the two plates (fig.4).

Figure 1

Fig 1 Initial X-ray

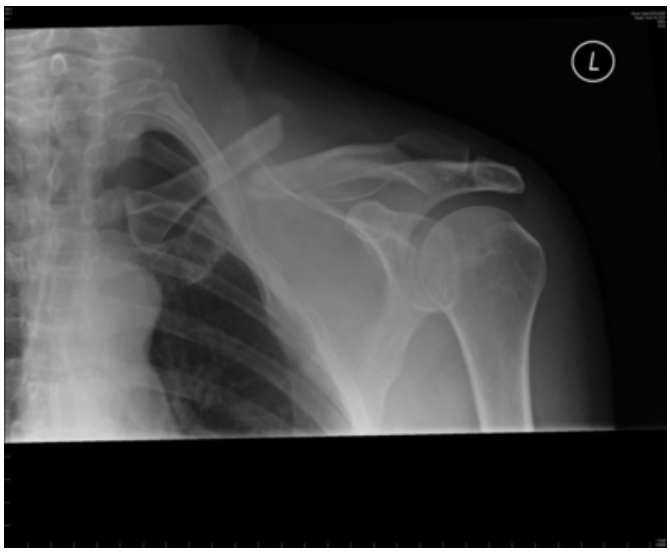

Figure 2

Fig 2 Obvious deformity and shortening

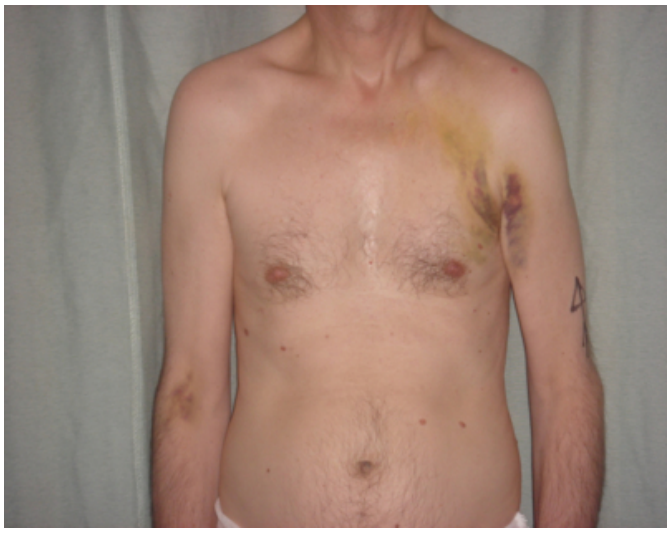

Figure 3

Fig 3 X-ray showing bony union

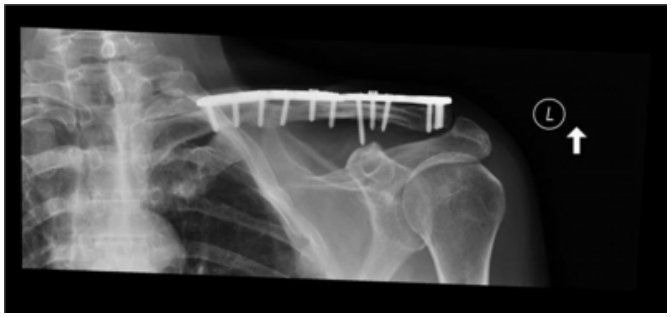

Figure 4

Fig 4 X-ray after removal of metalwork at 9 months

DISCUSSION

We are not aware of a segmental fracture of the clavicle associated with rib fractures and a pneumothorax being reported in the literature before. Segmental clavicle fracture is an extremely rare injury with the first case being reported over 100 years ago[1].Since then we are aware of only three more cases[2,3,4] being reported in the English literature.

Clavicle fractures are very common and constitute 5 to 10 % of all fractures[5]. Midshaft fractures account for up to 80 percent of all clavicle fractures , distal third fractures represent about 15% and the least common are medial third fractures which account for less than 5 percent of clavicle fractures[6].

The common mechanism of clavicle fracture is a fall directly on the shoulder with the arm adducted and less frequently from a fall on an outstretched hand. Less commonly, a fracture will occur after a direct blow and this has been the mechanism described in segmental fractures where there is usually multiple blows to the clavicle[2-4].

Patients who sustain clavicle fractures typically hold the arm adducted and supported by the contralateral hand. Attention should be paid to the presence of deformity and shortening , bruising and crepitus over the bone. In all cases a neurovascular as well as lung examination should be performed to assess co-existing injuries, which although uncommon can have serious consequences if missed. In our case the associated rib fractures and pneumothorax were missed initially.

Allman was the first to classify fractures by dividing the clavicle anatomically into thirds with group I fractures involving the middle third, group II fractures involving the lateral third and group III fractures involving the medial third[7]. Neer classified distal fractures as un-displaced (type I), in which the coraco-clavicular ligaments stays intact and displaced (type 2), in which the coracoclavicular ligaments are detached from the medial fragment with the trapezoid ligament remaining attached to the lateral fragment[ ]. Craig incorporated the Neer classification into that of Allman and added further subdivisions and this is the classification in most common use[9].

In general, undisplaced clavicle fractures are managed non operatively with good evidence from the literature supporting this approach. Very low rates of non-union, less than 1 %, have been observed and patient satisfaction with outcome appears to be high[10,11]. Non operative treatment consists of immobilization in a simple sling or figure-of-eight bandage. Several studies have shown that similar rates of union with higher patient satisfaction in those treated with a simple sling[11].

If displaced, middle third fractures have a higher rate of non-union and poor clinical outcome[12,13]. A recent multicentre randomised trial has shown that plate fixation for

displaced midshaft fractures offers a significantly shorter mean time to radiographic union with improved functional outcomes than non-operative management[14]. Therefore if risk factors for non- union are present such, as shortening greater than 2cm and major fracture displacement, then operative fixation should be considered[15,16]. In addition to plate fixation, intramedullary fixation has been attempted with mixed results[17] as well as external fixation in non union due to sepsis and open cases[18].

Displaced lateral third fractures are associated with a high rate of non-union and delayed union especially after conservative management[19]. Treatment is controversial and there is a lack of consensus regarding optimal management. The different methods that have been described, include direct plate fixation[20], coraco-clavicular fixation[21] and transacromial K-wiring[22].

Medial third fractures are rare with the majority being extra-articular and minimally displaced[23]. They are usually managed non-operatively, unless displacement of the fracture put the superior medistinal structures in danger. In such cases an emergency attempt at closed reduction should be made before open reduction if this is unsuccessful[24] . A variety of operative techniques have been described including the use of plates[25] and strong braided interosseous sutures[26]. K wiring is generally not recommended due to the high risk of migration to the superior mediastinal structures[27].

CONCLUSION

In conclusion segmental clavicle fracture is a highly uncommon injury. It is usually the result of more than one impact directly onto the clavicle and can lead to significant displacement with clinical shortening. Careful clinical and radiographic examination should be undertaken as to not miss associated injuries especially such as pneumothorax. Management of this type of fracture should consist of open reduction and internal fixation to avoid non-union and poor clinical outcome due to excessive shortening.

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