Case report of a fracture of the base of the acromion in association with mal-union of the clavicle

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Summary: Isolated acromial fractures are very rare in practical traumatology. Acromion fractures are usually due to violent trauma, associated with other serious lesions. Following observation of a clinical case of a fracture at the base of the acromion associated with a mal-union of the ipsi-lateral clavicle, the authors have reviewed the literature of isolated acromial fractures. The clinical observation reported here confirms the involvement of the claviculo-scapular system in the production of these fractures.

Key words: Fatigue fracture — Acromial fracture

Case support

A 47-year-old man fell his own height onto his dominant right shoulder. He attended the Accident Department the evening of the accident. He complained of pain in the deltoid and retro-clavicular area. Palpation revealed tenderness at the base of the acromion. His past medical history revealed an ipsi-lateral clavicular fracture one year previously, which had been treated conservatively. The patient, a shopkeeper, had been off work for 5 weeks.

AP and axillary X-rays (Fig. 1) revealed an isolated recent fracture at the base of the acromion with minimal displacement. The old clavicular fracture had healed, but with overlap of the middle segment. The conservative treatment had consisted of immobilisation in a body bandage of the "Mayo Clinic" type for 3 weeks, followed by free mobilisation of the shoulder.

Discussion

The superficial situation of the acromion, approximately 20° posteriorly with respect to the proximal two-thirds of the clavicle, and its articulation with the lateral clavicle makes it particularly liable to injury and shoulder trauma. Acromial fractures, however, are uncommon. In the largest reported series there were only 11 cases out of 1603 shoulder injuries (0.8%) [10]. Isolated fractures of the base of the acromion should not be confused with an anomaly of ossification between the metacromion and the basiacromion. This rare variety of acromion bipartita (1.4%) [9] is the only radiological differential diagnosis. Along with the glenoid cavity, the coracoid process and the acromial arch, the acromion is a part of the scapulo-humeral joint in the widest sense of the term. Gagey thus considers acromial fractures as a true articular fracture of the scapula [7].

High energy trauma is usually necessary to produce a fracture of the scapula, thus provoking serious associated lesions: visceral injuries, bony lesions - as in the omo-cleido-thoracic syndrome, brachial plexus lesions [10] or injuries of the sub-clavial vessels. Acromial fractures usually arise in this situation and do not require particular attention, unless they are complicated by non-union [10, 14], by mal-union or if there is an associated axillary nerve palsy [10].

Understanding the mechanism of the isolated acromial fracture in this case requires certain explanations. The mechanism of a clavicular fracture is always the same whatever the site of the fracture line [15]. That is not the case for the mechanism of acromial fractures [16, 17]. It requires a direct impact on the point of the shoulder for an axial compression load exactly parallel to the longitudinal access of the clavicle, is resolved by breaking continuity of the clavicle. This is only possible if the clavicle is blocked by the sterno-clavicular ligaments and its contact with the first rib [15]. This explains a clavicle fracture when the injuring force is strictly parallel to the bone and transmitted through the intermediary of the acromion. Warner and Port recently reported a case of a transverse stress fracture at the base of the acromion in a young competitive gymnast [17]. They blamed repeated traction forces from the large muscular insertions of the powerful deltoid.
but in fact the middle or acromial head of the deltoid cannot itself put such a traction force on the acromion alone. The broad insertions of the deltoid on the lower margin of the scapular spine might lead to an avulsion fracture of the spine [13]. The scapula would require to tilt with a solid acromio-clavicular counter-prop for a muscular contraction of the deltoid to produce such a fatigue fracture. This assumes a mechanism of extreme violence. All of this shows well that the involvement of the local osteoarticular anatomical factors are necessary to produce a fracture of the base of the acromion. We need to remember that the scapula lies obliquely, running from in to out and from behind forwards, forming a 30-35° angle with the frontal plane. The general direction of the clavicle in the normal state runs obliquely out and behind, forming a 60° angle facing inwards with the scapula. The proximal part of the clavicle lies behind the complex formed by the distal part of the acromion and glenoid. Baulot and Grammont have recently confirmed in their anatomical study the clear relationship between excessive shortness of the clavicle and excessive antversion of the glenoid (and thus of the scapula [1]). The particular anatomical situation of the acromion explains the difficulty in making radiological diagnosis of such a fracture situated at the top of the scapula. Only the axillary view of the gleno-humeral joint, which allows a true "aeroplane view" of the scapular region is suitable for studying the base of the acromion (Fig. 1a). The separation of the bony fragments caused by a bulky mal-union of the clavicle with overlap causes excessive shortening of the clavicular arch and disorganises the region of architecture. This can only accentuate physiological antversion of the complex formed by the distal part of the clavicle, the acromia and the glenoid, which greatly increases the risks to the acromion during shoulder injury.

In our case the isolated fracture of the base of the acromion therefore appeared in unusual circumstances. A simple fall on the point of the shoulder managed to produce this fracture, which normally occurs after much more violent trauma. All the conditions required to produce a new clavicular fracture were essentially present. However this did not occur. The lack of violent trauma and the abnormal forces acting on the acromion made this lesion a pathological fracture. The mechanical conditions produced by the trauma, and in particular the proximity of a marked overlapping mal-union of the clavicle leading to marked shortening of this bone, had altered the resistance of the acromion. This can explain why the increase in rigidity of the clavicle, produced by the diameter of the callous and the modification of the axes in this bone, could