CASE REPORT

BILATERAL SHOULDER FRACTURES SECONDARY TO ACCIDENTAL ELECTRICAL INJURY

Elena-Sorando E., Agulló-Domingo A., Juan-Garcia E., Amrouni B.

Department of Plastic and Reconstructive Surgery and Burns Centre, Miguel Servet Hospital, Zaragoza, Spain

SUMMARY. Electrical injuries sometimes cause grave internal lesions that go unnoticed in an initial exploration. Low-tension electrical energy can produce burns of variable depth by flash or conduction, but we rarely find fractures. This case reports a case of bilateral shoulder fractures secondary to low-voltage injury which were undiagnosed in the emergency approach.

Introduction

Electrical accidents usually cause burns associated with other injuries, which may be musculoskeletal, neurological, renal, or cardiac. High tension can produce severe impairments,[1] but low tension is rarely associated with serious damage.[2,3] We report a case of bilateral simultaneous shoulder fractures due to a low-tension electrical accident. We review the literature and consider the origin of such fractures. The missed diagnosis in the initial physical examination constitutes an important detail for our consideration.

Case report

A 49-yr-old male electrician was repairing an electrical failure in a private residence. The patient suffered a 220 V current discharge when he manipulated the conduction wires. His hands were in contact with the wires for a few seconds. He did not fall or lose consciousness but felt the shock pulling up his arms. He was admitted to a primary health centre.

The symptoms noticed in the initial physical examination were pain in the shoulders and decreased range of motion in the arms. The treatment prescribed was a week of rest and anti-inflammatory drugs. After five days the patient's condition deteriorated and he was admitted to our burns centre. He was suffering from severe pain and ecchymosis and had great difficulty moving his arms. The physical examination (*Fig. 1*) found bilateral typical Hennequin ecchymosis, asymmetric deformity of the shoulders, restricted and painful movements in all ranges of the scapulohumeral left joint, and inability for abduction and anteversion of the right arm. No entry or exit burns were found. The elbow, wrist, and hand joints were explored without any pathological findings. Both proximal and distal sensibility were perfectly normal in each extremity. Simple X-ray thorax revealed fracture of the left humeral neck, including several fragments and dislocation-fracture of right humerus with trochiter pulling-off (*Fig. 2*). Other bone and joint lesions were discarded.

Fig. 1 - Clinical appearance of patient with bilateral shoulder fractures, day 5.

Orthopaedic surgeons operated the fractures (*Fig. 3*). On the right shoulder, reduction of the fracture-dislocation with Steinmann's pin and fixation by three Kirschner percutaneous wires, leaving the glenohumeral joint free, were

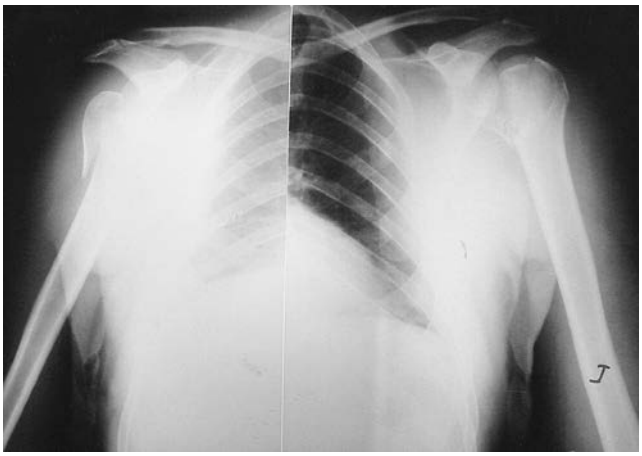

Fig. 2 - X-ray diagnosis. Right shoulder: dislocation-fracture of humerus. Left shoulder: humeral fracture with displacement by segments.

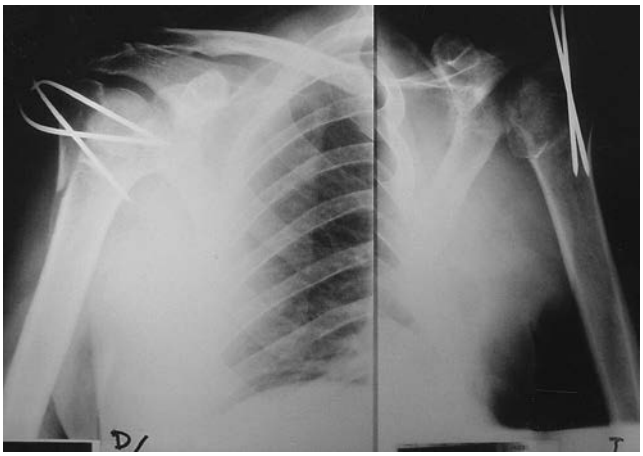

Fig. 3 - X-ray images of bilateral shoulder fractures, immediately post-operative.

Fig. 4 - RMN image post-operative (in detail) of right shoulder.

Fig. 5 - RMN image post-operative (in detail) of left shoulder.

performed (*Fig. 4*). The left shoulder fracture was treated by reduction and fixation using two Kirschner wires (*Fig. 5*). The surgical procedure was performed with low X-ray control.

The post-operative course was uneventful, and after three weeks the patient began rehabilitation treatment. He achieved full recovery three months later.

Discussion and conclusion

Bilateral simultaneous shoulder fractures are usually the consequence of a severe trauma, as in road accidents, falls, high-energy traumas, and electroconvulsive therapy employed in the treatment of severe mental disorders, when patients are given electric shocks to the brain to make them have convulsions.[4,5] All such injuries cause the fractures by direct trauma, when the shoulders are beaten against a hard surface.

High-voltage electrical and lightning injuries can produce shoulder fractures by a dual effect, i.e. direct trauma secondary to a fall and violent muscle contraction. These electrical injuries usually present certain signs, such as entry and exit burns and loss of consciousness, and severe complications[6] may appear, such as acute renal failure, associated skeletal and central nervous system injuries, and cardiac alterations. The severity of the injury depends on the intensity of the electric current, the pathway it follows through the body, and the duration of contact with the source of the current.[7,8]

Bilateral shoulder fracture due to low-tension electricity can be explained by tetanic contraction of the large muscle involving axial bones, e.g. the scapula, the humerus, the vertebrae, etc. The strong traction in different directions can break the weaker points of the scapulohumeral joint.

The literature reports only a few cases of bilateral shoulder fracture due to low-tension electricity,[9,10] and such fractures are indeed infrequent. However, we must consider this possibility in cases of electrical injury. Diagnosis of shoulder fractures requires a systematic clinical examination and a simple X-ray exploration can confirm a clinical suspicion.[11]

Treatment of these fractures has to be studied in each particular case by the orthopaedic surgeon. The reduction of dislocation-fractures, stabilization, and the restoration of scapulohumeral functionality are the main goal.

We conclude with the warning that low-voltage injuries can cause severe damage that goes unnoticed if the initial examination is poor.

RÉSUMÉ. Les décharges électriques peuvent produire des lésions internes graves qui parfois restent inobservées dans l'examen initial. L'énergie électrique à basse tension souvent produit des brûlures de profondeur variable, par un mécanisme de « flash » ou par conduction, mais rarement on observe des fractures. Les Auteurs présentent un cas de fractures bilatérales des épaules causées par l'électricité à basse tension qui n'ont pas été diagnostiquées dans le service d'urgence.

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Address correspondence to: Dr E. Elena-Sorando, Avda. Champagnat, nº 2; 6º B; 37007, Salamanca, Spain; e-mail: esorando@comz.org