Mediterranean BioMedical Journals
International Journal of Medicine and Surgery
2019, Volume 6, ID 302
DOI: 10.15342/ijms.v6ir.302

CASE REPORT

CONTRALATERAL FRACTURE-DISLOCATION OF THE SHOULDER DUE TO ELECTRIC SHOCK A CASE REPORT

Youssef MOTIAA [1 2], Wafae EL OTMANI [3], Safa BABA [4], Khalid AZIZI [4]

[1] Intensive care unit, Hassan I Hospital, Tiznit, Morocco.
[2] Department of anaesthesiology and critical care, Ibn sina University Hospital. Mohamed V University. Rabat, Morocco.
[3] Department of anaesthesiology and critical care, Mohamed V Military Hospital of Instruction, Mohamed V University, Rabat, Morocco.
[4] Emergency unit, Edderrak Hospital, Zagora, Morocco.

ABSTRACT
Electrical injuries are relatively common and can produce variable types of adverse effects to organs, but injuries to musculoskeletal system are less frequent. Bone injuries can involve both long and flat bones and they encompass several types: osteonecrosis, dislocation and fracture. Cases of shoulder dislocation with fracture have been reported in the literature; the mechanism is linked to the tetanizing effect from the alternating current flow through the shoulder without a fall or a violent trauma. Posterior dislocation is the most common shoulder injury.
We report the case of an anterior fracture-dislocation of the shoulder contralateral to the entry point and we emphasize that any pain or functional impotence in the context of electric shock, even when it's distant from the entry point, should trigger suspision of bone injury.

KEYWORDS: Electrical Injury, Fracture-Dislocation, Shoulder.

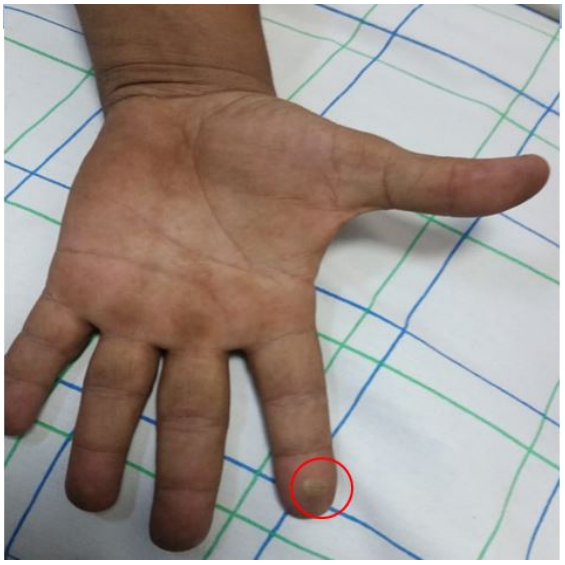
Correspondence: Dr Youssef Motiaa, Department of anaesthesiology and critical care, Ibn Sina University Hospital . Mohamed V University. Rabat, Morocco. Email: motiaa@hotmail.fr

INTRODUCTION
Electric shock is defined as the clinical manifestations of the electric current flow through the body. Electrocution is death caused by electric shock [1]. The severity of the injury depends on several factors: the intensity of the current, the amount of voltage, the type of current (alternating versus direct), the duration of the current, the surface, the direction of the electric flow through the body and the resistance at the source contact point [1,2]. Bone injuries secondary to low voltage (220V) electric shocks can involve both long and flat bones and are of various types : osteonecrosis [3], dislocation or fracture. These injuries can be either ipsilateral, contralateral or at a distance from the point of electrical contact. Fractures and dislocations after electrical injury are usually due to a fall or tetanic muscle contractions induced by low voltage alternative current. These fractures remain a rare condition [4].
We report the case of a 28 years-old patient who sustained a low-voltage electrical injury at home causing an anterior fracture-dislocation of the right shoulder.

CASE REPORT
A 28-year-old patient, with no significant past medical history, was admitted to the Emergency Department following a low-voltage electric shock at home (220V) to

the left hand, he didn't have any fall or additional trauma or loss of consciousness. On examination, the patient was conscious and alert with no neurological deficit, the blood pressure was 123/70 and the heart rate was 85 per minute and was regular. The main finding of physical examination was the entry point on the palmar side of the left index, there was no burn or muscle tension (figure1) but the patient had severe pain and limitation of movement of the right shoulder. No exit point was detected.

Figure 1: The entry point on the left index



Thr right shoulder X-rays showed a type 2 anterior fracture-dislocation with a tearing of the greater and lesser tuberosities (figure 2). Electrocardiogram was normal with no arrhythmias or repolarization abnormalities (figure 3).

Figure 2: Fracture-dislocation of the right shoulder. A: shoulder X-ray (AP view) tearing of greater and lesser tuberosities. B: shoulder X-ray (lateral view) anterior and intern shoulder dislocation associated to the fracture

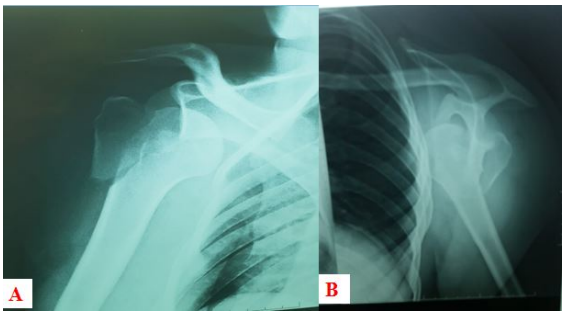
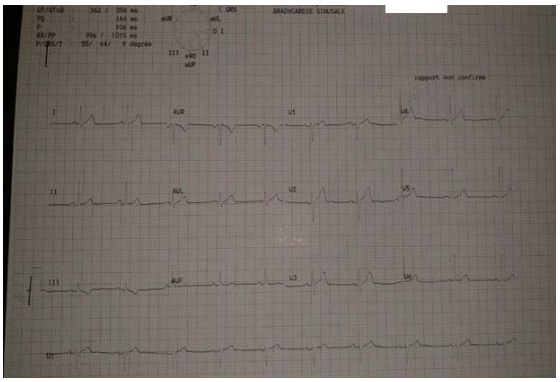


Figure 3 : Normal ECG



Laboratory tests were all normal including creatine kinase (CK) and renal function. Orthopaedic surgeons decided for a conservative treatment combining reduction of dislocation and orthopaedic treatment of the fracture. The patient was discharged from hospital after 3 days with a follow-up care under the orthopaedic team.

DISCUSSION

The majority of shoulder fracture-dislocations secondary to electric shock are posterior [5, 6, 7,8]. Few cases of anterior fracture-dislocations were reported in literature [9, 10]. They can be unilateral or bilateral, ipsilateral or contralateral to the contact point.

Musculoskeletal injuries due to low-voltage electric shock are unusual. However, fractures have been described as a frequent complication of electroconvulsive therapy [5]. There are two types of current: low-voltage current as less than 1000 V and high-voltage as more than 1000 V [1]. In Morocco, alternative current of low voltage 220V is used in homes. The passage of alternative current through muscles causes violent muscular spasms than can either push the patient away or prolong the time of exposure to the electric source [2]. These contractions explain why fracture-dislocations occur maily in joints with significant muscular mass ; spine [14], scapula [15,16] and femur [17]. There are also other mechanisms such as secondary fall or projection of a limbs against a hard plane.

The diagnosis is based on clinical examination and radiography in every patient suffering a limitation of motion of a limb following electrical injury. In some reported cases, the diagnosis was delayed until complications occurred or a shoulder joint replacement was indicated [7,8]. In our case, shoulder X-rays, guided by persistent pain and limitation of movement, confirmed the diagnosis of fracture-dislocation of the right shoulder.

Examination of the limb ipsilateral to the entry point, along with a radiography did not show any bone abnormalities. Both mechanisms of traumatic fall and projection of the limb were discarded in our patient as he remained conscious and clearly denied any secondary trauma. Initial assessment ruled out cardiovascular complications such as arrhythmias ; electrocardiogram (ECG) was normal. Indications of ECG monitoring are : abnormal initial ECG, arrhythmias during transfer to hospital or on admission, cardiac arrest, reduced level of consciousness or occurrence of other complications requiring monitoring. The monitoring needs to last at least 24 to 48 hours[2] ; in our case there was no indications for continuous monitoring as the patient was conscious and the ECG was normal. Physical examination also ruled out skin burns and compartment syndrome. Laboratory tests were conducted to exclude acute kidney injury and rhabdomyolysis.

Therapeutic approach of shoulder fracture-dislocations after electrical injuries are no different from those of other etiologies. Our patient was treated conservatively after reduction of the shoulder dislocation.

CONCLUSION

Bone lesions should be suspected when persistent pain and limitation of movement occur following electrical injury and must indicate a radiological assessment. Initial clinical examination must be exhaustive assessing for skin injuries, cardiac abnormalities and other complications. Shoulder fracture-dislocations can be anterior and contralateral to the contact point.

AUTHORS' CONTRIBUTIONS

The participation of each author corresponds to the criteria of authorship and contributorship emphasized in the Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals of the International Committee of Medical Journal Editors. Indeed, all the authors have actively participated in the redaction, the revision of the manuscript and provided approval for this final revised version.

PATIENT CONSENT

Written informed consent was obtained from the patient for publication of this case report.

COMPETING INTERESTS

The authors declare no competing interests.

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