

Bilateral scapular and humeral head fractures after electric shock – A case report

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Case report

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Abstract

Background Fractures of the scapula caused directly by electrical shock are very rare, and bilateral fractures of scapula and humeral head induced by an electric shock have not been described previously.

Case presentation We report a patient with bilateral fractures of the scapula and humeral head resulting from an accidental electric shock (220 Volt,50 Hz). This appears to be a previously unreported injury.

Conclusions Fracture of the scapula and humeral head secondary to electrical shock should be suspected in patients with shoulder pain but no dislocation.

Background

The posterior fracture dislocation of the shoulder is the most common orthopedic injury after electrical shock.^{1,2} Isolated shoulder fracture without dislocation after electrical shock is very rare. Bilateral scapular fractures after electrocution are rare with only few reported cases.^{2,3,4} It is postulated that the fractures were the result of tetanic muscular contractions involving the shoulder girdles. No cases of bilateral scapula and humeral head fractures have been reported.

Case Presentation

A 45-year-old man attended our emergency department complaining of severe both shoulders pain and numbness. He sustained a shock (220 Volt, 50 Hz) while working with his right hand on a switch, doing repair work at home. He stated that he felt the current going from his right hand to the left. He did not lose consciousness and did not fall. He was in contact with the switch for approximately 30 seconds.

On examination, there were only two small burn wounds at the tip of the index and middle fingers, no other wound or neurovascular deficit of his shoulder girdles and upper extremities. Range of motion of both shoulders were restricted.

Although his Myoglobin was raised at 1046 ug/L which may suggest possible myocardial infarction or muscle injury, he had no cardiac symptoms and his electrocardiogram and cardiac enzymes were normal. The Myoglobin returned to normal after a week of review. The right suprascapular neuropathy was diagnosed by electromyography. X-Ray and computed tomographic imaging showed no signs of dislocation of glenohumeral joint, but bilateral severely comminuted fractures of the scapula, and intraarticular fracture of glenoid on the left shoulder. After magnetic resonance imaging (MRI), bilateral humeral head fractures were diagnosed.

His scapular fractures were treated by open reduction and internal fixation with plate and early range of motion exercises. At 4-month follow-up, the scapulas were healed with no residual tenderness, with a Constant score 89 points of the right shoulder, 59 points of the left.

Discussion

Scapular fractures are rare injuries and usually caused by direct high-energy trauma.^{1,4} Direct trauma or fall has been reported as the most common cause of scapular fracture secondary to electrical shocks.⁵ Fractures of the scapula caused directly by electrical shock are very rare, and bilateral scapular fractures after electrocution are even more rare with only few reported cases.^{2,3,4} Kam⁶ report a patient who sustained fractures of the right humeral head and left scapula as a result of cardioversion during cardiopulmonary resuscitation. We report a case of bilateral fractures of scapula and humeral head induced by an electric shock, which have not been described previously.

The posterior fracture dislocation of the shoulder is the most common orthopedic injury after electrical shock.^{1,2} The massive shoulder girdle muscle contraction was proposed to be the reason of shoulder fracture dislocation.^{1,7} Shaw⁸ postulated that massive muscle contraction pull the humeral head superiorly and posteriorly against the acromion. This mechanism may explain the humeral head fractures of our patient, MRI showed that his fractures were both located in the posterosuperior part of the humeral head. If not result from falls, orthopedic injuries after electrical shock are due to muscle contraction.

We deduced from this case that the massive contractions of the muscles force the humeral head against the acromion and pull apart the scapula, producing the fractures. The resistance to current flow is greatest in bone and least in nerve, and muscle is situated between the two,² we assume that the damage to nerve was minimal according to the Joule effect. However, our patient had scapular and humeral head fractures, only right suprascapular neuropathy but no cardiac abnormalities even though the current went through his chest from the right shoulder to the left. We can infer from this case that, the scapula was damaged by muscle contraction but not heat.

Conclusions

Fracture of the scapula and humeral head secondary to electrical shock should be suspected in patients with shoulder pain but no dislocation. We can take X-ray evaluation, computed tomographic scan and additional magnetic resonance imaging examination to identify suspicious cases, however associated life-threatening injuries should take priority over other injuries.

Declarations

Ethics approval and consent to participate

This study was approved by the medical Ethics Committee of our Hospital. The committee waived the need for individual consent because of the retrospective nature of the study.

Consent for publication

Written informed consent for publication of their clinical details and/or clinical images was obtained from the patient. A copy of the consent form is available for review by the Editor of this journal.

Availability of data and materials

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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No funding was received.

Authors' contributions

ChunXiao Ye designed the study, collected the data, analyzed the data, and wrote the manuscript. YouHui Zheng collected and analyzed the data. YingBin, Guo participated in the design and coordination of the study. All authors read and approved the final manuscript.

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Not applicable.

Abbreviations

MRI

magnetic resonance imaging

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Figures



Figure 2

X-Ray showed bilateral scapular comminuted fractures.

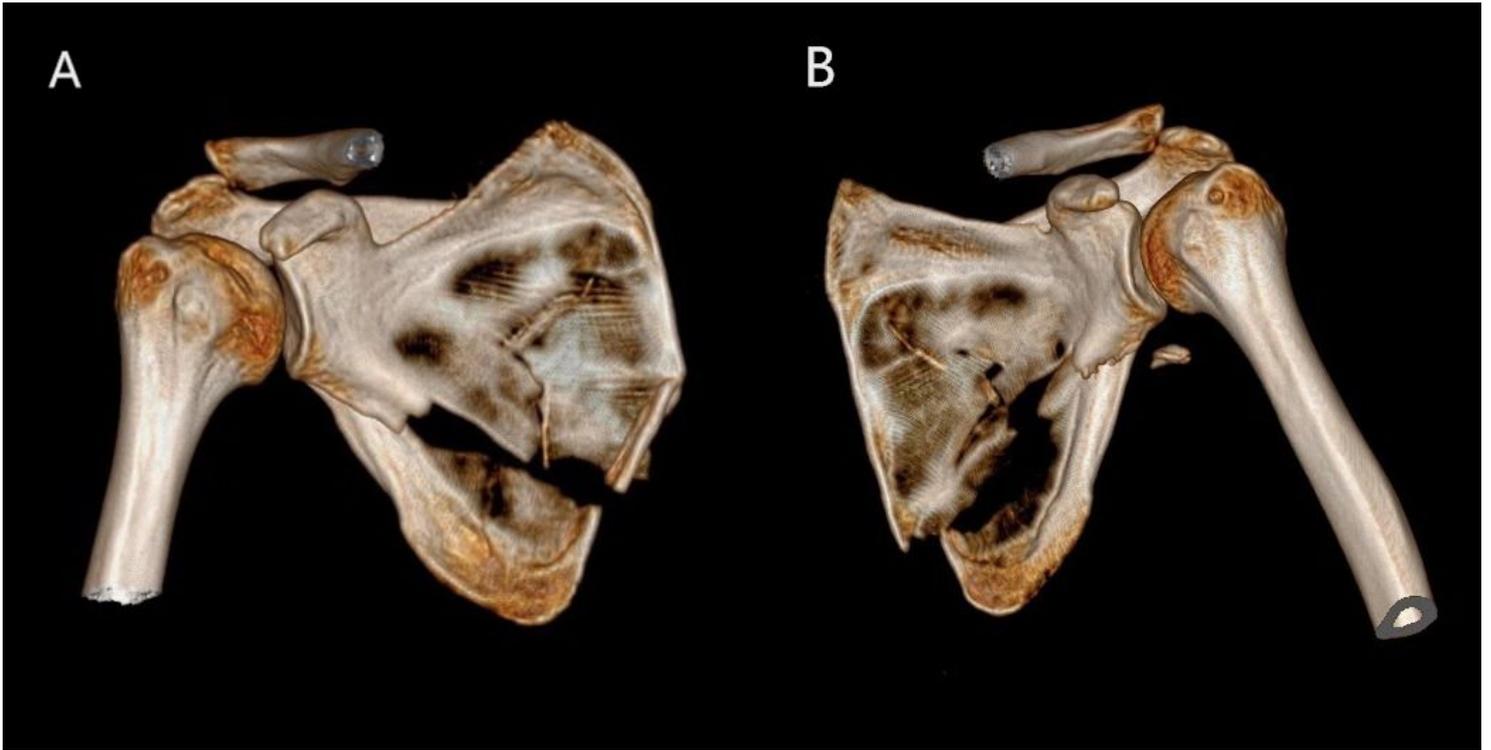


Figure 4

Reformatted computed tomography of the right (A) and the left (B) shoulders, showing bilateral scapular comminuted fractures with intraarticular involvements in left shoulder.

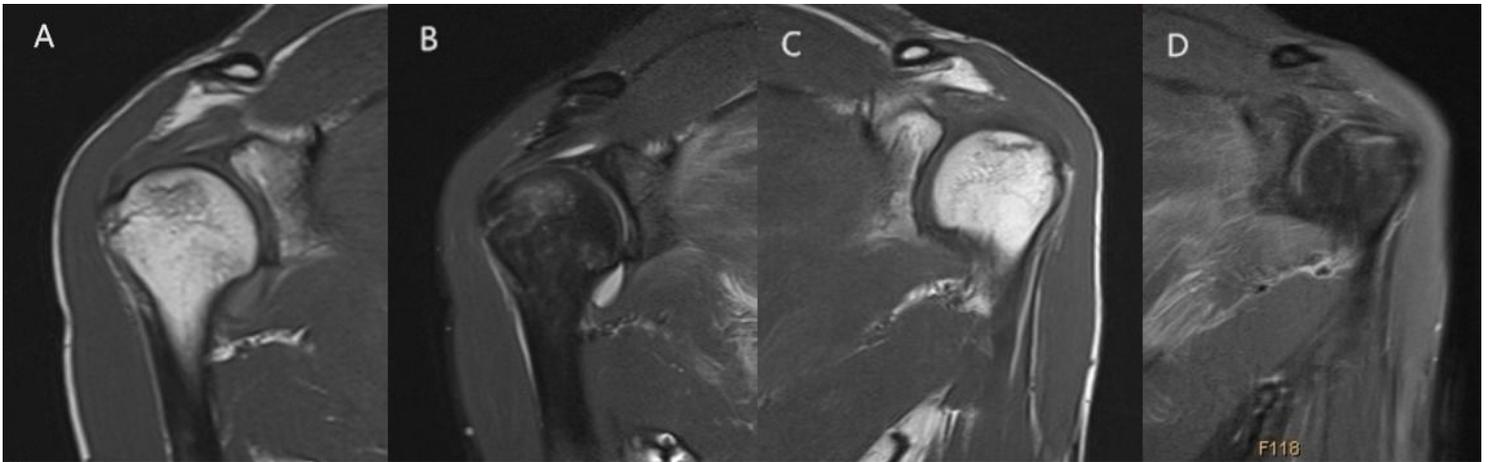


Figure 6

Magnetic resonance imaging of the right (A showed low signal on T1-weighted images; B showed high signal on T2 fat-suppressed images) and the left (C showed low signal on T1-weighted images; D showed high signal on T2 fat-suppressed images) shoulders, diagnosed with occult fractures of bilateral humeral head.