



# Bilateral Shoulder Injury Caused By Electric Shock

## Elektrik Çarpmasına Bağlı Bilateral Omuz Yaralanması

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### ABSTRACT

Shoulder injury, and more in particular bilateral involvement caused by electric shock, is extremely rare. We report a case of bilateral fracture of the greater tuberosity with anterior dislocation on the right shoulder following electric shock. The reduction of the right shoulder was accomplished using the Kocher maneuver. After reduction, Velpeau slings were applied for 4 weeks and then gentle physical therapy was carried out. At the last examination, which was 4 months after injury, recovery was uneventful for both shoulders. It must always be kept in mind that fractures and dislocations of the shoulder might occur in electrical injury. Early diagnosis and appropriate treatment lead to better outcomes.

**Keywords:** Shoulder, dislocation, electric shock

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### ÖZET

Elektrik çarpmasına bağlı özellikle de iki taraflı omuz yaralanmaları oldukça seyrekdir. Elektrik çarpması sonucu çift taraflı tuberkulum majus kırığı ve sağ omuzda anterior çıkığı olan bir olguyu sunmaktayız. Sağ omuz redüksiyonu Kocher manevrası kullanılarak gerçekleştirildi. Redüksiyon sonrası 4 hafta Velpeau bandajları ve ardından nazik fizik tedavi uygulandı. Travmadan 4 ay sonraki muayenede her iki omuzdaki iyileşme sorunsuzdu. Elektrik yaralanmalarında omuzda kırık ve çıkıkların olabileceği mutlaka öngörülmelidir. Erken tanı ve uygun tedavi iyi sonuç demektir.

**Anahtar Kelimeler:** Omuz, çıkık, elektrik çarpması

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### Introduction

Electrical injury is an uncommonly encountered occurrence in the emergency department. It may cause some neuro-musculoskeletal abnormalities in addition to serious multisystemic consequences. Such abnormalities usually include fractures, dislocations and motor-sensory nerve deficits. Fractures and dislocations of the shoulder caused by electric shock have been described in the literature formerly (1-4).

### Case Report

A 50-year-old man was referred to our emergency service after receiving an electric shock (220 V alternating household current). A short circuit occurred while he was repairing an electrical defect at home. The patient described that he was working on an electrical plate and cable, when suddenly both arms flexed, rotated externally and abducted partially away from his body. He had severely felt the current in his both upper extremities for several seconds. After another person turned off the circuit, the patient fell onto his buttocks. He did not lose consciousness. The patient complained of bilateral shoulder pain during first evaluation in the emergency service. He was not able to move his arms. On inspection, there was a prominence of the acromion with loss of the normal deltoid contour on the right shoulder, compared with left side. In addition to this asymmetry, some swelling without ecchymosis was determined. There was tenderness over both deltoid muscles and the humeral heads could be palpated anteriorly on the right side. Although motor examination was limited due to severe pain, no sensory nerve deficit was established. Vascular conditions were evaluated as normal. Skin burns and entry/exit wounds were not evident. Cardiac



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analysis was normal. The routine direct radiographs demonstrated a fracture of greater tuberosity with anterior dislocation on the right side (Figure 1) and a fracture of the greater tuberosity on the left shoulder (Figure 2). Then, the patient was taken to the intervention room in the emergency service. Under conscious sedation, the right shoulder was gently reduced using the Kocher maneuver. Internal fixation of the greater tuberosity fragments for both shoulders was offered, but the patient chose to be treated conservatively. Therefore, the shoulders were immobilized in Velpeau slings for 4 weeks. After the end of the immobilization process, the patient was referred to the outpatient physiotherapy unit. The aim of rehabilitation was pain control and improvement in the range of motion capacity. The rehabilitation program included some modalities such as electric stimulation, weight bearing activities, muscle strengthening and also range of motion exercises. At the final follow-up 4 months after injury, the patient had satisfactory results with a trivial limitation of motion and no obstruction to a return to daily activities. At this stage, the plain radiographs demonstrated uneventful consolidation (Figure 3).

### Discussion

Electrical injuries have a great variety of consequences in terms of the musculoskeletal system. At one extreme, there is deep tissue burns, at the other end of the spectrum are found fractures or dislocations. Also, motor and sensory nerve deficits can be seen. Fractures and dislocations as a result of falls or violent muscle contractions associated with electrical injuries are very rare. Fractures most commonly appear in the upper extremities, especially the shoulders rather than lower limbs (5, 6).

Dislocation of the shoulder can be unilateral or bilateral and anterior or posterior. Bilateral and posterior dislocations are relatively rare. The direction of dislocation is related to the position of the arms relative to the torso (1). The most common mechanism of anterior dislocation is that the humeral head is levered in relation to the glenoid, while the arm is abducted and externally rotated. However, in posterior dislocation, with indirect muscle contraction, the humeral head is forced superiorly and posteriorly over the glenoid cavity while the shoulder is adducted and internally rotated (1, 4).

In electrical injuries, fractures and dislocations can result from tetanic muscle contractions without direct trauma to the musculoskeletal system. The threshold value for damage from direct current is about 50 V (6). In our case, there was no history of direct trauma to the shoulders and the violent muscle contractions seem the main reason for the fractures and dislocation.

Since bone has the greatest electrical resistance among all tissues in the body, it accumulates the greatest heat while conducting an electric current. This excess heat can lead to osteonecrosis, most likely caused by bone "melting". Humeral head osteonecrosis caused by electrical injury has been reported in the literature (7).

The greater tuberosity is displaced in approximately 15% of all anterior dislocations (8). Even in displaced fractures of the greater



Figure 1. Right shoulder, fracture of greater tuberosity with anterior dislocation



Figure 2. Left shoulder, fracture of greater tuberosity

tuberosity, conservative treatment may be considered. Platzer et al. (9) recommended non-operative treatment in all patients with minimally displaced (1-5 mm) fractures of the greater tuberosity. Dinopoulos et al. (10) reported satisfactory functional results regarding a case of fracture-dislocation with a 1 cm displacement of the

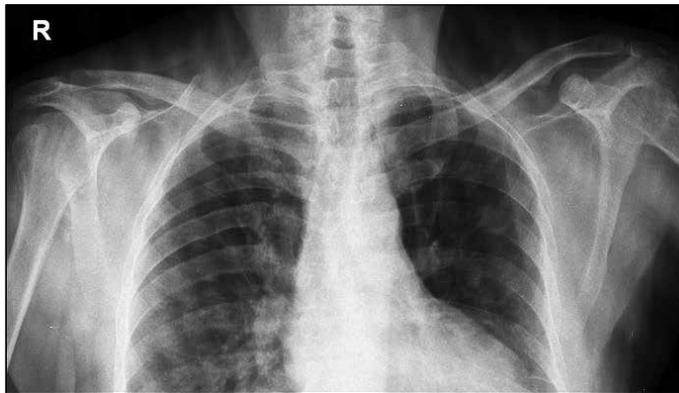


Figure 3. Radiography of both shoulders 4 months after injury

greater tuberosity, which was treated conservatively. In our case, although we carried out conservative treatment for both fractures, the patient regained satisfactory function.

### Conclusion

This case highlights the possibility of fracture and dislocation of the shoulder in an electrical accident. Emergency medicine doctors must be familiar with this rare clinical situation. Early diagnosis and proper surgical or non-surgical treatment with comprehensive physical therapy can maximize final functional results.

### Conflict of Interest

No conflict of interest was declared by the authors.

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### Author Contributions

Concept - M.Z.; Design - M.Z.; Supervision - M.Z., E.M.; Funding - M.Z.; Materials - M.Z., E.M.; Data Collection and/or Processing - M.Z., E.M.; Analysis and/or Interpretation - M.Z.; Literature Review - M.Z., E.M.; Writer - M.Z.; Critical Review - E.M.

### Çıkar Çatışması

Yazarlar herhangi bir çıkar çatışması bildirmemişlerdir.

**Hakem değerlendirmesi:** Dış bağımsız.

### Yazar Katkıları

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