



## Case report

## Bilateral posterior shoulder dislocation after electrical shock: A case report



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## HIGHLIGHTS

- Posterior dislocation of the shoulder is a rare and commonly missed injury.
- Electrical injury is a rare cause of posterior shoulder dislocation.
- Physical examination and radiographic evaluation are important for quick and accurate diagnosis.
- If the diagnosis is made early and the humeral head impression defect is less than 25%, closed reduction followed by a good rehabilitation program can lead to successful results.

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## ABSTRACT

**Introduction:** Posterior dislocation of the shoulder is a rare and commonly missed injury. Unilateral dislocations occur mostly due to trauma. Bilateral posterior shoulder dislocations are even more rare and result mainly from epileptic seizures. Electrical injury is a rare cause of posterior shoulder dislocation. Injury mechanism in electrical injury is similar to epileptic seizures, where the shoulder is forced to internal rotation, flexion and adduction.

**Presentation of case:** This report presents a case of bilateral posterior shoulder dislocation after electrical shock. We were able to find a few individual case reports describing this condition. The case was acute and humeral head impression defects were minor. Our treatment in this case consisted of closed reduction under general anesthesia and applying of orthoses which kept the shoulders in abduction and external rotation. A rehabilitation program was begun after 3 weeks of immobilization. After 6 months of injury the patient has returned to work. 20 months postoperatively, at final follow-up, he was painless and capable of performing all of his daily activities.

**Discussion:** The amount of bilateral shoulder dislocations after electrical injury is not reported but is known to be very rare. The aim of this case presentation is to report an example for this rare entity, highlight the difficulties in diagnosis and review the treatment options.

**Conclusion:** Physical examination and radiographic evaluation are important for quick and accurate diagnosis.

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## 1. Introduction

Posterior dislocation of the shoulder is a rare and commonly

missed injury. With an incidence of 6 per 1.000.000 it accounts for 2%–4% of all types of shoulder dislocations [1,2]. Epileptic seizures, electrical shock and extreme trauma are three major causes of this entity [3]. Mechanism of injury is forced internal rotation, flexion and adduction of the shoulder [4]. Bilateral posterior shoulder dislocations are even more rare accounting for 5%–15% of all posterior dislocations, and result mainly from seizure attacks [5,6]. Less than 5% of posterior shoulder dislocations are caused by electrical

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shocks [3]. In the USA, electrical injury-associated burns account for 3000 individuals per year [7]. In the developed world, electrical injuries constitute 3–5% of all burn cases; in developing countries, this ratio increases up to 21–27% [8]. In our country, Turkey, this amount is around 11.8–25% [9,10]. Electrical injuries are classified as low-voltage (<1000 V), high voltage (>1000 V) or lightning injuries according to electrical intensity; and the type of current is classified as direct or alternating [11].

We present a case of acute bilateral posterior shoulder dislocation resulting from high voltage electrical injury, which was treated by closed reduction and orthoses.

## 2. Presentation of case

A 45-year-old previously healthy man was brought to the emergency room after he was exposed to high voltage alternating electrical current, while he was welding in a building construction. Another employee pulled him away from the circuit. He did not fall down, lose consciousness or suffer convulsions. He was not taking any medication and had no other medical history. On admission to hospital his vital signs were stable, he was alert and oriented. Neurologic examination revealed no abnormalities. His electrocardiogram showed normal sinus rhythm. The patient complained of pain in both shoulders and was not able to move them. On physical examination range of motion of both shoulders were markedly decreased and painful. No abnormal contours of the shoulders were observed. First degree burn wound was noted on medial side of his left arm. Neurovascular functions of both sides were normal. Plain anteroposterior radiographs showed that both

shoulders were in internal rotation and tuberculum minus fracture was noted on left side (Fig. 1a, b). Axillary views could not be taken because the patient could not abduct his shoulders. Computerized tomography (CT) was obtained and it revealed locked posterior dislocation of both shoulders and tuberculum minus fracture on left side. Reverse Hill-Sachs lesions were noted on both sides (Fig. 2a, b).

The patient was submitted to the operating room and underwent closed reduction under general anesthesia. Stability was confirmed under fluoroscopy and bilateral orthoses were applied in the safest position, which was 20° of abduction and 20° of external rotation. As orthoses we used simple abduction pillows, which were placed laterally to also externally rotate the shoulders. Post-operative radiographs (Fig. 1c, d) and CT scans (Fig. 2c, d) also confirmed the reduction.

After 3 weeks of immobilization passive range of motion exercises were begun but the patient continued to use the orthoses. Six weeks after the injury orthoses were removed and rehabilitation program including active and passive range of motion, capsular stretching and muscle strengthening exercises was begun.

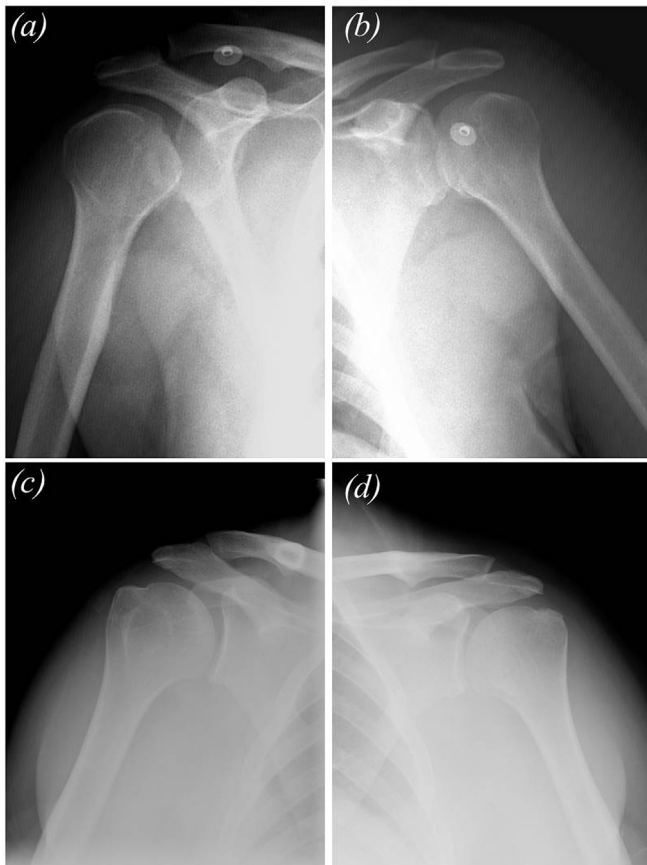
Six months after the injury he has returned to work. At post-operative 20th month his radiographic (Fig. 3) assessment revealed no abnormalities. Shoulder functions were assessed using Constant score, which revealed 89 for the right and 82 for the left shoulder. He is doing well without pain and with adequate range of motion to perform his daily activities (Fig. 4).

Informed consent was obtained from the patient for data and photographs concerning his case to be submitted for publication.

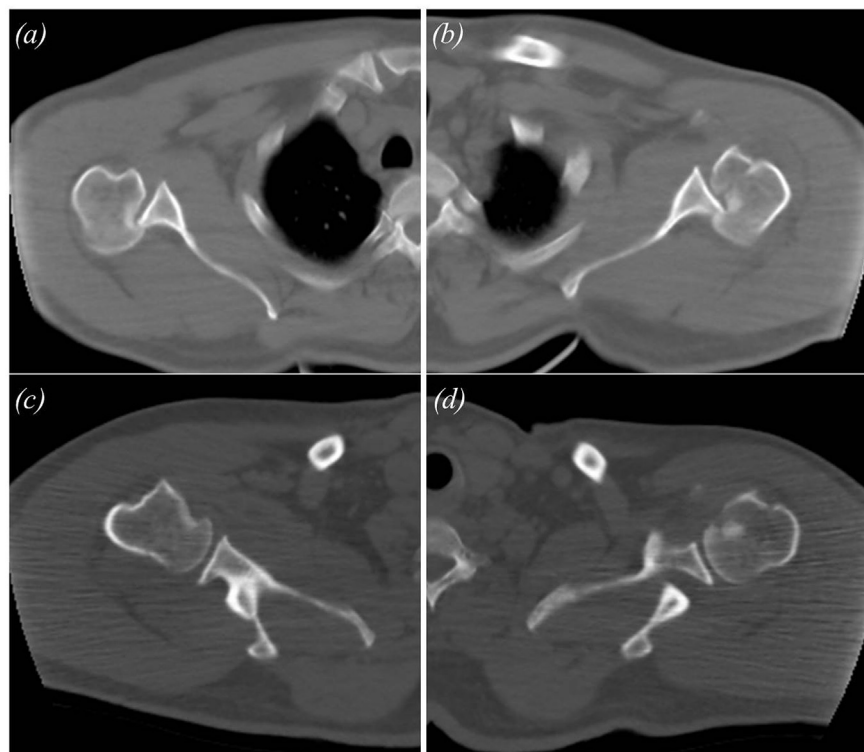
## 3. Discussion

Posterior dislocation of the shoulder is an uncommon injury and is mainly caused by trauma, seizures or electrical shock. While unilateral dislocations are more commonly due to trauma, bilateral injuries mainly result from seizures [3,5,6]. Seizures may be due to several reasons such as brain lesions or metabolic disorders [4,12–15]. Electrical shocks cause less than 5% of all posterior shoulder dislocations [3]. A recent systematic review about posterior shoulder dislocations revealed that 14.6% of all posterior dislocations were bilateral which were mainly caused by epileptic seizures [6]. The amount of bilateral shoulder dislocations after electrical injury is not reported but is known to be very rare. The aim of this case presentation is to report an example for this rare entity, highlight the difficulties in diagnosis and review the treatment options.

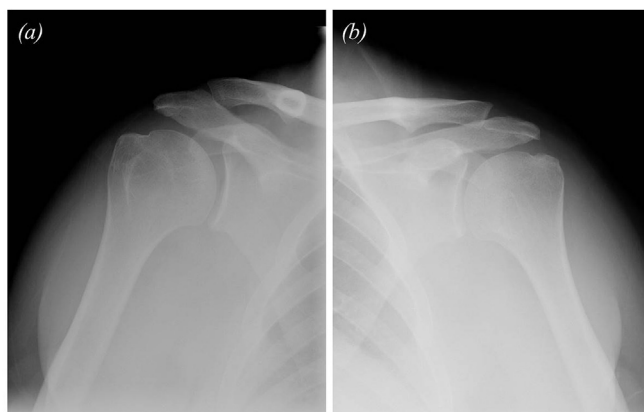
We could find three case presentations which report bilateral posterior shoulder dislocations caused by electrical shocks in English literature [16–18]. We searched the pubmed after typing “bilateral posterior shoulder dislocation”, and found full-texts or abstracts of the cases which were real bilateral posterior shoulder dislocations, in order to find the cause of the injury. We also checked the references of full-text case reports. In three cases the cause of bilateral posterior shoulder dislocation was electrical shocks. In one of these case presentations Clough et al. reported a patient in whom the diagnosis of bilateral posterior shoulder dislocation could not be made until 18 months post-injury, which was a low-voltage injury during repair of a domestic washing machine [16]. This case report did not mention how the patient was treated. The authors emphasized the importance of axillary radiographic view for diagnosis. The second case is about a patient who was diagnosed 5 days after the electricity induced trauma [17]. The source of the electrical injury was not mentioned. The patient was treated with closed reduction under general anesthesia and bilateral shoulder spica cast. The cast was discarded after six weeks, and range of motion and strengthening exercises were begun. As a



**Fig. 1.** Plain film radiographs of both shoulders. (a, b) Preoperative views of right and left shoulders. (c, d) Views after reduction under general anesthesia.

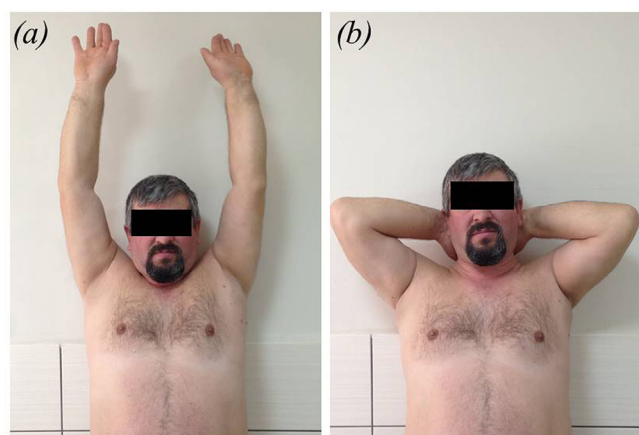


**Fig. 2.** Axial computerized tomography sections of both shoulders. (a, b) Preoperative views show locked posterior shoulder dislocations with reverse Hill-Sachs lesions on both sides. (b) Tuberculum minus fracture is noted on the left side. (c, d) Postoperative computerized tomography sections confirm the reduction of both shoulders.



**Fig. 3.** Plain film radiographs of both shoulders 20 months postoperatively.

professional athlete he returned to normal sports activities at one year. The last case report presents a patient who had posterior fracture dislocation on both of his shoulders after electrical shock [18]. The type of the electrical injury was not reported. He underwent closed reduction under general anesthesia. Percutaneous K-wire fixation was performed for his fractures. After 4 weeks of immobilization with a sling pins were removed and active rehabilitation was started. 27 months after the trauma the patient had painless shoulders and returned to his previous level of work. Posterior shoulder dislocation should be kept in mind in patients complaining of shoulder pain after electrical injury. Precise physical examination and using proper imaging modalities are key factors in making the diagnosis. Patients present with pain and decreased range of motion on shoulders, particularly external rotation and abduction. The shoulders are locked in internal rotation. There may



**Fig. 4.** Functional outcome of both shoulders 20 months postoperatively.

be posterior fullness and anterior appearance of the coracoid process [19]. But these findings may be subtle and the diagnosis may be missed initially [1,16]. Hawkins et al. found that only 30% of posterior shoulder dislocations were diagnosed within 6 weeks of injury [20]. Moreover, it has been reported that bilateral posterior shoulder dislocations may lead to misdiagnoses such as frozen shoulders and even myocardial infarction or thoracic aneurysm [21–23]. The signs defined for anteroposterior radiographs are often unreliable and obtaining axillary views is often difficult due to patient discomfort. Therefore computerized tomography should be taken for patients with painful and stiff shoulders who had a history of seizures or electrical shock.

The Hill-Sachs lesion, reported by Hill and Sachs in 1940,6 is a notch located at the posterolateral aspect of the humeral head in

shoulders with traumatic anterior instability [24]. Posterior shoulder dislocations are often associated with a reverse Hill-Sachs lesion, which is an impression fracture of the anterior aspect of the humeral head [25]. Fractures of the posterior aspect of the glenoid rim, fractures of greater or lesser tuberosities, tears of capsulolabral complex or rotator cuff may also accompany [19,26]. Treatment strategy depends on the duration of dislocation, the size of the humeral head impression defect, the presence of fracture and on the patient's age, health and functional status [19]. Defects up to 25% humeral head articular surface can be treated by closed or open reduction. In acute cases (less than 3 weeks) closed reduction should be attempted. For defects between 25% and 50% or for unstable joints subscapularis tendon transfer with or without tuberculum minus can be performed [27,28]. Humeral head reconstruction can also be achieved by filling the defect with allograft or autograft [29,30]. Hemiarthroplasty should be considered for defects of more than 50% [19,31]. In our case the impression defect was less than 25%. Since the case was acute we performed closed reduction under general anesthesia. After a nonrigid immobilization of 3 weeks we started a vigorous exercise program and achieved good results in terms of range of motion, strength and stability. In the case of Rezazadeh et al. the patient with bilateral posterior shoulder dislocation was also treated with closed reduction, but the immobilization was performed with rigid casts for 6 weeks [17]. However in their case articular surface defects of the humeral heads were 50% and 30%. We think that rigid orthoses or casts are not needed for immobilization, simple abduction pillows can be used, if the humeral head impression defect is less than 25%. Early range of motion and strengthening exercises are key factors for good functional outcomes. Early range of motion and strengthening exercises are key factors for good functional outcomes.

#### 4. Conclusion

We present a rare case of bilateral posterior shoulder dislocation after electrical shock. Physical examination and radiographic evaluation are important for quick and accurate diagnosis. If the diagnosis is made early and the humeral head impression defect is less than 25%, closed reduction followed by a good rehabilitation program can lead to successful results.

#### Ethical approval

This is a case report. The patient was informed that the data concerning his case would be submitted for publication.

#### Sources of funding

The authors declared that this study has received no financial support.

#### Consent

Written informed consent was obtained from patient who participated in this case.

#### Conflicts of interest

No conflict of interest was declared by the authors.

#### Author contribution

IK,TD,SM and AU were involved in the conception, design and interpretation. IK,TD and SM wrote the manuscript. IK,HY,MD and

SM collected data, reviewed relevant published reports and provided the images. All authors read and approved the final manuscript.

#### Guarantor

Ismail Emre Ketenci; Tahir Mutlu Duymus; Serhat Mutlu.

#### References

- [1] C.M. Robinson, A. Akhtar, M. Mitchell, C. Beavis, Complex posterior fracture-dislocation of the shoulder. Epidemiology, injury patterns, and results of operative treatment, *J. Bone Jt. Surg. Am.* 89 (2007) 1454–1466.
- [2] P. Bock, R. Kluger, B. Hintermann, Anatomical reconstruction for Reverse Hill Sachs lesions after posterior locked shoulder dislocation fracture: a case series of six patients, *Arch. Orthop. Trauma Surg.* 127 (2007) 543–548.
- [3] M. Brackstone, S.D. Patterson, A. Kertesz, Triple "E" syndrome: bilateral locked posterior fracture dislocation of the shoulders, *Neurology* 56 (2001) 1403–1404.
- [4] J.L. Shaw, Bilateral posterior fracture-dislocation of the shoulder and other trauma caused by convulsive seizures, *J. Bone Jt. Surg. Am.* 53 (1971) 1437–1440.
- [5] S.T. Elberger, G. Brody, Bilateral posterior shoulder dislocations, *Am. J. Emerg. Med.* 13 (1995) 331–332.
- [6] D.M. Rouleau, J. Hebert-Davies, Incidence of associated injury in posterior shoulder dislocation: systematic review of the literature, *J. Orthop. Trauma* 26 (2012) 246–251.
- [7] National Burn Repository, 2011 Report Dataset. Version 7.0, American Burn Association, Chicago, IL USA, 2011 [www.ameriburn.org].
- [8] S. Aggarwal, P. Maitz, P. Kennedy, Electrical flash burns due to switchboard explosions in New South Wales—a 9-year experience, *Burns* 37 (2011) 1038–1043.
- [9] A. Saracoglu, T. Kuzucuoglu, S. Yakupoglu, O. Kilavuz, E. Tuncay, B. Ersoy, R. Demirhan, Prognostic factors in electrical burns: a review of 101 patients, *Burns* 40 (4) (2014) 702–707.
- [10] T.Z. Nursal, S. Yildirim, A. Tarim, K. Caliskan, A. Ezer, T. Noyan, Burns in southern Turkey: electrical burns remain a major problem, *J. Burn Care Rehabil.* 24 (2003) 309–314.
- [11] C. Spies, R.G. Trohman, Narrative review: electrocution and life-threatening electrical injuries, *Ann. Intern. Med.* 145 (2006) 531–537.
- [12] K.M. Din, B.F. Meggitt, Bilateral four-part fractures with posterior dislocation of the shoulder. A case report, *J. Bone Jt. Surg. Br.* 65 (1983) 176–178.
- [13] O. Kilicoglu, M. Demirhan, Y. Yavuzer, A. Alturfan, Bilateral posterior fracture-dislocation of the shoulder revealing unsuspected brain tumor: case presentation, *J. Shoulder Elb. Surg.* 10 (2001) 95–96.
- [14] T.B.M. Niazi, J.G. Lemon, Posterior dislocation of the shoulder due to a hypocalcaemic fit, *Injury* 21 (1990) 407.
- [15] O. Poyanli, B. Gokcen, K. Unay, K. Akan, I. Esenkaya, Bilateral posterior shoulder dislocation with defect secondary to hypoglycemic coma, *J. Orthop. Sci.* 16 (2011) 125–128.
- [16] T.M. Clough, R.S. Bale, Bilateral posterior shoulder dislocation: the importance of the axillary radiographic view, *Eur. J. Emerg. Med.* 8 (2001) 161–163.
- [17] S. Rezazadeh, A.R. Vosoughi, Closed reduction of bilateral posterior shoulder dislocation with medium impression defect of the humeral head: a case report and review of its treatment, *Case Rep. Med.* 2011 (2011) 124581.
- [18] R. Claro, R. Sousa, M. Massada, J. Ramos, J.M. Lourenco, Bilateral posterior fracture-dislocation of the shoulder, *Int. J. Shoulder Surg.* 3 (2009) 41–45.
- [19] M.S. Kowalsky, W.N. Levine, Traumatic posterior glenohumeral dislocation: classification, pathoanatomy, diagnosis, and treatment, *Orthop. Clin. North Am.* 39 (2008) 519–533.
- [20] R.J. Hawkins, C.S. Neer 2nd, R.M. Pianta, F.X. Mendoza, Locked posterior dislocation of the shoulder, *J. Bone Jt. Surg. Am.* 69 (1987) 9–18.
- [21] F. Rodia, A. Ventura, G. Touloupakis, E. Theodorakis, M. Ceretti, Missed posterior shoulder dislocation and McLaughlin lesion after an electrocution accident, *Chin. J. Traumatol.* 15 (6) (2012) 376–378.
- [22] M.R. Karpinski, K.M. Porter, Bilateral posterior dislocation of the shoulder, *Injury* 15 (1984) 274–276.
- [23] M. Agarwal, W.S. Khan, R. Trehan, A.A. Syed, P.V. Giannoudis, Bilateral posterior fracture-dislocation of the shoulder presenting as a dissecting aneurysm of the thoracic aorta: an uncommon presentation of a rare injury, *J. Emerg. Med.* 35 (2008) 265–268.
- [24] H.A. Hill, M.D. Sachs, The grooved defect of the humeral head: a frequently unrecognized complication of dislocations of the shoulder joint, *Radiology* 35 (1940) 690–700.
- [25] M.T. Provencher, R.M. Frank, L.E. LeClere, P.D. Metzger, J.J. Ryu, A. Bernhardtson, A.A. Romeo, The Hill-Sachs lesion: diagnosis, classification, and management, *J. Am. Acad. Orthop. Surg.* 20 (4) (2012) 242–252.
- [26] A. Delcogliano, A. Caporaso, S. Chiassi, A. Menghi, M. Cillo, M. Delcogliano, Surgical management of chronic unreduced posterior dislocation of the shoulder, *Knee Surg. Sports Traumatol. Arthrosc.* 13 (2005) 151–155.
- [27] H. McLaughlin, Posterior dislocation of the shoulder, *J. Bone Jt. Surg. Am.* 24-A (3) (1952) 584–590.

- [28] J.A. Finkelstein, J.P. Waddell, S.W. O'Driscoll, G. Vincent, Acute posterior fracture dislocations of the shoulder treated with the Neer modification of the McLaughlin procedure, *J. Orthop. Trauma* 9 (1995) 190–193.
- [29] C. Gerber, S.M. Lambert, Allograft reconstruction of segmental defects of the humeral head for the treatment of chronic locked posterior dislocation of the shoulder, *J. Bone Jt. Surg. Am.* 78 (1996) 376–382.
- [30] M. Begin, O. Gagey, M. Soubeyrand, Acute bilateral posterior dislocation of the shoulder: one-stage reconstruction of both humeral heads with cancellous autograft and cartilage preservation, *Chir. Main* 31 (2012) 34–37.
- [31] N. Cicak, Posterior dislocation of shoulder, *J. Bone Jt. Surg. Br.* 86 (2004) 324–332.