Bilateral posterior shoulder dislocation after electrical shock: A case report

Ismail Emre Ketenci, Tahir Mutlu Duymuş, Ayhan Ulusoy, Hakan Serhat Yanık, Serhat Mutlu, Mehmet Oguz Durakbas

Department of Orthopaedics, Haydarpasa Numune Training and Research Hospital, Istanbul, Turkey
Department of Orthopaedics, Kanuni Sultan Suleyman Training and Research Hospital, Istanbul, Turkey

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.

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
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, loose 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. 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. Postoperative 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 postoperative 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
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 be posterior fullness and anterior appearance of the coracoid process [19]. But these findings may be subtle and the diagnosis may be missed initially [116]. 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, is a notch located at the posterolateral aspect of the humeral head in
shoulers 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 tubercles, 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 AJ 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 Duyumus; Serhat Mutlu

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