OPEN ACCESS

ISSN: 2676-7473

RBMS.2020; 25(1):e11

CASE REPORT

Open reduction and internal fixation of the bilateral proximal humeral fracture dislocation with head splitting in an active young adult: a rare case

Mohammad Ali Okhovatpour [1], Yaser Safaei[2], Behrooz Faramarzi[2], Mehrdad Sadighi[*3]

1. *Assistant Professor of Department of Orthopedics, Taleghani Hospital Research Development Committee, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran*
2. *Resident of Orthopedics, Department of Orthopedics, Taleghani Hospital Research Development Committee, Shahid Beheshti University of Medical Sciences, Tehran, Iran*
3. *Assistant Professor of Department of Orthopedics, Shohada Tajrish Hospital, School of Medicine, Shahid Beheshti University of medical sciences, Tehran, Iran*

*Corresponding Author:
Address: Department of Orthopedics, Shohada Tajrish Hospital, Tehran, Iran.
Email: mehrdad_1330@yahoo.com

Date Received: Arpil 2020 *Date Accepted: May 2020* *Online Publication: July 15, 2020*

Abstract

Proximal humeral fracture is a common injury particularly in elderly. A proper management of these fractures is very challenging, based on the various characteristics of patient, fracture anatomy, equipment and the surgeon experience. Bilateral PHF is a rare condition, which almost always caused by seizure, electric shock and trauma, respectively. An appropriate treatment of these patients needs especial attention to obtain a good clinical outcome.

We report a 29-year-old patient who suffered from bilateral proximal humeral fracture with posterior dislocation and splitted humeral head due to the combined mechanism of injury including severe trauma after high voltage electric shock. We did not find similar case(s) reported before in the literature. The patient treated with bilateral open reduction and internal fixation (ORIF). He was able to do his daily activities after 6 months.

Keywords: ORIF, Bilateral proximal humerus fractures, Shoulder surgery, Electrocution, Neer classification

Introduction

Proximal humeral fractures are responsible for about 4-5% of all fractures and are more common injury in the shoulder girdle, especially among adults (1, 2, 3). Although, PHF resulted from high-energy trauma especially in young adults, these injuries also rank third in osteoporotic fractures after hip and distal radius fracture (2,3). Neer's four part fractures include only 3% of all cases since fractures involving the articular surface (humeral head splitting) occur in 0.7% of all cases (3). One third of four part cases are fracture-dislocations (3). Bilateral proximal humeral fractures are extremely rare and often resulted from triple "E" syndrome (Epilepsy, Electrocution and Extreme trauma) (4, 5).

Case Presentation

In March 2019, a 29-year-old shop seller male fell from height due to electrocution was arrived to our emergency department presenting with a severe pain and swelling of both shoulders.

Neurovascular examination of both sides was intact and no burns were observed in the upper extremities. Clinical examination showed no obvious life threatening injuries except mild respiratory distress treated appropriately. In addition, the range of motion was limited and painful in his both shoulders.

He was right handed and no problem was reported in his past medical history. The upper limbs were immobilized with slings and plain anteroposterior and lateral radiographs and computed tomography (CT) scan of both shoulders were obtained. Imaging studies showed that bilateral displaced four part PHF with posterior dislocation and humeral head splitting (Figure 1, 2).

Figure 1. (A, B) anteroposterior and lateral X-rays of left shoulder. (C, D) anteroposterior and lateral X-rays of right shoulder

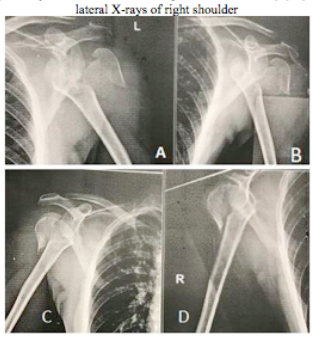
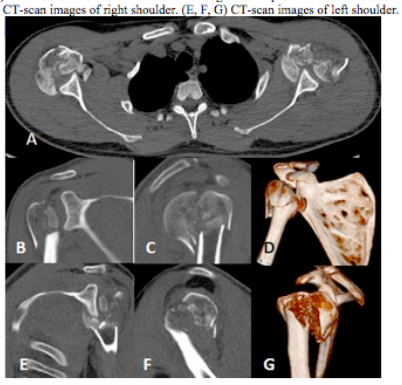


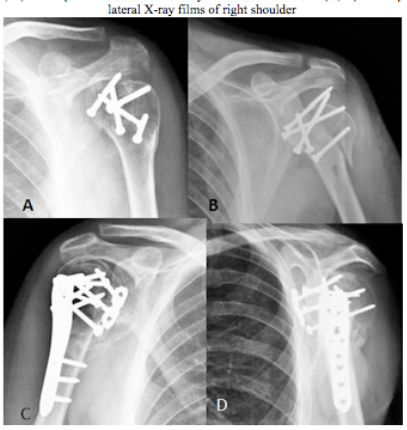
Figure 2. (A) Axial CT-scan of both shoulders showing bilateral proximal humerus fractures. (B, C, D) CT-scan images of right shoulder. (E, F, G) CT-scan images of left shoulder.



Treatment

The left and right shoulders were underwent open reduction and internal fixation (ORIF) using deltopectoral approach in 3 days and 7 days after the injury respectively and the tuberosities were relocated with non-absorbable ethibaned 5 suture threads. The left shoulder was internally fixed with four lag screws because of the multi-fragmented humeral head. The right shoulder was treated with proximal humeral internal locking system (PHILOS) plate and we were obligated to place a reconstruction plate, medial to the bicipital groove due to the excessive humeral head retroversion to achievement proper fixation. The post-operative imaging of both shoulders showed acceptable reduction (Figure 3).

Figure 3. (A, B) Anteroposterior and lateral X-ray films of left shoulder. (C, D) Anteroposterior and lateral X-ray films of right shoulder



Outcome and Follow-up

Passive range of motion for the left shoulder was started immediately after the surgery but because of the big reverse Hill–Sachs lesion in the right side, we put that in the externally rotated shoulder spica cast for four weeks to prevent recurrent posterior dislocation. Active abduction started 4 weeks after the surgery.

We manipulated his both shoulders under general anesthesia after 6 weeks post surgery. In 6-months follow-up visit the range of motion (ROM) of the right shoulder was 90, 90, 45 and 20 degrees in forward flexion, abduction, internal and external rotation, respectively and the left shoulder' ROM was 110, 90, 45 and 50 degrees in forward flexion, abduction, internal and external rotation, respectively. His disabilities of the arm, shoulder and hand (DASH) score was 20 (0-5: excellent, 6-15: good, 16-35: satisfactory, 36 and above: poor) and no recurrent dislocation was seen at the same time. The patient had ability to do all the routine daily activities (Figure 4).

Figure 4. Patient' photographs showing the satisfactory functional outcome.

Discussion

The four-part PHF is having the highest risk for the humeral head avascular necrosis. There are various options to treat these complex fractures such as percutaneous krishner wiring, screw fixation, intramedullary nail fixation, prosthetic replacement, plate fixation and also conservative treatment (5). A recently published Cochrane review showed no difference between these methods (6). Although there is no clear guideline to treat the PHF, patient's age ,bone quality and his / her demands as well as fracture severity may be helpful in the treatment of these fractures (2, 7).The most valuable predicator of outcome after treatment is the age of the patient (8, 9). Hertel has identified the main predictors of humeral head avascular necrosis, which include: Distal metaphyseal extension of the head fragment to metaphysis distally, fracture of the humerus anatomic neck and disruption of the medial cortex (9).

When the PHF involves more than 50% of the humeral head or when a Neer three- or four-part fracture is complicated by the presence of dislocation and/or porotic bone, prosthetic replacement is indicated, especially in elderly, but stem loosening, prosthesis instability, infection and other complications can compromise long term satisfactory outcome (10, 11). On the other hand, in young adults with good bone quality, every attempt should be made to anatomical fracture reduction and if avascular necrosis does develop, then secondary prosthetic replacement can be planned (12).

Königshausen et al. in a retrospective study between 2005 and 2016 showed that Bilateral complex proximal humerals fracture-dislocation in young adults is an extremely rare injury and these patients have more displaced and severe fractures and higher post-operative complication and revision rates compared to patients with unilateral fractures if treated surgically (13). Mynter was reported the first case of this injury at 1902 (14). Convulsive seizure is the most common cause for this situation and excessive trauma is the least reported mechanism for that in the literature (4,13). Our 29-year-old patient was injured in the combined Fashion including severe trauma after the electrocution. Considering patient youth and high activity demands besides the prevention of arthroplasty complications, we treated our case with bilateral ORIF.

Ellanti and Harrington reported a 56-year-old woman with traumatic bilateral proximal humeral fracture. They treated the left fracture with threaded pins and tension band wiring using an ORIF procedure, and the right side fracture with a hemiarthroplasty. In a two-year follow-up, the outcome scores of both sides were similar, functionally, but the patient had a more natural feeling about the right shoulder (15).

Another traumatic case reported by Jaiswal and kachchhap is a 40 years old male injured due to fall from height had right three part and left four part PHF Which treated with ORIF with PHILOS plate and ethiband suture threads for the tuberosities repositioning on both sides. The patient obtained good functional outcome at 6 months follow up; with 140' abduction, 150' flexion, 50' internal rotation, 50' external rotation and 40' extension of both shoulders (16).

In a case series reported by Uppal et al. four patients which older than 60 years with bilateral PHF and posterior dislocation of the humeral head managed using a combination of different surgical procedures including: reverse shoulder arthroplasty, hemiarthroplasty and ORIF with or without humeral autograft. They concluded that range of motion and Oxford shoulder scores of the shoulders, which underwent ORIF with humerus autograft, were improved than the hemiarthroplasty (17).

Conclusion

The proper treatment of the four-part PHFs should be selected individually based on patient age, bone stock, fracture type, desirable activity level and other circumstances. This management in the bilateral PHFs is more complex and should be planned by an experienced surgeon. Our patient, considering his fracture configuration, could be treated with bilateral shoulder arthroplasty but the patient' young age and economic problems in prosthesis provide including sanctions and high expenses of prosthesis replacement which not covered by insurance organizations, push us to find another ways of surgery. However, an anatomic reduction of theses fractures in

young adults may be accompanied with satisfactory functional outcome but prevent devastating complication after prosthesis replacement and functionally comparable with arthroplasty.

Conflict of interest
The authors have no conflict of interest to declare.

Acknowledgments
We thank Taleghani hospital Research Development Committee.

References:

1. Kristiansen B, Kofoed H. Transcutaneous reduction and external fixation of displaced fractures of the proximal humerus. A controlled clinical trial. The Journal of bone and joint surgery. British volume. 1988 Nov;70(5):821-4.
2. Ebrahimpour A, Zandi R, Sajjadi MM, Sadighi M, Karimi A, Okhovatpour MA, Moradi P. Treatment of Proximal Humeral Fractures Using Minimally Invasive Plate Osteosynthesis. Trauma Monthly. 2018 Sep 8;23(6):e60717-.
3. Court-Brown CM, Garg A, McQueen MM. The epidemiology of proximal humeral fractures. Acta orthopaedica Scandinavica. 2001 Jan 1;72(4):365-71.
4. Brackstone M, Patterson SD, Kertesz A. Triple "E" syndrome: bilateral locked posterior fracture dislocation of the shoulders. Neurology. 2001 May 22;56(10):1403-4.
5. Hsu CJ, Hsu HC, Fong YC, Kuo CC, Wang DY. Bilateral locked posterior fracture-dislocation of the shoulders due to electric shock. Mid-Taiwan Journal of Medicine. 2006 Jun 1;11(2):132-7.
6. Handoll HH, Brorson S. Interventions for treating proximal humeral fractures in adults. Cochrane Database of Systematic Reviews. 2015(11).
7. Thakur A, Muzzafar K, Charak SS, Dev B, Ghani A. Evaluation of results of three and four-part fracture dislocations of proximal humerus in young adults using philos (proximal humerus internal locking system). International Journal of Research in Medical Sciences. 2018 Feb;6(2):585.
8. Soliman OA, Koptan WM. Four-part fracture dislocations of the proximal humerus in young adults: results of fixation. Injury. 2013 Apr 1;44(4):442-7.
9. Hertel R, Hempfing A, Stiehler M, Leunig M. Predictors of humeral head ischemia after intracapsular fracture of the proximal humerus. Journal of shoulder and elbow surgery. 2004 Jul 1;13(4):427-33.
10. Hawkins RJ, Pianta RM, Mendoza FX. Locked posterior dislocation of the shoulder. The Journal of bone and joint surgery. American volume. 1987 Jan;69(1):9-18s.
11. Plausinis D, Kwon YW, Zuckerman JD. Complications of humeral head replacement for proximal humeral fractures. JBJS. 2005 Jan 1;87(1):204-13.
12. Mansat P, Guity MR, Bellumore Y, Mansat M. Shoulder arthroplasty for late sequelae of proximal humeral fractures. Journal of shoulder and elbow surgery. 2004 May 1;13(3):305-12.
13. Königshausen M, Rausch V, Mempel E, von Glinski A, Ull C, Bernstorff M, Schildhauer T, Seybold D, Gessmann J. Bilateral Proximal Humerus Fracture–a Rare Combination with a High Complication Rate after Surgery. Zeitschrift für Orthopädie und Unfallchirurgie. 2018 Dec;156(06):646-52.
14. Mynter H. XIV. Subacromial dislocation from muscular spasm. Annals of surgery. 1902 Jul;36(1):117.
15. Ellanti P, Harrington P. Functional outcome after simultaneous bilateral four-part proximal humerus fracture: a comparison of ORIF and hemiarthroplasty in an individual patient. Case reports in orthopedics. 2012;2012.
16. Jaiswal A, Kachchhap ND, Chaterjee R, Tanwar YS, Habib M, Singh SP.

Bilateral traumatic proximal humerus fractures managed by open reduction and internal fixation with locked plates. Chinese Journal of Traumatology. 2013 Dec 1;16(6):379-81.

17. Uppal HS, Robinson PW, Packham I, Crowther M. The management of bilateral posterior fracture dislocations of the shoulder: a case series illustrating management options. Shoulder & elbow. 2016 Apr;8(2):111-7.