Bilateral Four-Part Anterior Fracture Dislocation of the Shoulder
A Case Report and Review of Literature


Abstract
Although bilateral anterior dislocation of shoulder is not that uncommon, there have been only 12 published reports on bilateral anterior fracture dislocation of shoulder. The associated fractures have mostly been greater tuberosity fractures with bilateral three part fractures being reported in only two cases. To our knowledge, a bilateral four part anterior fracture dislocation of the shoulder has not yet been reported in the English literature. We here report a case of bilateral anterior fracture dislocation with four part fracture of both proximal humeri in a 60-year-old male due to electrocution. Considering the comparatively old age of the patient and excessive comminution of both the fractures, a bilateral hemiarthroplasty was done. At the last follow-up after more than 2 years, the patient was pain free with ability to comfortably carry out most of the activities of daily life. Through our case report, we highlight the rarity of the condition and review the available literature on the subject. We also emphasize the importance of meticulous perioperative planning when dealing with such cases to ensure a satisfactory long-term outcome.

The glenohumeral joint is the most frequently dislocated joint in body with 95% dislocations being anterior, 4% posterior, and a rare variety of inferior dislocation (luxatio erecta) seen in around 0.5% of the cases. However, bilateral dislocations of glenohumeral joint are relatively rare with most being posterior.1-3 Electroconvulsive therapy (sometimes referred to as triple E syndrome) are frequent modes of injury in bilateral dislocations.3 We here report a case of bilateral anterior fracture dislocation with four-part fracture of both proximal humeri in 60-year-old male due to electrocution. Through our report, we emphasize the importance of thorough physical examination of patients presenting after electrocution even with low voltage. Such patients may complain of generalized musculoskeletal pain due to violent muscle contractions during the episode, but any such pain needs to be evaluated for skeletal injuries and preferably by an orthopaedic surgeon. We also review in detail the literature related to the subject and discuss the management options in such patients. To our knowledge, such a presentation of bilateral four-part anterior fracture dislocation has not yet been reported in the English literature.

Case Report
A 60-year-old male religious teacher at a mosque got electrocuted when he held onto metallic rails along the footsteps of the mosque while going for his morning prayer. There had been a short circuit, which resulted in an electric current in rails, and the patient was suddenly thrown backward when he grabbed onto the metallic railings with both hands. The patient felt pain in both his shoulders immediately after the episode but never lost consciousness or developed seizures. He was taken to a hospital where plain radiography (Fig. 1) revealed bilateral four-part anterior fracture dislocation with striking similarity of both sides, as if one side were a mirror image of other. There was no distal neurovascular deficit on either side. Upon referral to our institute, a CT scan of both shoulders (Figs. 2 and 3) was obtained that confirmed the diagnosis of bilateral four part anterior fracture dislocation. The CT scan showed coronal split of humeral head with comminution of articular surface on both the sides.

After thorough medical evaluation and optimization of medical status, the patient was taken for surgery and the options of both internal fixation and hemiarthroplasty were kept. Intraoperatively 50% of articular surface on right side and 40% on the left side was lost due to comminution and as such no useful and stable reconstruction was possible and a decision of bilateral bipolar hemiarthroplasty was taken.

Due to bilateral involvement and lack of adequate ac-

**Figure 1** Preoperative radiographs of the patient showing bilateral four part anterior shoulder dislocation.

**Figure 2** Sequential axial cuts of CT scan of bilateral shoulder of the patient.

**Figure 3** CT scan images with three-dimensional reconstruction.
cess to professional trained physical therapist at home, the patient was kept in the hospital for 1 month until he displayed satisfactory recovery of strength and control of this shoulders. For the initial 4 weeks only, isometric active assisted exercises were allowed without any active flexion or abduction. On day 5, assisted external rotation exercises in supine position were started, and then on day 8, pendulum exercises in both internal and external rotation were added. At day 10, exercises in standing position were allowed, and assisted hyperextension was added to the regimen. At 2 weeks, horizontal external rotation was allowed, and at 3 weeks, isometric exercises targeting rotations and the deltoids (except anterior thirds) were started. As the patient progressively regained power and control, exercises for anterior deltoids were added, but the right side showed slight weakness for which electrical stimulation of the anterior deltoids was administered for 1 week after which the patient was discharged home.

The patient was followed up every month for the first 3 months, every 3 months up until 1 year, and every 6 months thereafter. At the last follow-up after 25 months, the patient had an excellent and pain free range of motion in both shoulders. Radiography (Fig. 4) did not show any signs of loosening. The active range of motion for the right shoulder was 90° abduction, 100° flexion, 25° extension, 25° external rotation in maximal abduction, and 30° internal rotation in maximal abduction. The active range of motion for the left shoulder was 80° abduction, 90° flexion, 25° extension, 25° external rotation in maximal abduction, and 30° internal rotation in maximal abduction. Constant score was used to evaluate the functional outcome at the last follow-up visit and was found to be 80 for the right shoulder and 76 for the left shoulder. The patient was able to carry out most of his previous daily activities but had some difficulty with overhead activities due to restriction in abduction on both sides.

**Discussion**

Since the first report of a bilateral dislocation of shoulder in 1902 by Mynter,4 about 60 cases have been reported, which is a relatively small number for over a century of literature in a joint so vulnerable to dislocation. Although there is an overwhelming predominance of anterior over posterior dislocations of the shoulder, the same does not hold true for bilateral cases. Most of the bilateral cases are posterior dislocations.5 Bilateral anterior fracture dislocations are still uncommon, and to our knowledge, there are only 12 published reports in the English literature.1,2,6-15 These have been summarized in Table 1.

The reason for relative higher frequencies of anterior or posterior dislocations in unilateral or bilateral cases can be inferred from the mechanisms that produce these dislocations. Anterior dislocation is caused by the levering out of the humeral head when the greater tuberosity impinges on the acromion in the position of extreme abduction, extension, and external rotation.16 This frequently occurs in falls with outstretched arms but is rarely bilateral as one arm will invariably hit the ground first and arms need to be relatively adducted if a person were to land on both arms. Posterior dislocation, on the other hand, is usually produced by indirect force of muscles with the shoulder in an adducted and internally rotated position.16 Thus excessive muscle contraction in cases of electrocution, epilepsy, and electroconvulsive therapy is a frequent cause of posterior dislocation due to the relative strength of the internal rotators of shoulder compared to the external rotators.2,3 Overall, a fall or a fall after an electric shock remain the most common cause of any type of bilateral shoulder dislocation.2 Apart from these usual modes of injury, a number of unusual causes have been reported (including bilateral anterior dislocation caused by excessive weight used during bench press exercise17), but in most cases the mechanism remains the same.

Anterior glenohumeral dislocations are associated with fractures in 15% of cases, and generally, these are two part fractures involving either the greater tuberosity or humeral neck.18,19 Only two cases of bilateral, three-part, anterior fracture dislocation have been described previously.20,15 While the mechanism of injury has not been clearly described in one of the reports,19 the patient in the second report15 was injured when a heavy object fell onto his back while he was leaning forward holding an overhead bar; this resulted in his arms being abducted and externally rotated. To our knowledge, bilateral, four-part, anterior dislocation has not yet been reported in the literature. Our case is also unique in the sense that it happens to be only the third case of bilateral, anterior fracture dislocation due to electrocution,8,9 which usually causes a dislocation in opposite direction.5

![Figure 4](image-url) Radiographs at the last follow up showing bilateral hemiarthroplasty done in the patient.
Treatment of four-part, proximal humeral fractures presents complex management issues due to universally poor results of nonoperative treatment and difficulty in achieving and maintaining reduction with internal fixation. In the series by Neer and colleagues,20 treatment of four-part failed in all 13 cases using internal fixation and 11 cases treated non-operatively as opposed to one failure and 31 excellent or satisfactory results with hemiarthroplasty. Although similar observations have been made by other investigators,19,21 the treatment of proximal humeral fractures has undergone major changes in recent years with the introduction of newer angle-stable implants, such as locked plates.22-24 Despite the promising results with these implants, there are complications peculiar to plate fixation, especially in the face of the high incidence of avascular necrosis in three- or four-part fractures.22,23 Late collapse of the head due to avascular necrosis can expose screws intraarticularly and lead to rapidly progressive arthritis. Although internal fixation remains our first choice for difficult three- or four-part fractures in all physiologically young patients, the relative old age of the patient and the extreme comminution of the humeral head prevented any useful reconstruction and forced us to perform bilateral hemiarthroplasty.

Arthroplasty for proximal humerus fractures can give reasonably good results; though, rotator cuff tears, which occur often in cases with fracture dislocations and tuberosity fixation, present some technical difficulty.25,26 However, if addressed appropriately, these do not preclude a satisfactory result. Reports of bilateral hemiarthroplasty for bilateral fracture dislocations of proximal humerus are few27,28 but have shown uniformly good results. Comminution, large size of articular surface involvement, and poor bone quality are the most important factors that favor arthroplasty over internal fixation as the surgical option of choice.28 Pain relief is the most predictable outcome after arthroplasty, although in some cases range of motion may be significantly restricted. However, despite the reduced range of motion, most studies have shown more than an 80% satisfaction rate after arthroplasty for proximal humerus fractures.25,26,29

To conclude, we report one of the first cases of bilateral, four-part, anterior fracture dislocation of the shoulder. Although we believe that angle-stable implants, such as locked plates, should be the management modality for such patients, the presence of excessive comminution (in such fractures) and the older age of the patient tilts the management option in favor of hemiarthroplasty. A meticulous perioperative evaluation goes a long way in ensuring a satisfactory long-term outcome.

Table 1  Cases of Bilateral Anterior Fracture-Dislocation of Shoulder

<table>
<thead>
<tr>
<th>Year</th>
<th>Author</th>
<th>No. of Cases</th>
<th>Etiology of Injury</th>
<th>Mechanism of Injury*</th>
<th>Associated Fracture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>Yadav6</td>
<td>1</td>
<td>Seizure</td>
<td>ABD with ER</td>
<td>Bilateral greater tuberosity</td>
</tr>
<tr>
<td>1979</td>
<td>Segal et al7</td>
<td>1</td>
<td>Seizure with fall</td>
<td>ABD with ER or ABD with HE</td>
<td>Bilateral greater tuberosity</td>
</tr>
<tr>
<td>1980</td>
<td>Carew-McColl8</td>
<td>1</td>
<td>Electric Shock</td>
<td>Not provided</td>
<td>Bilateral greater tuberosity</td>
</tr>
<tr>
<td>1983</td>
<td>Salem9</td>
<td>1</td>
<td>Electric Shock</td>
<td>Not provided</td>
<td>Bilateral greater tuberosity</td>
</tr>
<tr>
<td>1990</td>
<td>Nagi et al10</td>
<td>1</td>
<td>Fall with outstretched hands</td>
<td>ABD with ER</td>
<td>Three-part fractures both humeri</td>
</tr>
<tr>
<td>1992</td>
<td>Lal et al11</td>
<td>2</td>
<td>1. Fall with outstretched hands 2. Fall from height</td>
<td>1. ABD with ER 2. Not provided</td>
<td>Bilateral greater tuberosity in both</td>
</tr>
<tr>
<td>1994</td>
<td>Markel et al12</td>
<td>1</td>
<td>Seizure</td>
<td>ABD, EXT with ER</td>
<td>Bilateral greater tuberosity</td>
</tr>
<tr>
<td>1996</td>
<td>Thomas et al13</td>
<td>1</td>
<td>Fall with outstretched hands</td>
<td>Not provided</td>
<td>Bilateral greater tuberosity</td>
</tr>
<tr>
<td>1999</td>
<td>Dinopoulos et al12</td>
<td>1</td>
<td>Fall with outstretched hands</td>
<td>ABD with EXT</td>
<td>Three part fracture right humerus</td>
</tr>
<tr>
<td>2000</td>
<td>Cottias et al14</td>
<td>1</td>
<td>Convulsion secondary to hypoglycemia</td>
<td>Not provided</td>
<td>Three-part fracture both humeri</td>
</tr>
<tr>
<td>2005</td>
<td>Sharma et al15</td>
<td>1</td>
<td>Heavy object falling on the back</td>
<td>ABD with ER</td>
<td>Three-part fracture both humeri</td>
</tr>
</tbody>
</table>

*ABD = Abduction, ER = External Rotation, HE = Hyperextension, EXT = Extension, IR = Internal Rotation.

Disclosure Statement
None of the authors have a financial or proprietary interest
in the subject matter or materials discussed, including, but not limited to, employment, consultancies, stock ownership, honoraria, and paid expert testimony.

References