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The management of recurrent shoulder instability in patients with epilepsy: a 15-year experience

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Background: The purpose of this study was to review our experience with recurrent shoulder instability in epileptic patients and to discuss factors influencing its management.

Methods: A retrospective review was conducted at a single facility. All patients with epilepsy and recurrent shoulder instability were included for study.

Results: A consecutive series of 33 patients with 49 unstable shoulders presented during a 15-year period. Mean age at the time of the index dislocation was 20 years (range, 9-31). There were 24 patients with 36 anteriorly unstable shoulders, 6 patients with 8 posteriorly unstable shoulders, and 3 patients with 5 multidirectionally unstable shoulders. A large Hill-Sachs lesion was present in 21 shoulders. Glenoid bone loss was seen in 11 cases and involved >25% of the anterior-inferior margin in 6 cases and >50% in 2 cases. Thirty-six shoulders in 31 patients underwent surgery. Ongoing postoperative instability was found in 61% (22 of 36 shoulders) of the anterior group, 38% (3 of 8 shoulders) of the posterior group, and 40% (2 of 5 shoulders) of the multidirectional group. Skeletal reconstruction was found to be associated with a significantly lower rate of recurrence compared with an isolated soft tissue repair ($P = .004$). Glenohumeral arthrosis was found in 17 patients (22 shoulders) a mean of 12 years (range, 5-20) after the index dislocation.

Conclusion: The presence of bone loss and degenerative changes are the principal factors affecting the specific surgical strategy employed to treat shoulder instability in patients with epilepsy.

Level of evidence: Level IV, Case Series, Treatment Study.

Keywords: Epilepsy; instability; shoulder

Epileptic seizures can cause shoulder dislocation and instability.[2] The incidence of shoulder dislocation during a seizure is approximately 0.6%, but this may be an underestimation because many go undetected.[4,17] Recurrent instability is common and occurs soon after the first dislocation, with anterior and posterior instability occurring equally.[2,15] Significant bone loss from the glenoid and humeral head is thought to be responsible for this, and therefore the majority of surgical strategies focus on bone augmentation of the glenohumeral joint.[2,8,13,14]

Relatively little is documented about the relationship between the type of instability, the pattern of structural lesions, and the outcome of treatment of shoulder

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instability caused by epileptic seizures.[2,6] Treatment protocols vary and encompass a wide range of soft tissue (Putti-Platt, Bankart repair) and bone augmentation procedures (Eden-Hybinette, coracoid transfer, glenoid neck/humeral osteotomy, arthrodesis).[2] Despite several technically satisfactory procedures, some patients still experience persistent instability, which is often due to ongoing seizures and poor compliance with anticonvulsive medication. The patients are often young, in education or seeking work, and find the prospect of living with a painful unstable shoulder untenable.

The purpose of this study was to review our 15-year experience with epilepsy-related recurrent shoulder instability to distinguish patterns of pathoanatomy and to relate these to management and outcomes in this heterogeneous group.

Materials and methods

Between November 1996 and December 2011, 33 consecutive epileptic patients with 49 unstable shoulders were treated at our institution for recurrent instability. Sixteen patients were initially managed in other hospitals for a number of years before being referred to our study institution, which specializes in the management of complex shoulder instability. All clinic notes and operative reports were reviewed. Patients were categorized into anterior, posterior, or multidirectional groups by both clinical assessment and radiographic evaluation. Index surgery varied throughout the cohort, but all patients were evaluated by computed tomography (CT) or diagnostic arthroscopy. Clinical and radiographic assessment (anterior-posterior and axillary/scapula lateral views) was also undertaken.

The duration of epilepsy before the first dislocation was 9.8 years (range, 0-26), and 29 patients were receiving concomitant medical therapy. The remaining 4 patients who were not taking anticonvulsive medication were advised as such by their neurologist or family physician. Mean age at the time of the index dislocation was 20 years (range, 9-31), and mean age at the time of the first operative procedure was 26 years (range, 12-39). The cohort consisted of 21 men and 12 women. Sixteen patients had bilateral symptoms, and the dominant arm was affected in 23 cases. Daily episodes of instability were noted in 11 patients, and weekly to monthly episodes were noted in 22 patients. In 23 patients, the onset of instability coincided with a seizure in the absence of direct trauma (i.e., there was no extrinsic force applied to the shoulder); in the remaining 10 patients, there was a direct injury to the shoulder sustained during a seizure. In all cases, subsequent dislocations occurred during normal daily activities or further seizures.

Patients were evaluated by CT (24 patients) or diagnostic arthroscopy (9 patients) to confirm the direction of instability, the character of previous intervention (if any), the size of the bone defect of humerus and glenoid, and the presence and extent of arthritis. The size of the Hill-Sachs lesion was assessed on CT imaging by assessment of the maximum cord length of the defect as a ratio of the arc length of the intact articular surface (whether the intact surface was arthritic or not). If the ratio was $<20\%$, we assessed the Hill-Sachs defect as being small, whether or not it engaged with the glenoid rim in the direction of instability. If the ratio was $>20\%$, we assessed it as being large.

Thirteen shoulders in 11 patients were treated nonoperatively, and 36 shoulders in 31 patients underwent surgery. Nonoperative management was considered if the patient elected not to proceed with surgical reconstruction after discussion with the consultant surgeon, if the patient could not comply with rigorous postoperative splintage or rehabilitation regimens, or if the epilepsy was so poorly controlled that a safe period of seizure-free rehabilitation could not be foreseen.

Statistical analysis

The Fisher exact test was performed to examine the relationship between the direction of instability and the recurrence rate after previous surgery, the size of the Hill-Sachs lesion, and the incidence of arthritis. A comparison was also made between the recurrence rate after soft tissue repair alone and skeletal stabilization. A Bonferroni-adjusted significance level of 0.0125 was calculated to account for the increased possibility of type I error because 4 hypotheses were tested. The SPSS software package (version 22; SPSS Inc., an IBM Company, Chicago, IL, USA) was used to analyze data.

Results

The cohort consisted of 36 anterior (24 patients), 8 posterior (6 patients), and 5 multidirectional (3 patients) instabilities. Hill-Sachs lesions were identified in 28 shoulders. These were large in 21 cases and small in 7 cases. In the anterior group, 15 shoulders had a large Hill-Sachs defect compared with 1 shoulder (reverse Hills-Sachs defect) in the posterior group and 5 shoulders in the multidirectional group. Of the 7 small lesions, 6 were associated with anterior instability and 1 with posterior instability. Reverse Hills-Sachs lesions were found in 2 shoulders. The direction of instability was not found to significantly affect the size of the Hill-Sachs or reverse Hill-Sachs lesions ($P = .228$). Glenoid bone loss was found in 11 shoulders and was anterior in 10 and posterior in 1. It involved $>25\%$ of the anterior-inferior glenoid rim in 6 cases and $>50\%$ in 2 cases.

The recurrence rate after the index repair was 69% (25 of 36 shoulders), and the reoperation rate in this group was 60% (15 of 25 shoulders). Ongoing instability after previous surgery was seen in 61% (22 of 36 shoulders) of the anterior group, 38% (3 of 8 shoulders) of the posterior group, and 40% (2 of 5 shoulders) of the multidirectional group. These differences were not statistically significant ($P = .365$).

Thirty-one patients were managed operatively, of whom 12 underwent a preoperative neurologic review to optimize medical treatment of the epilepsy because of persistent uncontrolled seizures. The first operation was undertaken 4.8 years (range, 0-21) after the index dislocation and consisted of an isolated soft tissue procedure in 23 shoulders,