

# BILATERAL POSTERIOR FOUR-PART FRACTURE-DISLOCATION OF THE SHOULDER

C. MARTENS<sup>1</sup>, G. HESSELS<sup>2</sup>

**A case of a bilateral posterior four-part fracture dislocation of the shoulder after a convulsive seizure was treated conservatively on one side, while the other shoulder was replaced by a hemiarthroplasty. A review of the literature and a treatment protocol for managing these injuries are presented. In four-part fracture-dislocations good results can be achieved with conservative treatment, but when avascular necrosis is likely to occur (delay in diagnosis or dubious relationship of the fragments after reduction) it is better to replace the humeral head.**

**Keywords :** posterior fracture-dislocation shoulder ; hemiarthroplasty ; conservative treatment.

**Mots-clés :** fracture-luxation postérieure de l'épaule ; hémiarthroplastie ; traitement conservateur.

---

## INTRODUCTION

Although the shoulder is the most frequently dislocated joint in the body, posterior dislocation is uncommon, accounting for about 2% of all the dislocations (2, 3, 11). Posterior fracture-dislocation of the shoulder is even less common, representing 0.9% of the 1500 fractures and dislocations reviewed by Neer (4, 5). Bilateral posterior fracture-dislocation is sufficiently unusual to justify a case report. Only a few clear reports can be found in the literature (3, 6, 7, 9, 11).

We report the case of a woman who presented with a bilateral four-part fracture with posterior dislocation after a convulsive seizure. Early diagnosis and open reduction alone (left) and total shoulder replacement (right) produced a good functional result in this uncommon severe shoulder injury.

## CASE REPORT

A 50-year-old woman was hospitalized after an acute major convulsive seizure. The patient had very painful shoulders bilaterally and her husband heard a cracking noise.

The radiographs showed a bilateral four-part fracture-dislocation (fig. 1). The patient had some paresthesias in her right fingers (I, II, III), and an EMG showed a reduced conduction velocity of the median nerve in the upper arm (posterior fascicle) without functional deficit.

Attempts at gentle closed manipulation under full relaxant general anesthesia were unsuccessful, so a small posterior incision was made to reduce the right shoulder with the finger. The reduction was achieved but the main articular fragment of the humeral head was rotated and displaced, so that conservative treatment would have resulted in avascular necrosis. The right shoulder was then replaced with a hemiprosthesis through a deltopectoral approach.

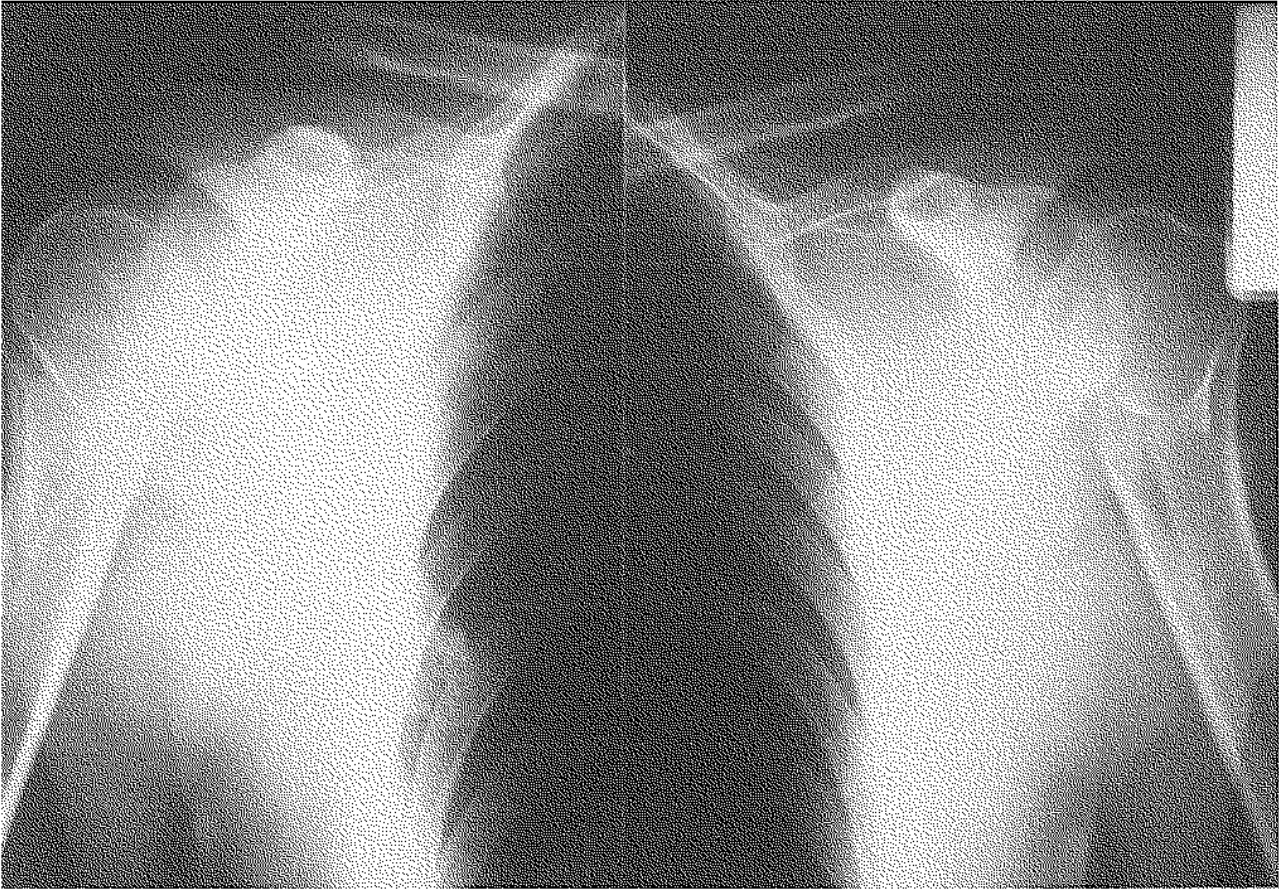
For the left shoulder, the reduction was also achieved with the finger through a small posterior arthrotomy. There was an acceptable anatomical relationship between the fragments and a Kirchner pin was placed to hold the reduction of the dis-

---

<sup>1</sup> University Hospital of Gent, Department of Orthopedics and Traumatology.

<sup>2</sup> St. Andries' Hospital of Tielt, Department of Orthopedics and Traumatology.

Correspondence and reprints : C. Martens, Beernege-  
straat 2, bus 8, 8700 Tielt, Belgium.



*Fig. 1.* — Bilateral posterior four-part fracture-dislocation of the shoulder.

location. The pin was removed after 3 weeks, and active rehabilitation was started.

There were no specific problems in the rehabilitation process and now 6 years after the trauma we found functional upper arms bilaterally; left shoulder anteflexion 125°, abduction 120°, retroflexion 55°, external rotation 45°, internal rotation T6; right shoulder anteflexion 105°, abduction 105°, retroflexion 40°, external rotation 45°, internal rotation L4. Despite the restriction of the internal rotation of the right shoulder, the patient is very satisfied with the functional result, feels very comfortable and has no pain.

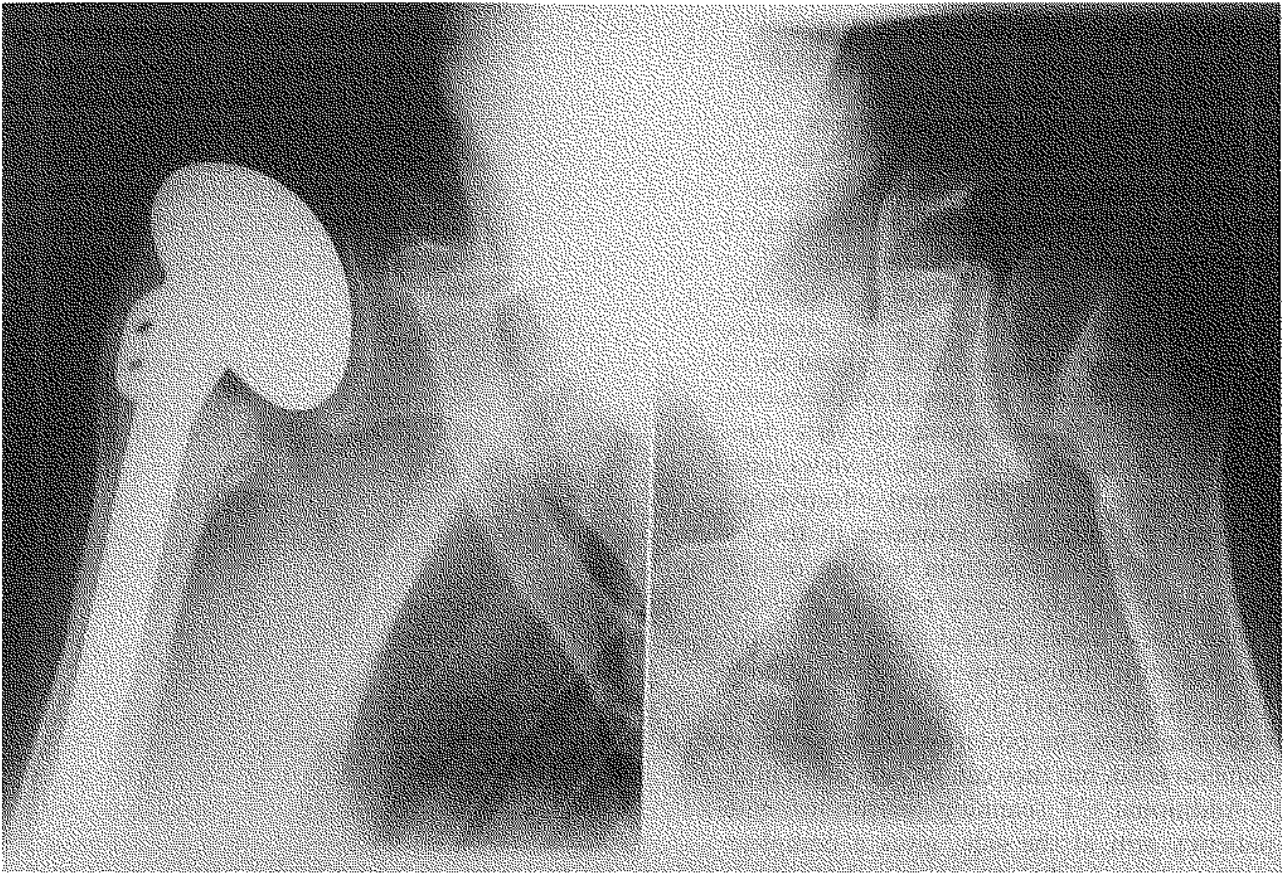
### DISCUSSION

Bilateral posterior glenohumeral fracture dislocation is extremely rare and almost all the cases

reported were ascribed to postconvulsive status. The majority of bilateral dislocations during an epileptic seizure are posterior; only 2 cases are reported of bilateral anterior dislocation during a grand mal convulsion (8). Other causes for posterior dislocations are a fall forward on the outstretched arm with a flexed, internally rotated and adducted shoulder, a syncopal attack or direct trauma. Bilateral dislocations are nearly always caused by a convulsive seizure.

#### *Mechanism*

The typical position of the shoulder during a convulsion is adduction, internal rotation and flexion. During this spasm the humeral head is forced superiorly and posteriorly over the glenoid edge. If the convulsion stops, the humeral head stays lodged behind the glenoid, often with a



a



b

*Fig. 2.* — Functional shoulders bilaterally 6 years after the severe trauma.

depression in the head just medial to the lesser tuberosity. This depression is caused by a continuing muscular contracture of deltoid and subscapularis which forces the anterior portion of the humeral head onto the posterior rim of the glenoid. With further convulsive force, the glenoid edge shears off the humeral head, and the subscapularis and infraspinatus complex shear off the respective fragments, resulting in a typical four-part fracture (3, 9).

#### *Diagnosis*

Examination of a posterior luxation shows an arm held in internal rotation while external rotation is impossible. This clinical finding may not be present when there is a discontinuity of the humerus. Then passive external rotation could be carried out, so that motion at the fracture site might be misinterpreted as joint motion; however this maneuver is painful.

Furthermore in a posterior fracture-dislocation the coracoid process is prominent anteriorly, the deltoid appears flattened laterally and there is a posterior bulging of the shoulder. Peripheral neurovascular compromise is rare, but when it does occur, the axillary or radial nerve is most commonly injured (2). However in our patient we found a median nerve lesion.

When a posterior dislocation is associated with a fracture, it is difficult to make the diagnosis by physical examination, and it is easy to be misled by the obvious lesion as viewed on the roentgenogram. When the anteroposterior view does not show the dislocation, then specific views including axial projections are the most effective way to establish the diagnosis. However in these cases they are difficult to perform because of the lack of mobility and the severe pain. If necessary, an axillary view under general anesthesia will reveal the posterior dislocation of the fractured head. The scapular lateral (Y) view and the transthoracic view also show the posterior displacement of the humeral head, but they can be difficult to interpret.

Additional CT scanning, performed with the patient's arm at the side, gives a complete and accurate picture. It is rapidly performed with no discomfort or pain to the patient. Furthermore a CT scan helps in operative planning by precisely defining the extent of the articular damage and the soft tissue lesions (11).

### *Treatment*

In 50% of the posterior dislocations, there is an associated fracture; this may delay diagnosis, make closed reduction difficult and give late instability.

In posterior dislocation associated with compression fractures in general, Neer (4) recommends closed treatment when the fragment involves less than 20% of the articular surface. When 20 to 50% of the articular surface is damaged, a modification of McLaughlin's operation is recommended in which the lesser tuberosity and the attached subscapularis are implanted into the defect (5, 6). For humeral head loss of more than 50% Neer recommends prosthetic replacement of the humeral head. Excision without replacement has also been

described as a treatment for fractures that involve more than 50% of the articular surface (7).

In three- or four-part fracture-dislocations, reduction can be achieved by pressure with both thumbs in the infraspinatus fossa, while the assistant uses adduction and some traction. While the pressure is maintained from behind, the arm is allowed to fall free (1). Sometimes when closed reduction is not successful in acute posterior fracture-dislocation, one can perform a small posterior arthrotomy to reduce the shoulder with the finger, as we did. When reduction still cannot be achieved, interposition of the biceps tendon should be considered, so that open reduction is necessary (6). The biceps tendon can be subluxed into the joint space, preventing reduction of the humeral head, when a lesser tuberosity fracture or avulsion includes the bicipital groove.

After reduction one must analyze the anatomical configuration of the humeral head. When it looks acceptable and there is no delay in diagnosis, one can achieve good functional results with conservative treatment using an immobilization sling for 4-6 weeks with early institution of pendulum exercises (1, 3). Even after open reduction using the deltopectoral approach and when there is adequate soft tissue attachment from capsule and muscle to the fragments, internal fixation or replacement is not necessary (3).

Although conservative treatment gives very good results if used early, there are some clinical presentations requiring surgery. Delay in diagnosis and therapy has a particularly adverse effect on the prognosis. Complete displacement and an injury that has been present for at least ten days may result in a humeral head that is avascular and nonviable. Avascular necrosis of the humeral head can be a sequel to a complex proximal humeral fracture because the blood supply of the humeral head originates from anterior and posterior humeral circumflex branches, which enter the humeral metaphysis below the level of the anatomic neck. There are lesser contributions through the capsular and muscular attachments. The incidence of avascular necrosis following conservatively treated multifragmented humeral neck fractures has been estimated at 7-8% (4), but fracture-

dislocations were not included in the frequencies mentioned.

Some authors recommend open reduction and internal fixation. The anterior approach is commonly advised. Most authors use a deltopectoral approach, although the superior subacromial approach is used by Stableforth (10). The exposure from above allows a good view of the articular segments and of their relationship to the glenoid. Sometimes posterior approach is necessary when a cardiac pacemaker is situated in the deltopectoral region (Reckling, 1986).

But Neer (5) reported avascular necrosis in 6 out of 8 patients with four-part fractures after ORIF. He suggested arthroplasty as appropriate for fracture-dislocations due to the difficulty of securing internal fixation and the possibility of later avascular necrosis with subchondral bone collapse and resultant joint incongruity. Good results are achieved after hemiarthroplasty (5), but complications are more frequent in shoulders with chronic fracture-dislocations and are generally related to surgical difficulty, extensive tissue scarring and distortion of anatomy. Early surgery should be performed to avoid scarring and inelasticity that engender complications and limit functional recovery.

### CONCLUSION

We agree that in posterior four-part fracture-dislocations, good functional results can be achieved with early diagnosis and conservative treatment, followed by early institution of pendulum exercises. Our patient has a better functional result in the conservatively treated shoulder than in the hemiarthroplasty shoulder. However, when avascular necrosis is likely to occur, especially after a delay in diagnosis of several days or with a non-anatomical relationship of the fragments after reduction, it is better to replace the humeral head by a hemiprosthesis.

### REFERENCES

1. Bell H. Posterior fracture-dislocation of the shoulder, a method of closed reduction. *J. Bone Joint Surg.*, 1965, 47-A, 1521-1524.

2. Blasier R., Burkus I. Management of posterior fracture-dislocations of the shoulder. *Clin. Orthop.*, 1988, 232, 197-204.
3. Din K., Meggitt B. Bilateral four-part fractures with posterior dislocation of the shoulder. *J. Bone Joint Surg.*, 1983, 65-B, 176-178.
4. Neer C. II. Displaced proximal humeral fractures — Part I : classification and evaluation. *J. Bone Joint Surg.*, 1970, 52-A, 1077-1089.
5. Neer C. II. Displaced proximal humeral fractures — Part II : treatment. *J. Bone Joint Surg.*, 1970, 52-A, 1090-1103.
6. Nicola F., Ellman H., Eckhardt J., Finerman G. Bilateral posterior fracture-dislocation of the shoulder treated with a modification of the McLaughlin procedure. *J. Bone Joint Surg.*, 1981, 63-A, 1175-1177.
7. Mills K. Simultaneous bilateral posterior fracture-dislocation of the shoulder. *Injury*, 1974, 6, 39.
8. Ribbans W. Bilateral anterior dislocation of the shoulder following a grand-mal convulsion. *Br. J. Clin. Fract.*, 1989, 43, 181-182.
9. Shaw J. Bilateral posterior fracture-dislocation of the shoulder and other trauma caused by convulsive seizure. *J. Bone Joint Surg.*, 1971, 53-A, 1437-1440.
10. Stableforth M., Sarangi P. Posterior fracture-dislocation of the shoulder. *J. Bone Joint Surg.*, 1992, 74-B, 579-584.
11. Zissin R., Apter S., Morag B., Rubinstein Z. Bilateral posterior glenohumeral fracture-dislocation : CT appearance. *Isr. J. Med. Sci.*, 1990, 26, 55-57.

### RÉSUMÉ

*C. MARTENS, G. HESSELS. Fracture-luxation postérieure à quatre fragments de l'épaule, bilatérale.*

Les auteurs rapportent le cas d'une fracture bilatérale à quatre fragments de l'extrémité supérieure de l'humérus associée de chaque côté à une luxation postérieure de l'épaule, après une crise convulsive. Un côté a été traité de façon conservatrice, tandis qu'une hémiarthroplastie était réalisée de l'autre côté. Les auteurs présentent une revue de la littérature et un protocole pour le traitement de ces lésions. Dans les fractures à quatre fragments associées à une luxation postérieure, le traitement conservateur peut apporter de bons résultats mais s'il existe un risque excessif de nécrose avasculaire (retard diagnostique ou rapports anatomiques inacceptables après réduction), il est préférable de remplacer la tête humérale.

**SAMENVATTING**

*C. MARTENS, G. HESSELS. Bilaterale posterieure 4 delen fractuur-luxatie van de schouders.*

Een geval wordt beschreven van een patient met een bilaterale posterieure 4-delen fractuur-luxatie na een epileptische aanval. De ene zijde werd conservatief behandeld, de andere schouder werd vervangen door een hemiprothese.

Aan de hand van de literatuurstudie wordt een behandelingschema opgesteld voor dergelijke letsels. Bij 4-delen fractuur-luxaties worden goede resultaten bekomen na een conservatieve therapie, doch wanneer de kans groot is op avasculaire necrose (laattijdige diagnose of slechte anatomische reductie van de botfragmenten) is het beter om in één tijd de humeruskop te vervangen door een hemiprothese.