



Subtraction osteotomy of the humeral head in posterior shoulder dislocation: a case report

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Received: 3 December 2018 / Accepted: 17 January 2019 / Published online: 28 January 2019
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Abstract

Locked posterior dislocations of the shoulder with an impacted fracture of the humeral head and an articular surface defect greater than 35–40% are generally treated with a femoral head bone graft or prosthesis. We present a case in which a subtraction osteotomy with osteoclasia on the impacted zone was performed to try to make the articular surface of the humeral head congruent and continuous. With a 42-month follow-up, the clinical outcome, in terms of mobility and pain, was very good; X-rays show there was no avascular necrosis of the humeral head nor signs of articular arthrosis. The aim of this work is to present a detailed description of our procedure, which can be a therapeutic option for this type of pathology.

Keywords Posterior dislocation · Shoulder · Osteotomy

Introduction

The traumatic posterior dislocation of the shoulder is usually associated with an impaction fracture of the anterior part of the humeral head, called a reverse Hills-Sachs lesion. The dislocation can be diagnosed as an emergency making the closed reduction straightforward although it can be relocated quickly only if the impaction zone is relatively small. Often however, the posterior dislocation is unnoticed and the diagnosis is often delayed until the observation of a lack of lateral rotation; by this point, the lesion is already considered chronic. Anteroposterior and axial X-rays will give the diagnosis and more fundamentally CT and MRI scans.

The treatment is an open reduction, and taking into account the size of the initial impact damage and the patient's age, treatment of the associated lesions will take place. For humeral head bone defects covering less than 30–35% of the articular surface, transposing the subscapularis as described by McLaughlin [1], or transposing the greater tuberosity together with the subscapularis as published by Hawkins [2], would be indicated. For bone defects of the articular surface greater than 35–40%, we should consider a bone allograft of the humeral or femoral head in young people, as described by Debousset [3], whereas a partial or total prosthesis [4, 5] should be considered in older people, where graft integration might be difficult.

We present a case of chronic posterior shoulder dislocation in a 51-year-old male patient with 43% bone defect over the articular surface. We performed a subtraction osteotomy in the impaction fracture zone and closed posteriorly by osteoclasia. There was a follow-up period of 42 months.

Case report

A 51-year-old male patient, who related having suffered electrocution 5 weeks previously, was examined in a medical consultation. The examination determined that there was no external rotation in the right shoulder. Following X-rays and MRI, this was diagnosed as a chronic and

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locked posterior dislocation fracture with 43% damage of the articular surface (Fig. 1).

The intervention was carried out under general anaesthesia with antibiotic prophylaxis. A deltopectoral approach was used; the subscapularis muscle was detached carefully so as not to dissect or open the anteroinferior capsule, thus avoiding greater vascular damage, and with a mechanism of retropulsion, lateralisation and external rotation of the humeral head, the posteriorly dislocated humeral head was reduced. The impacted fracture zone on the anterior face of the humeral head was observed. With a fine chisel, a subtraction was carefully performed on the sunken area while taking the precaution of keeping part of the spongy bone in the posterior and inferior zone of the head. After this, an incomplete osteotomy was carried out on the remaining humeral head to close the bone with posterior and inferior osteoclasis using reduction clamps. In this way, the continued existence of bone was guaranteed behind and below, avoiding and minimising possible necrosis of the remaining humeral head (Fig. 2). After closing the bone, the reduction was held in place with 3 cannulated screws (4 mm) located from the anterolateral to the posteromedial and from the tuberosity zone to the large medial fragment of the humeral head. The glenohumeral joint was mobilised to check its stability, and that there was no posterior dislocation. Then, the subscapularis muscle was reattached with two metal anchors.

The shoulder was immobilised in a sling for 4 weeks. Subsequently, rehabilitation was started with passive movements for 3 weeks and active movement for 5 weeks.

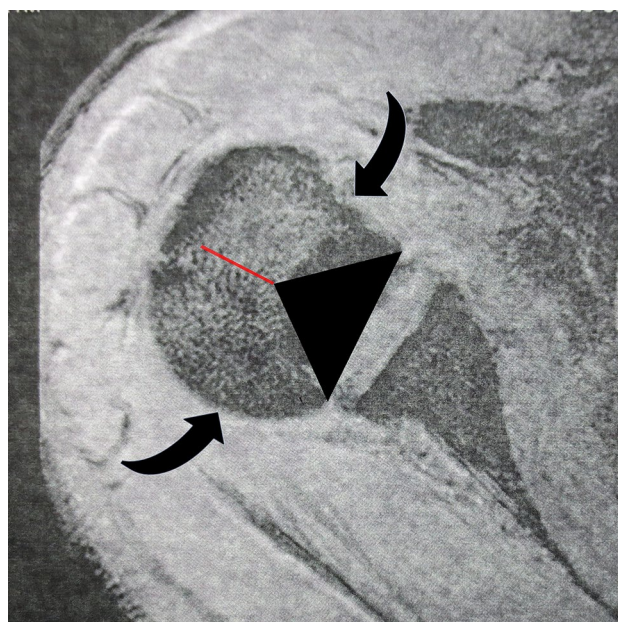


Fig. 2 In the transversal view of the magnetic resonance image, the area of subtracted bone is represented in black, whereas the direction and depth of the osteotomy performed are in red. The arrows indicate the direction of the posterior and inferior osteoclasis closure (colour figure online)

After 12 months had passed since surgery, the patient had no clinical pain and flexion mobility was 150°, abduction was 140°, external rotation was 40°, and internal rotation reached L3 (Fig. 3). The Constant [6] test score was 94.

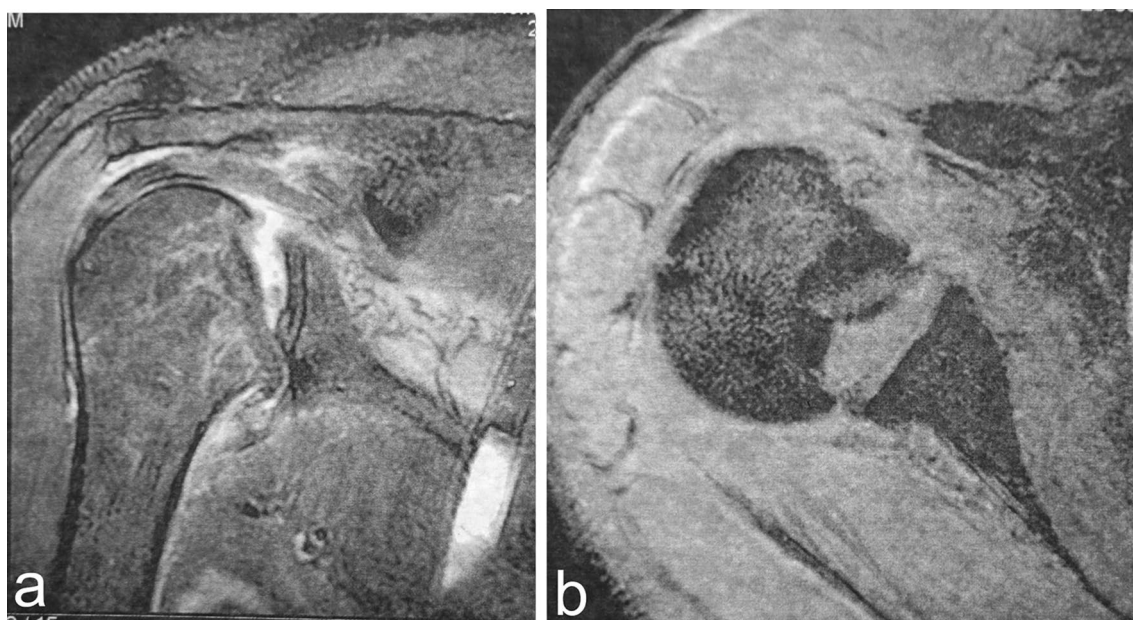


Fig. 1 **a** Magnetic resonance image (MRI), frontal view of locked posterior dislocation fracture. **b** Magnetic resonance image: transversal view locked posterior dislocation fracture with an affectionation on the articular surface of 43%



Fig. 3 a Patient mobility 12 months after surgery: 150° shoulder flexion. b 140° shoulder abduction. c 40° external shoulder rotation. d Internal rotation reached L3

Periodic X-rays were performed to evaluate the evolution of the humeral head. In the last X-ray taken 42 months after surgery, there were no signs of necrosis or glenohumeral osteoarthritis (Fig. 4).

Discussion

A humeral head impact fracture resulting from a traumatic posterior dislocation of the humeral head ought to be treated surgically if the size of the affected articular surface is significant or is locked with movement limitations, articular incongruence or shoulder instability.

If the fractured and impacted area is less than 30–35% of the articular surface, the McLaughlin [1] technique might be a solution [7], or the Hawkins [2] modification, with the transposition of the subscapularis or greater tuberosity to the depressed articular zone.

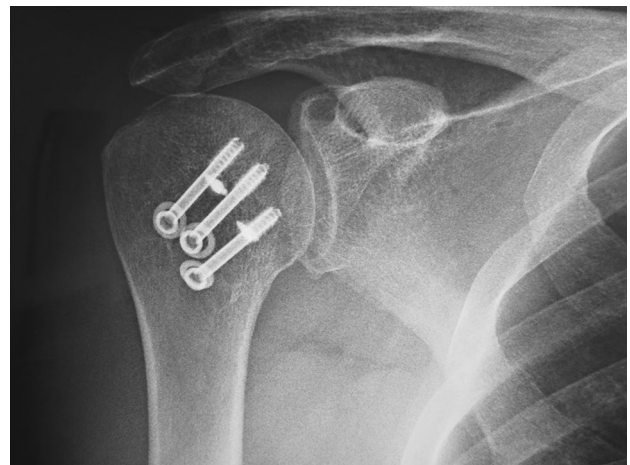


Fig. 4 X-ray result 42 months after surgery. There is no necrosis of the humeral head and good articular congruency

If the affected area exceeds 35–40% of the articular surface and if the bone is osteoporotic in an older person, a partial or total prosthesis is indicated [4, 5]. However, for some authors [8], anatomical prosthetic results are poor and it seems that this therapeutic procedure should be reserved for significant bone defects—situations where the remaining head is already damaged and severely osteoporotic. Results have still not been compiled or referenced in the literature following these types of lesions with inverted prostheses.

Another option in cases of significant defects is the use of humeral head or femoral allografts; these should be successfully incorporated by the humeral head. This procedure was published by Debousset in 1967 [3]. Subsequent publications by Diklic [9] and by Gerber [10] had long follow-ups that confirmed good results using the procedure. Gerber published 19 cases with an average follow-up of 128 months, of which two patients needed prostheses, 4 suffered from advanced arthrosis, 4 from moderate arthrosis, while only 9 patients (47%) had minimal signs or no arthrosis.

The osteotomy performed in this work is closed by osteoclasia which does not break the posterior or inferior of the humeral head, after having dried out the impacted zone and resected as necessary, so one can approximate the edges of the bone defect.

In our patient, the bone was bleeding, the two edges of the osteotomy were well approximate, and the osteosynthesis was stable, so the possible consolidation appeared favourable. However, when carrying out this procedure, there is an increased risk of necrosis of the cephalic fragment. We therefore avoid dissecting the anteroinferior capsule so as not to lesion the arterial vessels of the terminal branch of the ascending anterolateral artery, a branch of the anterior humeral circumflex artery, which is the most important in the humeral head vascularisation [11].

We therefore believe that when faced with significant bone impaction defects of more than 35–40% of the articular surface in traumatic posterior dislocations, and above all in active people, this type of osteotomy could be a therapeutic option to consider.

The limitations of this work are that a large number of patients and a much longer follow-up are required to fully evaluate this procedure's efficacy with these types of lesions.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Safeguarding of people and animals The authors declare that for this research no experiments were carried out on human beings or on animals.

Confidentiality and data protection The authors declare that they have followed their work centre's protocols regarding the publication of patients' data.

Right to privacy and informed consent The authors declare that no patient data appear in this article.

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