CHRONIC NON-TREATED POSTERIOR FRACTURE-DISLOCATION OF THE SHOULDER

Egiazaryan KA, Ershov DS, Badriev DA ✉, Soshnikov DY

Pirogov Russian National Research Medical University, Moscow, Russia

Posterior fracture-dislocations often remain undiagnosed at initial medical attendance. In dislocation, the head of the humerus extends beyond the glenoid to form a zone of impaction, which “fixes” it. The injury is almost unidentifiable in standard frontal X-ray images. Meanwhile, continued fixation of the humerus in the state of posterior dislocation leads to a rapid progression of the traumatic impaction over up to 50% of the articular surface area. The associated damage to the articular lip of the scapula, rupture of the rotator cuff muscles, symptoms of shoulder instability after relocation, and severe pain syndrome require advanced treatments for this type of injury. Here we report a clinical case of anatomical neck fracture of the humerus with displaced consolidation, combined to posterior dislocation. To avoid subacromial impingement, instead of correcting the position of the head, we abandoned the reposition and performed an osteotomy with distal displacement of the greater tubercle of the humerus.

Keywords: posterior dislocation of the shoulder, fracture-dislocation of the shoulder, shoulder joint surgery

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Compliance with ethical standards: the study was approved by Ethical Review Board at the Pirogov Russian National Research Medical University (Protocol No. 202 of November 23, 2020) and carried out in compliance with ethical standards established by the Declaration of Helsinki; the patient provided written informed consent for data processing and publication.

✉ **Correspondence should be addressed:** Denis A. Badriev
Ostrovityanova, 1, Moscow, 117997, Russia; ill1dan@mail.ru

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ЗАСТАРЕЛЫЙ ЗАДНИЙ ПЕРЕЛОМОВЫВИХ ПЛЕЧА

К. А. Егиазарян, Д. С. Ершов, Д. А. Бадриев ✉, Д. Ю. Сошников

Российский национальный исследовательский медицинский университет имени Н. И. Пирогова, Москва, Россия

Задние переломовывихи нередко являются недиагностированным повреждением при первичном обращении за медицинской помощью. Головка плечевой кости во время вывиха заходит за гленоид, на ней образуется зона импрессии, за счет которой она и «фиксируется». На рентгенограммах в стандартной прямой проекции практически невозможно заподозрить данное повреждение. В случае длительного нахождения плечевой кости в фиксированном заднем вывихе, импрессионное повреждение головки плечевой кости быстро прогрессирует, и может достигать 50% площади суставной поверхности. Ассоциированные с данной травмой повреждение суставной губы лопатки, разрыв мышц ротаторной манжеты, появление нестабильности плечевого сустава после устранения вывиха, выраженный болевой синдром требуют серьезного подхода к лечению данной патологии. В представленном клиническом случае у пациента кроме заднего вывиха был срастающийся со смещением перелом анатомической шейки плечевой кости. Чтобы избежать субакромиального импинджмента вместо исправления положения головки мы отказались от репозиции и произвели остеотомию с перемещением большого бугорка плечевой кости дистально.

Ключевые слова: задний вывих плеча, переломовывих плеча, хирургия плечевого сустава

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✉ **Для корреспонденции:** Денис Айдарович Бадриев
ул. Островитянова, д. 1, г. Москва, 117997, Россия; ill1dan@mail.ru

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Posterior dislocations of the shoulder are rare and account for 2–5% of all cases of shoulder dislocation. Posterior dislocations complicated by a fracture of the proximal metaepiphysis of the humerus are exceptionally rare and constitute about 0.9% of fracture-dislocations of the shoulder, corresponding to 0.6 cases per 100,000 people [1, 2].

At initial medical attendance, posterior dislocations of the shoulder escape correct diagnosis in 60% of the cases. Meanwhile, after 6 weeks of the humeral head dislocation the injury becomes chronic [3]. The median interval between the injury and final diagnosis constitutes 8 months [4].

Here we report a clinical case of chronic non-treated posterior dislocation of the shoulder with a reverse Hill-Sachs lesion involving about 25% of the articular surface, accompanied by a fracture of the anatomical neck of the humerus with varus displacement, in order to illustrate the complexity of diagnostics and treatment for such conditions.

Clinical case

Patient S., 37 years old, was admitted to our clinic. Two months before, he was injured by falling off a scooter. Immediately after the accident, the patient consulted an emergency room, where they performed clinical examination and a routine X-ray of the right shoulder joint in frontal projection (Fig. 1). The X-ray image revealed a fracture of the proximal humerus with minimal displacement of the fragments. The right upper limb was immobilized in a cast; the patient was advised to continue limb immobilization for 3 weeks and released with a recommendation to consult a local traumatologist at his place of residence. Next day, the patient attempted to visit the local trauma center, but there was no reception that day. The patient called an ambulance, which took him to one of the city hospitals, where they re-performed clinical examination and X-ray of the right shoulder joint in the same one frontal projection. Other

projections (lateral, etc.) were ignored, multispiral computed tomography (MSCT) was not performed either, so the correct diagnosis was missed again. Finally, as late as 3 weeks after the accident, another traumatologist recommended computed tomography (Fig. 2).

After receiving the results of instrumental examination, the patient re-applied to the doctor who recommended MSCT of the shoulder joint. However, the trauma center was not equipped with a computer, and the patient was re-addressed for a consultation in a hospital. Few days later, the patient was able to get to the hospital, where, on the MSCT basis, the posterior fracture-dislocation of the shoulder was finally identified; however, they recommended him to wait another few days until a specialist from another institution with appropriate experience would pay a visit. Under these unsatisfactory circumstances, the patient decided to independently consult at the Pirogov City Clinical Hospital No. 1, where, after clinical re-examination and study of the X-ray data, he was offered emergency hospitalization to prepare for surgical treatment.

At the time of admission to our clinic, the patient experienced significant limitations in the range of motion of the right shoulder joint: abduction — 25°, external rotation — 10°, internal rotation — 70°, and flexion — 65° (Fig. 3). No acute neurocirculatory reactions in the right upper limb were encountered.

The analysis of X-ray and MSCT data revealed the following features: a reverse Hill-Sachs lesion involving 25% of the total articular surface area of the humeral head; a fracture of the anatomical neck of the humerus with varus displacement; a fracture of the greater tubercle with proximal displacement (the tubercle protruded significantly above the articular surface). On top of that, all fractured areas showed distinct osseous consolidation, whereas the humerus had long remained in a position of fixed posterior dislocation.

In such injuries, the area of impacted fracture is one of the main factors predisposing to subsequent recurrence of shoulder dislocation [5]. Cases with > 25% of the articular surface affected usually require surgical treatment to restore the shoulder joint “stability” [2, 6].

Known surgical options for this pathology include transfer of the lesser tubercle (McLaughlin procedure); filling the defect in articular surface of the head with the subscapularis muscle tendon (Neer’s modified method); subcapital rotational osteotomy (Weber’s procedure); and shoulder arthroplasty (implants) [3]. Our selection of surgical tactics involved an algorithm proposed by Paparoidamis et al. on the basis of systematic literature review [7].

In accordance with the algorithm, given that in our patient the impaction area reached 25% of the humeral articular surface, a decision was made to eliminate the dislocation and reconstruct the proximal humerus. After preoperative preparation, a standard deltopectoral approach to the shoulder joint was performed under general anesthesia in the beach chair position. At the first stage, an osteotomy of the lesser tubercle was performed with an oscillating saw. At the second stage, the long head tendon of the biceps was dissected from the scapula and sutured to the pectoralis major muscle, and the shoulder joint scars were removed; we further performed a soft tissue release for the rotator cuff muscles and an open reduction of the dislocation. At the third stage, in order to prevent subacromial impingement, we performed an oblique slide osteotomy of the greater tubercle and brought it down 10 mm distally. The decision to relocate the tubercle was made in connection with the increased risk of aseptic necrosis of the humeral head due to possible damage to the posterior circumflex humeral artery

Fig. 1. X-ray of the right shoulder joint on the day of injury

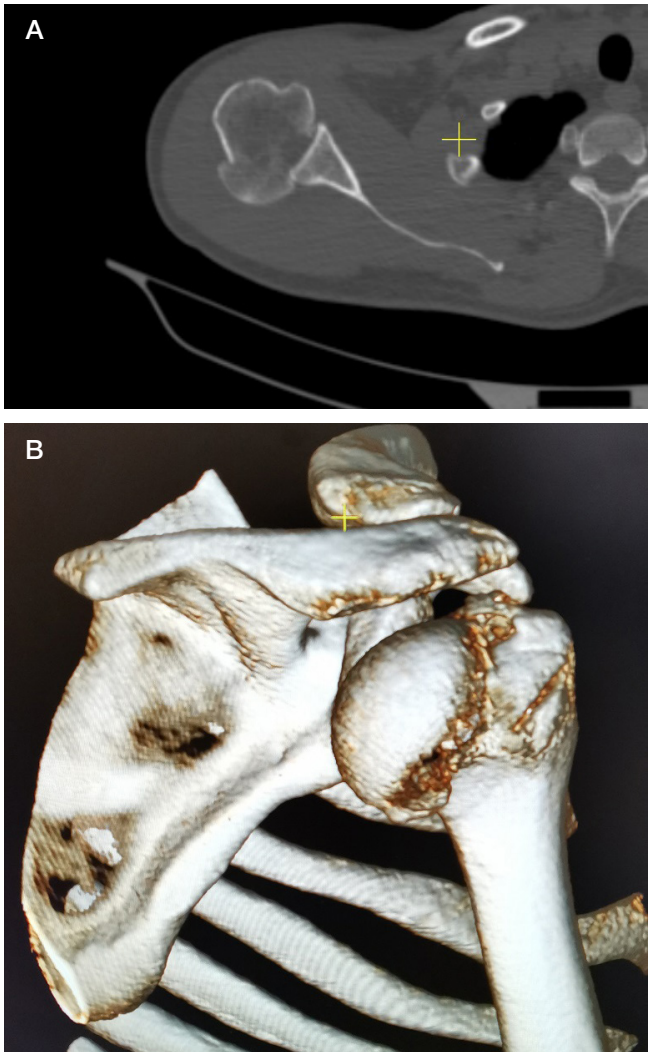

Fig. 2. Axial computed tomography scan of the right shoulder joint 3 weeks after injury (**A**). Volumetric reconstruction of the proximal part of the right humerus 3 weeks after injury (**B**)

upon the attempt to eliminate the varus displacement of the head [8]. At the fourth stage, the fragments of the humeral head and the reduced greater tubercle were fixed with a premodeled plate for osteosynthesis of the proximal humerus. The fifth stage consisted of a modified McLaughlin procedure: the lesser tubercle was relocated and fixed with a screw in place of the impaction defect in the articular surface of the humeral head. The wounds were sutured in layers. Aseptic dressings were applied. The right upper limb was immobilized with an abductor splint in the external rotation position.

The postoperative period proceeded smoothly. The sutures were removed on day 14. The immobilization of the upper limb in the abduction splint lasted 4 weeks, and the patient wore a standard arm sling for another 2 weeks. The patient received physiotherapy and physical rehabilitation with a coach starting from day 1 after surgery. The rehabilitation protocol emphasized strict immobilization of the right upper limb in the position of abduction to 60° in neutral rotation during the first 4 weeks after surgery. After that, passive recovery of the right shoulder joint mobility was carried out for 2 weeks, accompanied by immobilization of the right arm in a standard sling. The active locomotor rehabilitation of the operated limb was commenced 6 weeks after surgery.

Control X-rays performed 12 weeks, 6 months, and 1 year after surgery revealed progressive consolidation of the humeral neck fracture, preserved congruence of the articular surfaces in the shoulder joint, and no signs of aseptic necrosis in the humeral head (Fig. 4).

The function of the shoulder joint was assessed using the Constant Shoulder Score: the indicators increased from 24/100 at the time of admission to 88/100 at 12 months of observation, which corresponds to an excellent treatment outcome. The DASH and ASES scores at 12 months of observation were also interpreted as excellent [9] (Fig. 5).

Discussion

Fracture-dislocation of the shoulder occurs rarely and tends to escape correct primary diagnosis both clinically and radiographically, even in patients who seek medical help in a timely manner and follow all recommendations. A failure of timely diagnosis entails adverse functional sequelae. Prolonged fixation of the humerus in the state of posterior dislocation facilitates a rapid spread of the impaction injury, affecting up to 50% of the articular surface area. The management of such cases must include advanced examination and careful preoperative planning with mandatory MSCT of the shoulder

Fig. 3. The patient before surgery

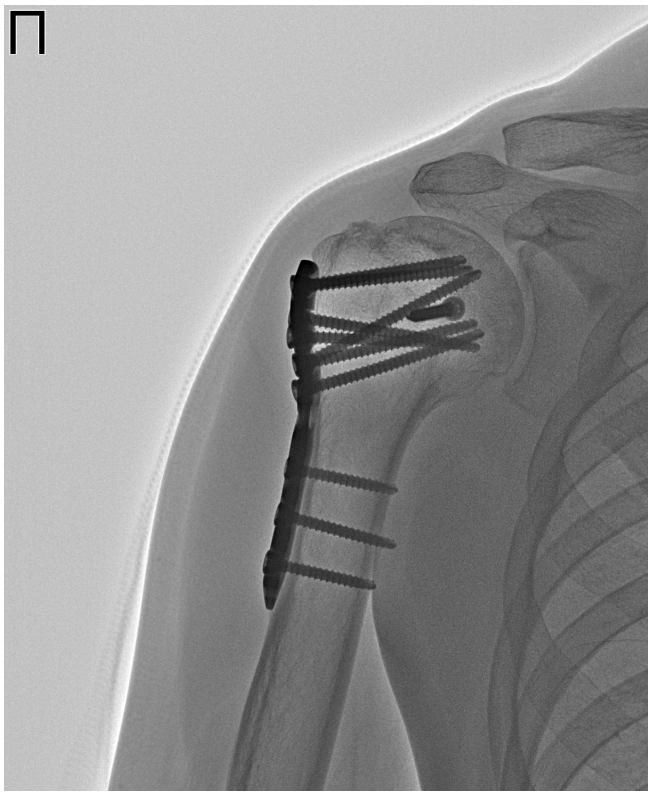

Fig. 4. X-ray of the right shoulder joint 12 months after surgery

Fig. 5. The patient 12 months after surgery

joint. The quality of long-term functional results crucially depends on the earliest possible diagnosis of fracture-dislocation and its urgent surgical treatment. [10, 11].

The most common types of fracture encountered in fracture-dislocations of the shoulder are impression injury to the articular surface of the head (the so-called reverse Hill-Sachs fracture; 29%) and fractures of the surgical neck (18.5%), the lesser tubercle (14.3%), and the greater tubercle (7.8%) of the humerus [12]. Fractures of the humeral diaphysis, scapula, or clavicle are encountered in 6% of the patients.

CONCLUSION

Routine X-ray radiography of the shoulder joint in frontal projection does not afford reliable determination of the humeral head dislocation. The lack of complementary projections poses a threat of misdiagnosis. Delayed application for medical help, as well as conservative treatment because of incorrect diagnosis, significantly impairs the long-term functional outcome. Our report demonstrates the need for mandatory X-ray radiography of the shoulder joint in at least two projections.

The choice of surgical tactics for such cases requires careful planning, accounting for the time elapsed since the dislocation, the volume of defect in the articular surface of the humerus, the presence of concomitant injuries in the glenoid and the ligamentous-tendon complex, as well as the patient's age and functional requirements for the shoulder joint. Our clinical example illustrates options for the treatment of posterior fracture-dislocation, including preservation of the varus displacement of the humeral articular surface and distalization of the greater tubercle. Our choice of treatment tactics led to an excellent functional outcome in the patient.

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