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## Case Report

## Humeral Head Fracture with Intrathoracic Migration 向胸腔內移位的肱骨頭骨折：病例報告和文學回顧



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## ABSTRACT

Fracture-dislocation of the humeral head with intrathoracic migration is extremely rare. In our study we describe the case of a 23-year-old man who was admitted to the emergency clinic of our hospital, after being injured in a high-speed motor vehicle accident. The patient presented in a state of hemorrhagic shock and severe respiratory disease. Chest radiography showed fracture of the right humeral head and the presence of a round radio-density area resting on the diaphragm right hemithorax. The total body computed tomography scan revealed a right pneumothorax related to the presence in the chest cavity of the fractured humeral head, longitudinal fracture of the sacrum, and diastasis of the symphysis pubis. After an initial hemodynamic stabilization the patient underwent surgical excision of the humeral head and its replanting. It is important after airway management and the use of diagnostic imaging, the treatment of any injuries associated with the trauma.

## 摘要

向胸腔內移位的肱骨頭骨折脫臼是極為罕見的。我們報告了一名23歲男子，因高速交通意外被送往我們醫院的急診室。病人呈現出血性休克和嚴重的呼吸道疾病的狀態。胸部X光檢查顯示右側肱骨頭骨折，以及在右邊半胸橫隔膜上有一個圓形不透X光的影像。全身電腦掃描顯示病人因肱骨頭移到胸腔，引致右氣胸；有骶骨的縱向骨折；以及恥骨結合位擴張。在病人初步穩定後，我們為他進行手術取回移位的肱骨頭，用螺釘內固定。我們討論了當中的治療，前景，和文獻綜述。

## Introduction

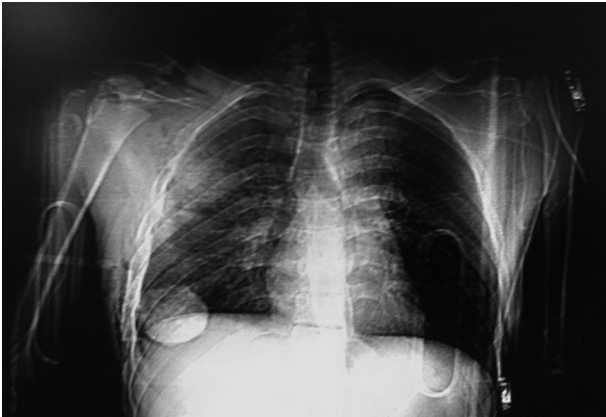
Among the gleno-humeral fracture-dislocations which have been reported in literature, those which concern an intrathoracic displacement of the humeral head, are by far the least common.<sup>1–4</sup> Intrathoracic fracture-migration of the humeral head is an uncommon injury, usually related to high-energy impact trauma associated with abduction and external rotation; this mechanism leads to humeral head fracture and its confinement in the thorax. Another possible mechanism is the posttraumatic transmission of the force along the humeral shaft, causing the dislocation of the humerus within the thorax.<sup>5</sup> Diagnosis of this injury is frequently missed on initial examination. Based on this case and a review of previous reports, we summarize the presenting signs that should make one suspect the presence of such

an injury and make recommendations for initial diagnostic imaging and management.

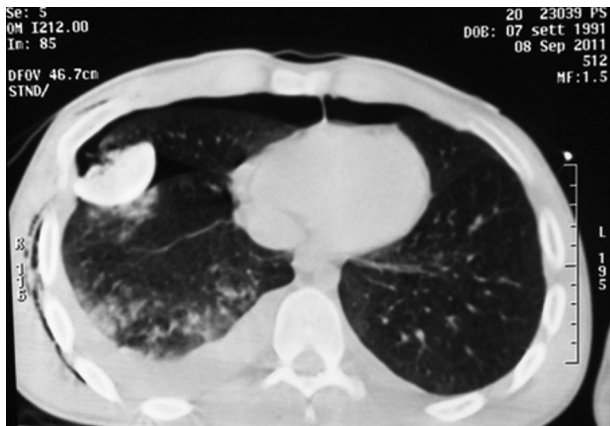
## Case report

A 23-year-old man was admitted to our emergency department with severe multiple injuries due to a high-speed motor vehicle accident. According to the Advanced Trauma Life Support guidelines, we sequentially assessed the function and condition of airway breathing, circulation, etc., and the results of a fast physical examination and routine analysis of blood revealed hemorrhagic shock with a blood pressure of 70/40 mmHg and hemoglobin of 5.9 g/L. A chest roentgenogram revealed a right hemopneumothorax, fractures of the third and fourth right ribs, and a complex fracture of the proximal right humerus with head migration into the thoracic cavity (Figure 1). The total body computed tomography scan revealed a right pneumothorax, related to the presence in the chest cavity of the fractured humeral head, and longitudinal fracture of the right sacral wing (Figure 2). The surgical session

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**Figure 1.** Chest roentgenogram showing humeral head fracture with intrathoracic migration.



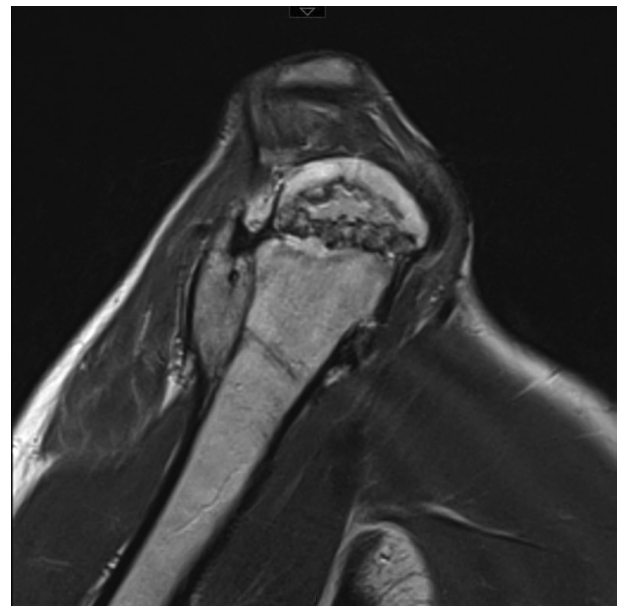
**Figure 2.** Computed tomography scan confirms right pneumothorax with intrathoracic humeral head migration.

began about 6–8 hours after the traumatic event. The patient underwent a right thorascopy and the removal of the migrated humeral head. A right-sided chest tube was placed. The access used was the anterior deltoid pectoralis. The humeral head was repositioned in the glenoid cavity empty and secured by three screws; the fragment at the lower glenoid area it is the greater tuberosity (Figure 3). The subsequent surgical time provided for the reduction of the dislocation of the humerus and because the rotator cuff presented avulsion of the supraspinatus tendon was necessary the suture of the supraspinatus and reinforced capsuloplasty. The stability of the synthesis has been documented by the dynamic tests carried out under the control of the image intensifier. The patient's air leak was resolved, his chest tube was removed, and he was discharged 8 days after injury. In the immediate postoperative period we observed axillary nerve palsy related to injury of the brachial plexus resolved after 6 months of the neuro-rehabilitation program. The patient did not show other nerve damage and there was no special damage of the axillary vessels. In order to reduce the risk of avascular necrosis of the humeral head, the patient underwent hyperbaric oxygen therapy for 2 months. In Magnetic Resonance Imaging (MRI) and X-ray study, the head did not show signs of necrosis. Clinical and radiological follow-up visits after 1 year showed a good restoration of function of the right shoulder with a small radio-lucency area around screws, that was probably a



**Figure 3.** Intraoperative X-ray view showing glenoid cavity empty.

calcification or an intraarticular fragment. There was a limitation of the range of motion in elevation movements of the shoulder of about 1/3. The humeral head into the postoperative time did not go in avascular necrosis. Follow-up was performed with a magnetic resonance check. Magnetic resonance imaging was performed for the 1 year follow up which showed the surgical outcomes of osteosynthesis of the humeral head, which appears deformed in connection with coarse bone remodeling. In the joint space we



**Figure 4.** Magnetic resonance imaging scan with sequence turbo-spin echo–proton density, exostosis in proximity of medial profile of the third proximal diaphyseal humeral, and other bone fragments scattered in the periarticular soft tissues.

recognize some bone fragments. In proximity of medial profile of the third proximal diaphyseal humeral other bone fragments in the periarticular soft tissues (Figure 4).

## Discussion

Remote displacement of a humeral head following fracture or dislocation has been reported infrequently. Few cases have been reported. In literature only 13 cases appear in total. Of these patients, five were older than 60 (mean, 72; range, 64–80) years of age, and the injury mechanism was falling down stairs; another eight were younger than 60 (mean, 31.5; range, 14–49) years of age, and the injury mechanism was high-energy trauma (motor vehicle accidents) and a fall from a horse.<sup>6</sup> The few reported cases in the literature do not describe a clear-cut plan of surgical treatment.<sup>2</sup> Glessner<sup>1</sup> described the case of a 75-year-old woman who sustained a fracture-dislocation into the ipsilateral pleural space which was managed with drainage with a chest tube and reattachment of the rotator cuff to the humeral shaft. Wirth et al<sup>7</sup> described a case in which the humeral head was displaced into the ipsilateral retroperitoneal space. The humeral head was retrieved and replaced during open reduction, and it was then internally fixed. These patients have been managed in a variety of ways, ranging from excision of the humeral head and immediate fixation of the excised fragment, to simple supportive care and nonsurgical treatment. Despite the varied orthopedic treatments, functional outcomes were generally good.<sup>7–10</sup>

Many of the presenting signs and symptoms of intrathoracic fracture-dislocation of the humeral head are more commonly associated with other injuries. However, a patient who presents with a history of high-speed motor vehicle accident with shoulder pain, respiratory distress, and palpable crepitus over the shoulder and chest wall should be evaluated for this injury. Close attention

must be paid to the initial studies, as the injury is usually detectable on chest radiographs. Adjunctive imaging with computed tomography scan may aid in the diagnosis. Initial management focuses on airway management. Once recognized, we recommend immediate excision of the bony fragment from the chest, followed its replanting when possible, especially if the patient is young.

## Conflicts of interest

The authors have no conflicts of interest to declare.

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