Intrathoracic displacement of fractured right humeral head

A Case Report

Abstract:

Introduction: Intrathoracic displacement of head of humerus is very uncommon condition that can be life threatening by lung or heart injuries. There is a report of this condition that intrathoracic bone fragment was missed. Because of rare incidence there is no guideline for approach and treatment of this condition.

Presentation of case: We here present a man with car roll over that fractured head of humerus displaced to thorax.

Discussion: This condition requires team workup of trauma surgeon, orthopedic surgeon and physical therapist that any of them must made a good decision according to the patient's condition.

Conclusion: Displaced fractured head of humerus into thorax is rare condition that needs more punctuality for on time diagnosis and team approach.

Keywords: Intrathoracic Displacement; Fracture; Head of Humerus

Level of evidences: this is a level V case report study
Introduction:

Intrathoracic displacement of head of humerus is very uncommon condition that can be life threatening. Because of rare incidence there is no guideline for approach and treatment of this condition [1]. We here present a man with car roll over that fractured head of humerus displaced to thorax and discuss about how we can don’t miss these patients? How we approach to them?

Management ways that reported until now are: non-operative, fragment removing from thorax with thoracoscopy or thoracotomy and open reduction with internal fixation or hemiarthroplasty or total arthroplasty or arthrodesis [2, 3]. In one study rib fixation also recommended [2]. This case report has been reported in line with the SCARE criteria [4].

Case Presentation:

A 47 years old right-handed male, presented to Meshkin Shahr hospital as a motor vehicle accident multi-trauma victim in a rollover type car accident. Patient was the driver and airbags were deployed at the time of accident and the car speed was unknown. Initial encounter was done by EMS team and patient was transfer to the hospital with cervical collar while was immobilized in supine position on the backboard. His GCS (Glasgow Coma Scale) was 15 but He tachypneic, tachycardic Dyspneic with diminished respiratory sounds on the right side. Right-side Chest-tube was inserted and 250cc bloody secretion was drained. Patient stabilized, and vitals significantly improved. He didn’t have any disease or drug until until now. In physical examination the right shoulder was deformed, swelled and ecchymotic, without any open fracture or wound [figure 1]. Brachial, radial and ulnar pulses were 2+ and symmetric bilaterally. Due to severe pain neurological examination of right upper limb was not reliable. Chest radiography showed right forearm dislocation and fracture of head of humerus, glenoid, acromion and posterior arch of 3rd, 4th and 5th ribs and right chest-tube and head of humerus were seen in right hemi-thorax [figure 2]. FAST was negative and radiologic evaluation for head and neurologic trauma was not significant. Examinations of other extremities were normal. The spiral computed tomography of chest and 3-Dimentional reconstruction corroborated the finding of radiography [figure 3].

Figure 1. Right shoulder with deformity, swelling and ecchymosis without any open fracture or wound.
Figure 2. Chest radiography shows forearm dislocation and fracture of Humeral head, glenoid, acromion and posterior arch of 3rd, 4t and 5th ribs. Right chest-tube and head of humerus are seen in right hemi-thorax.

Figure 3. The spiral computed tomography of chest with 3-Dimentional reconstruction. Head of humerus in right hemithorax.

Patient was transferred to operating room and antero-lateral thoracotomy from 5th intercostal space was done by trauma surgeon. Blood and Hematoma evacuated from thoracic cavity. In exploration, 3rd, 4th and 5th ribs fractures visualized with minimal displacement and did not need surgical fixation. For decreasing the pain of patient bupivacaine 0.5% was injected to periosteum of ribs around the site of fracture. Lung was intact and there was no active bleeding. One piece of bone that was head of humerus removed from the thoracic cavity [figure 4]. After insertion of two chest-tubes, the thorax was closed.

Figure 4. The Head of humerus

After thoracic surgery, orthopedic operation was done on the same day and with deltopectoral incision approached the right shoulder. In exploration of the shoulder, rotator cuff muscles with tuberosities entirely were torn. Due to pattern of fracture and strong probability of axillary nerve damage, orthopedic surgeons decided to open reduction internal fixation (ORIF) of head of humerus. The head of humerus fixed with PHILOS plate to shaft of humerus. Also glenoid reducted and fixed with two bolts. Then tuberosities fixed on plate with fiber wires and controlled with C-Arm X-Rays [figure 5].

Figure 5. Humerus after open reduction an internal fixation of head of humerus to shaft of humerus.

Vessels of bone fragment were damaged, so we expected the necessity for hemiarthroplasty in the future because of probability of Avascular Necrosis (AVN). Also we expected that axillary nerve (a part of brachial plexus) would be damaged. His arm positioned with arm sling and pain controlled with continuous intravenous narcotic analgesis. After 4 days his pain decreased and his passive range of motion exercises started by physical therapy team. His chest-tubes removed and after ten days the patient discharged home with outpatient physical therapy. Follow-up appointments were scheduled at the time of discharge.

Discussion:

24 cases have been reported about intrathoracic displacement of fractured head of humerus until now in English and non-English articles [5]. This condition requires high-energy trauma [1]. About mechanism of this condition there are two hypotheses: Severe and sudden trauma to shoulder in position of abduction and external rotation or post-traumatic migration of humerus head to thorax because of force along the humeral shaft [2,3,5]. Fragility between the upper ribs facilitates this migration [6].

In evaluation with radiography only, fragments of bone in thorax because of hematoma or lung contusion may not be seen. Absence of wound may worsen this misdiagnosis. So in patients that proximal part of humerus can't be seen we must use the computed tomography.
Some cases like this treated non-surgically with traction and close reduction and bone fragments were left in the lung because of no complication. But they can migrate and cause to dangerous injury to vessels and organs as well as they can act as a nidus for infection although they are sterile [2,5].

In another reports VATS (Video-Assisted Thoracic Surgery) was used with minithoracotomy [1,3]. Hawkes et al recommended the posterolateral thoracotomy that provide good exposure for removing of bone fragments and also fixing fractured ribs at the same time [2] but it may be complicated surgery with higher morbidity and lethality [1].

The recommended surgery for shoulder is ORIF and the most significant complication of this approach can be AVN [5]. The most common surgery for shoulder in these cases reported as hemi-arthroplasty [6].

team-work is the key in managing this patient and providing the best care. Traumatologist, orthopaedic surgeon, physical therapist and well-trained nurses and techs were all part of great medical and surgical team.

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Patient consent:

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

References:

Figure Legends:

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