Case Report

Ipsilateral Humeral Shaft Fracture Combined With Distal Clavicle Fracture and Acromioclavicular Joint Injury: Case Report

Morteza Nakahei Amroodi[1], Pouria Tabrizian[1*], Mohammadreza Bahaeddini[1], Mojtaba Khajeh Alizadeh Attar[1], Babak Hashemipour[1], Mohammadmehdi Mahdavifar[1], Yousef Barati[2]

1. Department of Orthopedics, Bone and Joint Reconstruction Research Center, School of Medicine, Iran University of Medical Sciences, Tehran, Iran.
2. School of Medicine, Iran University of Medical Sciences, Tehran, Iran.

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A B S T R A C T

Background: Simultaneous ipsilateral humeral shaft fracture, distal clavicle fracture, and acromioclavicular (AC) joint injury are extremely uncommon injury patterns. The coexistence of these lesions may indicate high-energy trauma and requires careful evaluation to avoid missed diagnoses and to determine an optimal surgical strategy.

Case Presentation: We presented the case of a 23-year-old right-hand dominant male patient who sustained injuries in a high-energy motor vehicle accident and presented to the emergency department with left shoulder pain and deformity. Radiographic evaluation revealed an ipsilateral humeral shaft fracture associated with a distal clavicle fracture and AC joint disruption. The patient underwent surgical management for all injuries. At 4-month follow-up, clinical examination demonstrated a satisfactory range of motion and acceptable functional recovery.

Conclusion: This rare combination of injuries emphasizes the importance of thorough clinical and radiographic assessment in cases of high-energy shoulder girdle trauma. Early surgical intervention can result in favorable short-term functional outcomes.

*** Corresponding Author:**
Pouria Tabrizian, MD.
Address: *Department of Orthopedics, Bone and Joint Reconstruction Research Center, School of Medicine, Iran University of Medical Sciences, Tehran, Iran.*
Phone: *+98 (915) 5216214*
E-mail: *tabrizian.pouria@gmail.com*

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Introduction

Humeral shaft fractures account for approximately 1–3% of all fractures and commonly result from high-energy trauma in young adults or low-energy falls in the elderly population [1]. Distal clavicle fractures represent nearly 15–25% of all clavicular fractures and are frequently associated with ligamentous instability. Acromioclavicular (AC) joint injuries are also common shoulder girdle lesions, particularly in young active individuals following high-energy mechanisms [2].

The integrity of the superior shoulder suspensory complex (SSSC), as described by Goss, is crucial for maintaining the stability of the shoulder girdle. Disruption of two or more components of this ring structure may result in significant instability, similar to the "floating shoulder" phenomenon. Although combinations of clavicle and scapular neck fractures have been well described, the simultaneous occurrence of ipsilateral humeral shaft fracture, distal clavicle fracture, and AC joint disruption is exceedingly rare and scarcely reported in the literature [3].

Given the complexity of this injury pattern and the absence of standardized treatment guidelines, optimal management remains controversial. We report a rare case of an ipsilateral humeral shaft fracture combined with a distal clavicle fracture and AC joint injury, treated surgically, resulting in a favorable functional outcome [4].

Case Presentation

A 23-year-old right-handed male presented to the emergency department following a motor vehicle accident, complaining of severe pain and inability to move his left shoulder. On physical examination, swelling, deformity, and marked tenderness were observed over the left arm and shoulder, with normal neurovascular assessment. Plain radiographs demonstrated a humeral shaft fracture associated with a distal clavicle fracture and AC joint disruption (Figure 1). Considering the instability and the combined nature of these injuries, surgical management was planned. The postoperative course was uneventful. At the 4-month follow-up, radiographic evaluation showed acceptable fracture union, and clinical examination revealed satisfactory shoulder range of motion without any neurovascular deficit, indicating good functional recovery.

Discussion

The present case describes a rare combination of ipsilateral humeral shaft fracture, distal clavicle fracture, and AC joint disruption following high-energy trauma [5]. While each of these injuries may occur independently, their simultaneous presence in the same extremity is exceedingly uncommon [6]. To the best of our knowledge, only a few reports have described this exact triad, underscoring the uniqueness and clinical relevance of this injury pattern [7].

Humeral shaft fractures typically result from high-energy mechanisms in young adults, most commonly motor vehicle accidents. They may be managed conservatively or surgically depending on fracture characteristics and associated injuries [8]. Distal clavicle fractures, particularly unstable patterns, are frequently associated with coracoclavicular ligament disruption and carry a higher risk of nonunion if treated nonoperatively. AC joint injuries similarly range in severity and are commonly classified according to the Rockwood system, with higher-grade injuries often requiring surgical stabilization [9, 10].

The concept of the SSSC, introduced by Goss, provides an important biomechanical framework for understanding this injury constellation [11]. The SSSC consists of a ring structure formed by the glenoid, coracoid, and coracoclavicular ligaments, along with the distal clavicle, AC joint, and acromion. Disruption of two or more elements of this ring can result in significant instability, similar to the "floating shoulder" phenomenon. In our case, the coexistence of a distal clavicle fracture and AC joint disruption represents a double disruption of the SSSC. When combined with a humeral shaft fracture, the mechanical integrity of the entire shoulder girdle is further compromised, potentially leading to severe instability and functional impairment if not adequately addressed [5, 11].

High-energy trauma sufficient to produce this combination of injuries suggests substantial force transmission through the upper limb and shoulder girdle. A plausible mechanism may involve axial loading through the humerus combined with direct impact to the lateral shoulder. The humeral shaft fracture may result from bending or torsional forces, while the distal clavicle fracture and AC joint disruption likely reflect direct lateral compression and ligamentous failure. Recognizing this mechanism is essential, as the presence of one injury should prompt careful evaluation for associated lesions to avoid missed diagnoses [5, 8, 12].

The management of such complex injury patterns remains controversial due to the lack of standardized guidelines. In isolated humeral shaft fractures, functional bracing may achieve satisfactory outcomes in selected

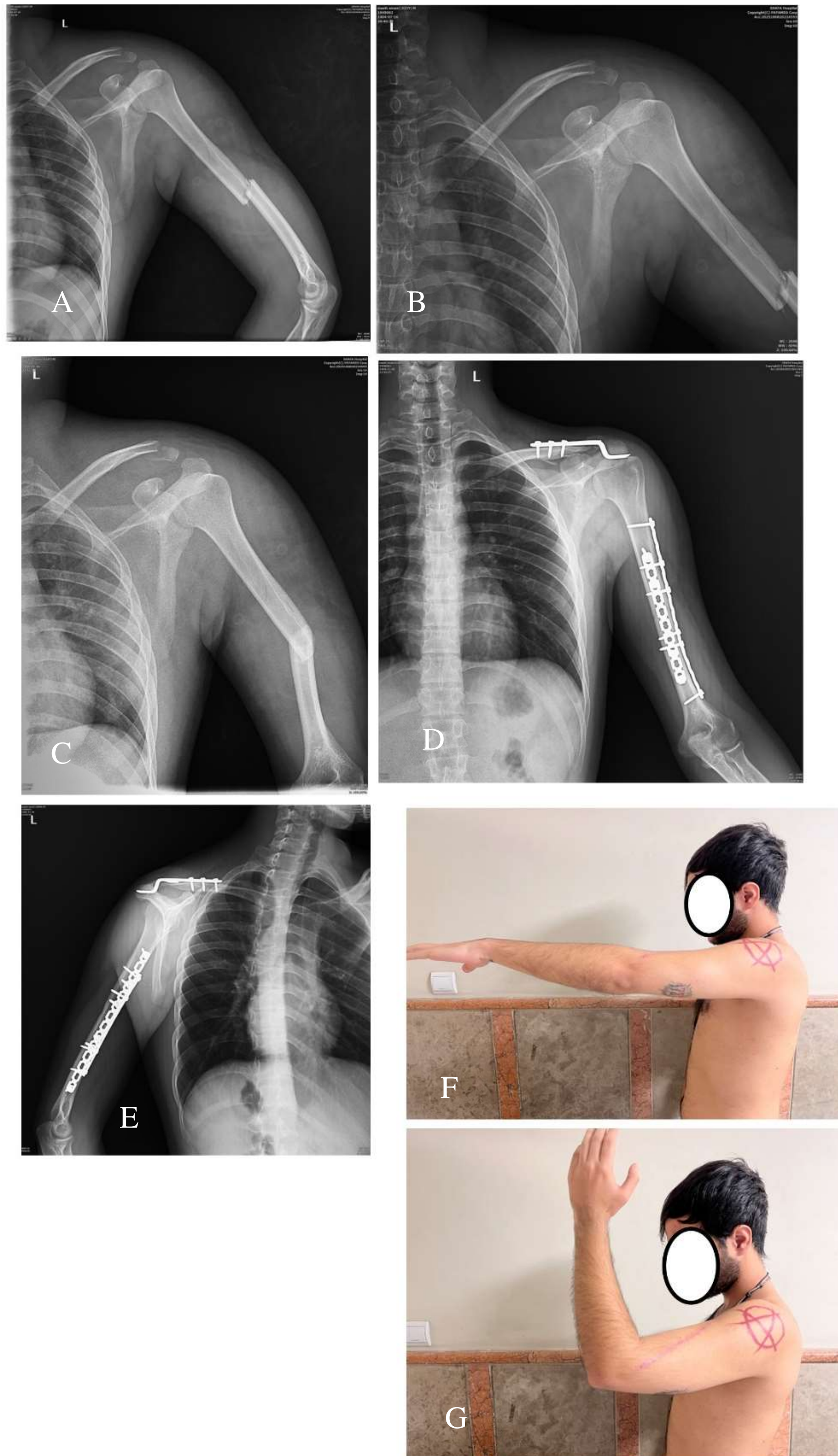

Figure 1. Ipsilateral humeral shaft fracture with distal clavicle fracture and AC joint injury

A, B, C) Plain radiographs of patient for preoperative planning, D) Early post-op X-ray, E) 2-month post-op X-ray, F & G) Shoulder range of motion at 4-month follow-up

patients. However, in the context of multiple ipsilateral shoulder girdle injuries, nonoperative treatment may lead to malalignment, persistent instability, and suboptimal functional recovery. Similarly, unstable distal clavicle fractures and higher-grade AC joint injuries often benefit from surgical stabilization to reduce the risk of nonunion and chronic instability [8, 9, 13].

In the present case, we opted for surgical fixation of all unstable components. This strategy was based on the combined instability of the SSSC and the humeral shaft, as well as the patient's young age and high functional demands. Early operative stabilization allowed for restoration of anatomical alignment, facilitated rehabilitation, and likely contributed to the satisfactory short-term functional outcome observed at four months. The absence of neurovascular complications and the achievement of acceptable radiographic union further support the effectiveness of this comprehensive approach.

Nevertheless, this report has inherent limitations. As a single-case report, it does not allow for generalizing outcomes or for a direct comparison between operative and nonoperative strategies. A long-term follow-up is necessary to evaluate potential complications, such as hardware irritation, post-traumatic AC joint arthritis, or residual shoulder dysfunction.

Conclusion

This case highlights a rare combination of an ipsilateral humeral shaft fracture, a distal clavicle fracture, and an AC joint injury. Comprehensive evaluation and surgical management of all unstable components may lead to satisfactory functional outcomes.

Ethical Considerations

Compliance with ethical guidelines

There were no ethical considerations to be considered in this research.

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Authors' contributions

Investigation: Mojtaba Khajeh Alizadeh Attar, Babak Hashemipour, and Mohammadmehdi Mahdavifar; Writing : All authors.

Conflict of interest

The authors declared no conflict of interest.

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