Clavicle Fracture With Intrathoracic Displacement

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Abstract

Clavicle fractures are common, and most are isolated injuries. Injury to the nearby subclavian vessels and brachial plexus have classically been described as potential complications of clavicle fractures. However, in the setting of a substantially displaced clavicle fracture, concomitant thoracic trauma is relatively frequent. Injury to the thorax can be difficult to identify on physical examination, and advanced imaging modalities may be required for diagnosis.

The evaluation, workup, and management of a patient with intrathoracic displacement of a clavicle fracture are described. Despite the significant fracture displacement and associated pneumothorax, the injury severity was not clinically obvious. Imaging, including a screening chest radiograph and subsequent axial computed tomography, played an important role in diagnosis and management. The patient underwent successful open reduction and plate fixation. A thoracostomy tube was not required at any point during the hospitalization. The patient recovered uneventfully and returned to full work duty by 3 months postoperatively.

Including the current report, only 3 cases of intrathoracic displacement of the clavicle have been published in the English literature. All involved fractures of the middle third of the clavicle. The severity of displacement was not obvious in any patient, and diagnosis was dependent on additional imaging. Given the frequency of associated chest trauma and limitations of physical examination, chest radiography should be considered in the evaluation of patients with substantially displaced clavicle fractures.

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Figure: Axial computed tomography image showing intracostal displacement of the medial clavicle fragment.
Fractures of the clavicle are relatively common, representing 2.6% to 4% of fractures in adults. A male predominance exists until the sixth decade, when the male/female incidence equalizes. The majority of these fractures occur at the middle third of the shaft and are the result of low-energy mechanisms such as a fall onto the shoulder. Significant injuries are not typically associated with this type of fracture. However, high-energy mechanisms have a much greater rate of concomitant injury.

Injury to the nearby subclavian vessels and brachial plexus have classically been described as potential complications of clavicle fractures, and thorough neurovascular examination of the ipsilateral arm has been advocated as a routine part of the evaluation. More recently, associated chest trauma has been recognized as a serious issue, with concomitant thoracic injury rates as high as 40%. Despite this high rate of thoracic injury, the incidence of pneumothorax in closed clavicle fractures remains low, with only 8 reported cases. It is unknown whether the incidences of pneumothorax were the result of pleural penetration by the fractured clavicle or other traumatic mechanism.

Intrathoracic penetration by the clavicle is exceedingly rare, with only 2 reported cases. In both cases, the fracture occurred at the middle third of the shaft, but a pneumothorax occurred in only 1 patient. The intrathoracic fracture displacement was not obvious on initial examination but was identified on radiography and confirmed with computed tomography (CT) scans in both patients.

This article reports a third case of thoracic injury associated with a clavicle fracture. Despite the displacement, no significant neurologic or vascular injury was observed. Small bilateral pneumothoraces were present but did not require a thoracostomy tube.

**CASE REPORT**

A 22-year-old right-hand-dominant man was airlifted to the authors’ emergency department after being struck directly on the right shoulder by a large piece of lumber while at work. He was knocked to the ground from his position 6 feet up a ladder and had a positive loss of consciousness. On presentation, he reported only right shoulder pain. He reported no shortness of breath, numbness, or weakness. His vital signs were within normal limits during transport and remained normal throughout his evaluation.

On examination, the patient’s vital signs were within normal limits. He maintained an oxygen saturation level of 100% using room air. He was alert and oriented to person, place, and time. His lungs were clear to auscultation. Lacerations of the nose and lip were present. A superficial abrasion and swelling were present over the right clavicle; however, the skin was intact. The area was tender to palpation. Shoulder range of motion produced pain at the clavicle. Distally, he maintained motor and sensory function in the extremity without deficit. He had a palpable radial pulse and capillary refill of less than 2 seconds in all digits.

Initial radiographs identified a displaced clavicle and first-rib fracture (Figure 1). Given the patient’s mechanism of injury, loss of consciousness, and identified fracture, CT scans of the head, neck, chest, abdomen, and pelvis were performed in accordance with the protocol at the authors’ institution. Axial imaging identified penetration of the first intercostal space by the medial clavicle fracture fragment (Figure 2). The overlying pleura appeared to be intact, but small bilateral pneumothoraces were observed (Figure 3). The CT scan also identified small bilateral pulmonary contusions and a nasal bone fracture.

Given that the patient remained hemodynamically stable and maintained his oxygen saturation level, thoracostomy tubes were not placed. He was admitted to the hospital to monitor the pneumothorax and for fixation of his clavicle fracture.

The patient underwent subsequent open reduction and internal fixation of the clavicle fracture. Given the degree of displacement and the potential for operative complications, thoracic and vascular surgery teams were available. Intraoperatively, the medial fragment was found to be interposed within the first intercostal space (Figure 4). Dissection of this fragment proceeded from medial to lateral. Care was taken to atraumatically free the fragment from the pleura. After fracture reduction, an 8-hole precontoured plate...
Given the relatively high association of thoracic injuries and the clinical difficulties identifying these injuries, chest radiography should be considered in the evaluation of patients who have sustained a displaced clavicle fracture. More advanced imaging, such as CT, should be obtained in cases of significant displacement identified on radiography, a sufficiently high-energy mechanism, open fracture, or clinical suspicion of thoracic trauma. In so doing, the acuity of patient care and ultimate management of the fractured clavicle can be optimized.

**CONCLUSION**

Clavicle fractures with intrathoracic displacement are rare and not easily identified by physical examination alone. Patients who have sustained a clavicle fracture should be evaluated for concomitant chest, neurologic, and vascular injury. In addition to physical examination, chest radiography should be readily considered in the evaluation of patients with displaced clavicle fractures. Additional axial imaging may be warranted.

**REFERENCES**


