

## Rib fractures following minor trauma in older patients: a not-so-benign injury

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**ABSTRACT:** Two older adults presented to the emergency department with rib fractures following minor trauma. Both were discharged on oral analgesics and died within 2 days. Rib fractures more often lead to adverse outcomes in older adults. Emergency physicians should consider admitting any such patient who presents with two or more rib fractures.

**RÉSUMÉ ANALYTIQUE :** Deux personnes âgées furent reçues à l'urgence pour des fractures de côtes à la suite de traumatismes mineurs. Toutes deux reçurent leur congé avec une ordonnance d'analgésiques oraux et décédèrent dans les deux jours suivants. Les fractures de côtes ont plus souvent une issue fatale chez les personnes âgées. Les urgentologues doivent évoquer la nécessité d'hospitaliser tout patient âgé qui présente deux fractures de côtes ou plus.

**Key words:** minor trauma, rib fractures, older adults, geriatric, complications

### Introduction

With ongoing acute hospital bed closures, Canadian emergency physicians often feel pressure to discharge patients with significant illness or injury. Improved home care programs allow more patients to be safely discharged, but these programs may tempt emergency physicians to take greater risks and discharge sicker patients. This article reviews the cases of 2 older patients who died soon after being discharged from the emergency department (ED) with rib fractures.

### Case 1

An 85-year-old man presented to the ED 2 days after falling and injuring his head and back. He had no recollection of the event and believed he had suffered a seizure. His chief complaint was chest pain on inspiration, but he denied dyspnea, chest heaviness or palpitations. His past history was significant only for a chronic post-traumatic seizure disorder treated with phenytoin and clobazam. He denied heart disease, hypertension or diabetes.

On examination, he was alert, oriented and afebrile. Pulse was 88 beats/min, blood pressure 124/66 mm Hg, and respiratory rate 16 breaths/min. No oxygen saturation was recorded on the chart. Breath sounds and heart sounds were normal, but the patient was tender over the right posterolateral chest wall. Abdominal and neurological examinations were unremarkable. There was a 3-cm laceration above his right eye.

Complete blood count, serum electrolytes, glucose, urea, and creatinine were normal. His phenytoin level was within therapeutic range, and the electrocardiogram was normal. A chest x-ray showed fractures of the right 7th to 10th ribs with no evidence of underlying lung injury, and a head CT scan was within normal limits for age.

He was discharged home under the care of his family and given a prescription for acetaminophen with codeine. Arrangements were made for daily community nurse visits for a week and for early home consultation by a geriatrician.

Two days later the patient returned to the ED with nausea and coffee-ground emesis. At this time, rectal temperature was 38.9°C, pulse 98 beats/min, blood pressure 90/48 mm

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Hg, respiratory rate 24 breaths/min, Glasgow Coma Score 14/15 and oxygen saturation was "unobtainable" on 100% oxygen. On examination, he was lethargic and had dry mucous membranes. Chest auscultation revealed crackles in the left base, while cardiovascular and abdominal examination were non-contributory. The ECG showed ST-segment elevation in leads V1 to V4 and aVL, with reciprocal ST-depression in leads II, III and aVF. A chest x-ray demonstrated consolidation in the right mid lung zone and medial left base. Fractures were again noted in the 7th to 10th ribs.

He was admitted with a diagnosis of bilateral pneumonia, acute anteroseptal myocardial infarction, and upper gastrointestinal hemorrhage. After discussion with the family, and in view of the poor prognosis, it was decided to provide comfort care only. The patient expired soon after admission, and no autopsy was performed.

### Case 2

A "very healthy" 78-year-old woman was bowling when she missed a step, fell backwards, and struck her chest against the corner of a chair. She presented to the ED complaining of right-sided chest pain and dyspnea. She reported no past illnesses apart from asthma; however, it was noted that she was on several cardiac medications.

On examination, her pulse was 84 beats/min, blood pressure 170/90 mm Hg, respiratory rate 24 breaths/min, and oxygen saturation 97% on room air. She appeared distressed and had tenderness and bruising over her right lateral rib cage. Her chest was clear on auscultation, and her heart sounds and abdominal examination were normal. The attending emergency physician identified fractures of the right 5th to 8th ribs on her chest x-ray. She was given intravenous and subcutaneous morphine, and discharged with a prescription for oxycodone. The emergency chart did not include an assessment of her home situation.

The subsequent radiology report noted "multiple right lateral rib fractures with subcutaneous emphysema and a small hydropneumothorax." Unfortunately, due to the introduction of a digital x-ray system the same week, this report did not reach the emergency physician until after the patient's death.

Two days after her initial presentation, the patient experienced sudden dyspnea and her family called 911. The paramedics found her in respiratory distress, wheezing loudly, and able to speak only in single words. During ambulance transport she suffered a respiratory arrest and developed pulseless electrical activity. She was intubated and treated according to ACLS protocols. On arrival in the ED, she was pulseless and asystolic with fixed, dilated pupils. Further resuscitation attempts failed and she was pronounced dead in the ED.

An autopsy showed fractures of the right 6th to 9th ribs, a right-sided hemothorax (400–500 cc), and coronary heart disease. The pathologist attributed death to the effects of blood loss and impaired pulmonary function on her underlying heart disease.

### Discussion

Because of the proximity of the chest wall to the underlying lung and cardiovascular system, seemingly minor injuries of the thoracic cage can lead to life-threatening complications, particularly in older patients with diminished cardiopulmonary reserve.<sup>1</sup> Rib fracture, the most common injury seen after blunt chest trauma,<sup>2,3</sup> may be associated with trauma to the lung parenchyma, pleural membrane and intercostal vessels or nerves. Parenchymal trauma can cause pulmonary contusion or hemorrhage; pleural disruption can cause pneumothorax; and vascular injury can cause hemothorax, which may be delayed or may accumulate over several days.<sup>4,5</sup> The pain associated with rib or pleural injuries inhibits ventilatory effort, reduces tidal volume and decreases cough effectiveness. This leads to hypoventilation, a relative increase in dead space, and retained secretions.<sup>6</sup> These derangements may progress to hypercarbia, hypoxia, infection and, in some cases, adult respiratory distress syndrome. Fractures of the seventh or lower ribs should raise suspicion for abdominal injuries, such as splenic or liver laceration.

With age, the chest wall becomes less elastic, and rib fractures, pneumothorax, and hemothorax become more common.<sup>7</sup> Simple rib fractures (not associated with injuries to other organs) are common in older patients and most often result from falls.<sup>6</sup> Although clinical findings are non-specific,<sup>2</sup> the diagnosis is based on a suggestive history, localized chest pain, rib tenderness and, sometimes, bony crepitus. Typically, lateral or anterior–posterior chest compression will provoke pain at the fracture site. Standard PA and lateral chest x-rays are unreliable and will miss 30% to 50% of fractures;<sup>1,8</sup> therefore, in cases where the specific identification of rib fractures will change management, oblique (rib) views may be helpful.

Although persons over 65 sustain proportionally fewer injuries than younger patients, injuries in older patients are more likely to have a fatal outcome.<sup>7,9,10</sup> In one study, Shorr and colleagues<sup>3</sup> recorded a mortality rate that was 2.76 times higher in older victims of blunt chest trauma (although mortality in this series was often associated with complicating extrathoracic injuries). Pneumonia, a common complication of chest trauma in older adults,<sup>11,12</sup> is 3 to 5 times more likely to cause death in older patients.<sup>13</sup>

This disparity in the survival rates of elderly trauma victims has several possible explanations. It is likely that age itself affects the body's ability to respond to injury,<sup>9</sup> and although most older patients can maintain internal homeostasis under normal conditions, they are less likely to have the physiological reserve to respond to disruptions of the body's balance.<sup>7,9</sup> Pre-existing disease (present in up to 70% of older patients) may also play a role; however, comorbidity has not been found conclusively to influence survival after trauma.<sup>9,10</sup>

The patients presented above may not represent typical geriatric patients with minor chest trauma, and many clinicians would suggest that one or both warranted admission on their first visit; however, it could also be argued that hospitalization might not have changed the outcome for either. These cases serve to remind us that there is less room for error when treating older patients with injuries. It is also important to remember that, despite our sadly limited inpatient bed availability, the Canadian Medical Protective Association (and Canadian legal precedents) state clearly that the lack of resource availability is not a justification for inappropriate care.

## Conclusion

Most patients with simple rib fractures can be treated as outpatients, but older patients with two or more rib fractures have a higher risk of unfavourable outcomes and should be considered for hospitalization.

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## Apologies and errors

In the 1999 CAEP/AMUQ Scientific Assembly Oral Abstract Presentation Schedule, published in the October issue (vol. 1, no. 3) of *CJEM*, Dr. Grant Innes and Dr. Peter Rosen were identified as the moderators of the Resident Research Competition (pg. 169). Dr. Bob McGraw, a moderator and the primary organizer of the competition, was inadvertently omitted because of a misunderstanding on the editor's part. Apologies go out to Dr. McGraw for this oversight. [G.I.]

In that same issue of *CJEM*, on page 197, we listed the reviewers who helped us from November 1998 to August 1999. We inadvertently forgot to thank the following reviewers. Our apologies to: Scott Anderson, Jeffrey Arnold, Joe Finkler, Anna Jarvis, Gerald Lazarenko, Marilyn Li, D. Bruce MacLeod, R. Bruce McLeod, Linda Papa, David Warren and Brian Young. [G.I.]