Letter to the Editor

Lethal intercostal artery injury after a fall

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Submitted Oct 25, 2021. Accepted for publication Dec 02, 2021.
doi: 10.21037/qims-21-1041
View this article at: https://dx.doi.org/10.21037/qims-21-1041

Introduction

Intercostal artery (ICA) injury is an uncommon condition that can lead to lethal outcomes. Trauma has been identified as the main cause of ICA hemorrhage. Various treatment options for ICA hemorrhage are available, while they often require multidisciplinary collaborations. In this report, we will discuss a rare case of ICA injury resulted from a fracture of the thoracic vertebral body.

Case presentation

An 80-year-old man was brought to the emergency department (ED) due to severe middle back pain. The patient slipped in the bathroom and hit his back 1 hour prior to ED arrival. His medical history included hypertension and left renal stone. Upon presentation, the patient was alert and oriented, with a body temperature of 35.7 ℃, a heart rate of 53 beats per minute, and a blood pressure of 72/51 mmHg. After the immediate administration of fluid resuscitation with 1,000 mL of normal saline, his blood pressure was elevated to 91/53 mmHg. Laboratory examinations revealed a Hemoglobin level of 9.5 g/dL without the signs of leukocytosis or coagulopathy. Chest X-ray showed a massive right pleural effusion (*Figure 1A*). Focused abdominal sonography for trauma manifested no ascites accumulation at the abdomen region. To determine the cause of the right pleural effusion, we conducted contrast enhanced trauma computer tomography (CT). The trauma CT revealed a fracture of the ninth thoracic vertebra body, which resulted in a bone fragment injury of the right ICA. Extravasation of contrast media at the ICA was detected, suggesting the cause of the right hemothorax (*Figure 1B-1D*). Upon consultation with a chest surgeon, we began the preparation for an emergent ICA ligation, before which a cardiac arrest occurred despite the fluid resuscitation. We performed resuscitative thoracotomy at the ED. However, the patient expired eventually.

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Ethical approval was granted from the hospital's ethics committee (No. 21MMHIS028e). 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 editorial office of this journal.

Discussion

To our knowledge, only very few cases of ICA injury resulted from vertebral fracture were previously reported (1-3). ICA injury is a rare but potentially life-threatening condition. Clinical presentations of ICA injury include chest pain, dyspnea, hypotension, and increased pleural fluid (4,5). Three main causes of ICA injury have been identified—spontaneous, traumatic, and iatrogenic (6,7). Spontaneous ICA hemorrhage is often associated with specific underlying

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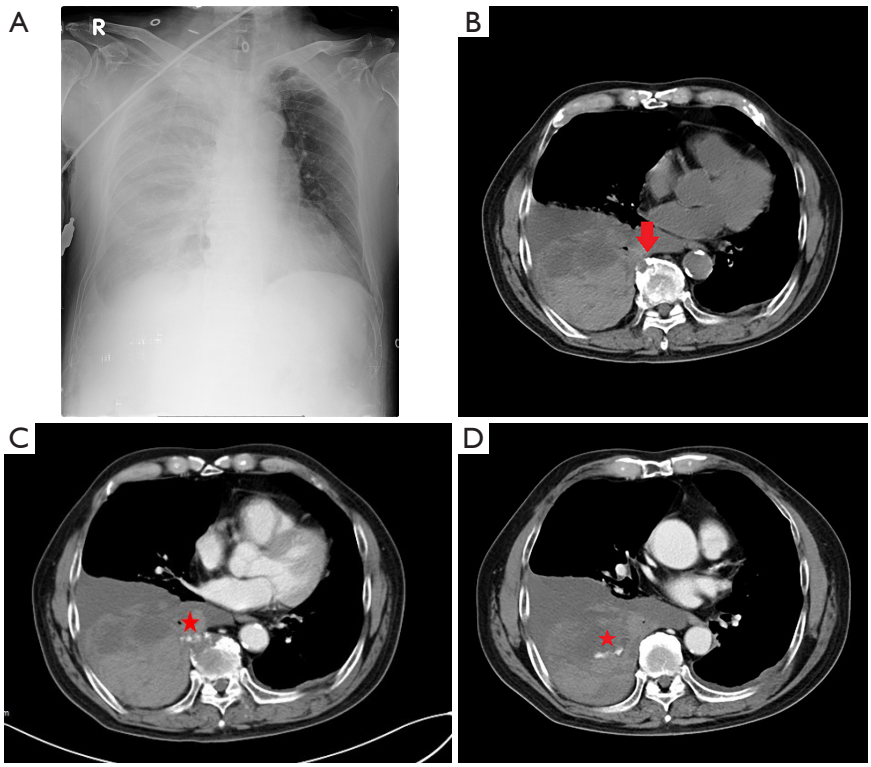

Figure 1 Image of a patient diagnosed with intercostal artery injury. (A) Chest X-ray showed a massive right pleural effusion. (B) Non-contrast CT revealed a fracture of the anterior-superior endplate of thoracic spine No. 9 body (arrow). (C,D) Contrast enhanced computed tomography (CT) manifested contrast extravasation at the right intercostal artery (star) resulted from the fractured thoracic bone fragment, which caused the right hemothorax.

diseases, such as neurofibromatosis type 1, systemic lupus erythematosus, and coagulopathy (7-9). Although extremely rare, spontaneous ruptured ICA resulted from cirrhosis or aneurysm has also been reported (5,10-12). Trauma, the most common cause of ICA hemorrhage, can be caused by either blunt or penetrating thoracic injury (4,7,9). Iatrogenic causes of ICA injury include the complications with thoracentesis, pleural biopsy, chest tube insertion, and liver biopsy (4,7).

Chest film and ultrasound are the common initial diagnostic tools for the detection of pleural effusion (4). The use of lung ultrasound can aid the diagnosis of patients under the suspicion of hemothorax. Previous studies revealed that lung sonography possesses a 95% positive predictive value and 92% negative predictive value for the detection of hemothorax. Clinicians should be aware of the possibility of massive hemothorax if lung ultrasound manifests increased pleural effusion or hematocrit sign (13,14). However, contrast-enhanced CT remains the golden standard in the diagnosis of ICA hemorrhage (6,15) because it is able to reveal detailed information, such as the source of active bleeding, the hematoma size, and other bleeding origins if any (6).

Treatment options of ICA injury include conservative management, embolization, and surgery (6,16). Conservative therapy includes fluid resuscitation, chest tube drainage, pain control, and observation. In these cases, when hemodynamic instability occurs, the surgical intervention of ICA ligation should be further arranged (6,16). Recently, transarterial embolization (TAE) has become an alternative treatment for patients with ICA hemorrhage (4,6,8,10,11,15,16). TAE in the patients with ICA hemorrhage has been reported with a success rate of over 80% with only minor complications (6). However, emergent thoracotomy shall not be delayed when massive hemothorax with persistent bleeding is encountered (4).

Acknowledgments

Funding: None.

Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://dx.doi.org/10.21037/qims-21-1041). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Ethical approval was granted from the hospital's ethics committee (No. 21MMHIS028e). 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 editorial office of this journal.

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Cite this article as: Shen CY, Hsiao CH, Tsai W, Chien DK, Chang WH, Chen TH. Lethal intercostal artery injury after a fall. Quant Imaging Med Surg 2022;12(3):2203-2205. doi: 10.21037/qims-21-1041

