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Visual Diagnosis in Emergency Medicine

DIAGNOSIS AND ENDOVASCULAR TREATMENT OF AN INTERNAL MAMMARY ARTERY INJURY

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INTRODUCTION

Internal mammary artery (IMA) disruption after blunt chest trauma is rare. In some instances, it may occur after mild chest trauma with minor external physical findings. However, prompt diagnosis and treatment are necessary, as it can be associated with vascular and parenchymal injuries.

We report a case of blunt chest trauma resulting in a sternal fracture associated with an IMA injury, active anterior mediastinal bleeding, bilateral lung contusions, and a left hemothorax. It was successfully treated by selective embolization to the left IMA branch and chest tube placement.

CASE REPORT

A healthy 64-year-old man was admitted to our Emergency Department after a motor vehicle accident in which he was the restrained driver. The accident was frontal and the impact took place at low speed. Upon admission, the clinical assessment found normal neurological condition, normal blood oxygen, mild blood hypertension, and tachycardia (110 beats/min); his hemoglobin measurement was 14.8 g/dL; the external physical examination showed abrasions on the anterior chest wall from the sternal surface to the shoulder, most likely caused by the harness restraint system. Stable vital signs were recorded in addition to peripheral pulses and a negative neurologic examination during the diagnostic work-up. The chest examination did not reveal any kind of pathologic sound or impairment of the thoracic cage.

In the trauma room, the patient underwent chest and cervical spine X-ray studies as part of the routine trauma screening. Chest radiography revealed an oblique fracture of the distal sternal body without pneumothorax, hemothorax, or other post-traumatic possible consequences. Cardiac monitoring and cardiac isoenzymes levels remained within normal limits. An echocardiogram was performed by means of a portable instrument to speed up diagnostic time. The cardiologist disclosed normal heart dimension and kinesis, normal systolic function, and normal ejection rate (75%). A normal valves aspect was described. Possible parietal laceration of the proximal aorta was hypothesized. After these findings, a further inquiry with superior imaging technique was then required.

An immediate computed tomography (CT) scan of the chest confirmed the sternal fracture and revealed an 8.5 cm × 3 cm anterior mediastinal hematoma with evidence of active contrast leakage (Figure 1A, B), a 4-cm-thick left hemothorax (Figure 1A), and bilateral basal lung contusions. A left chest tube (28Fr) was placed and 900 mL

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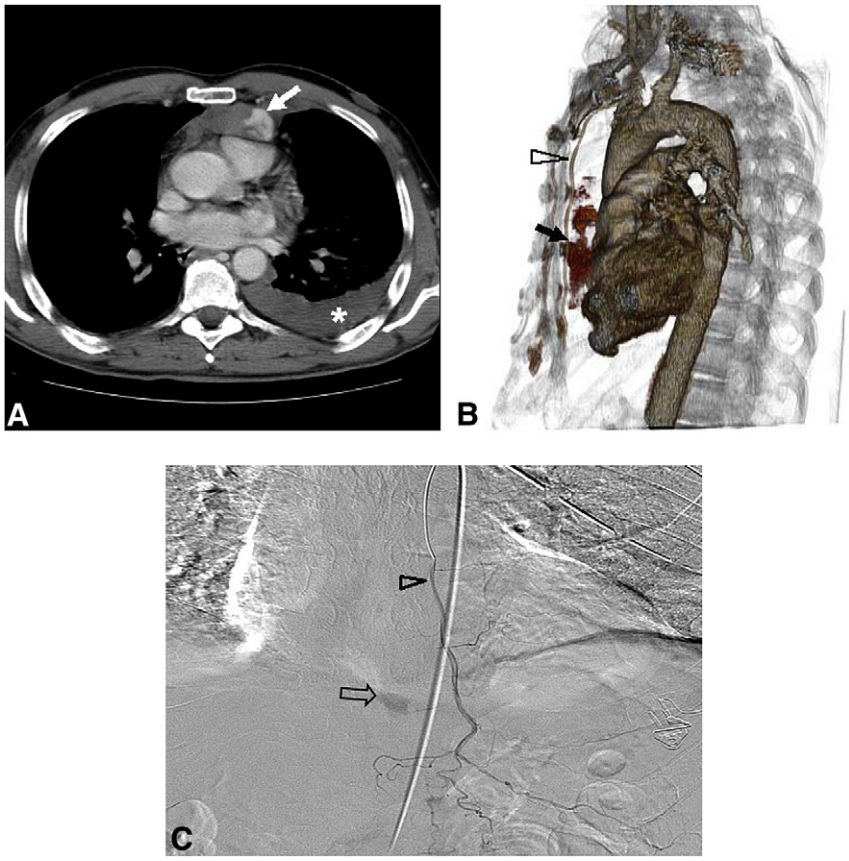

Figure 1. Computed tomography scan of the chest (A); sagittal three-dimensional volume rendering reconstruction (B) and preoperative angiography (C) show the left hemothorax (asterisk in A), the active bleeding within the anterior mediastinal hematoma (arrow in A, B, and C), and the course of left mammary artery (arrowhead in B and C).

of blood was drained in a short time (approximately 1 h). Although surgical exploration was considered, the hemodynamic conditions permitted a conservative approach to be followed through with angiography.

After right femoral artery access was obtained, a 0.0035-inch (0.89 mm) Betson guidewire (Cook Inc., Bloomington, IN) was advanced into the ascending aorta. The left subclavian and internal mammary arteries were selectively catheterized with a 5Fr internal mammary curved Torcon NB Advantage catheter (Cook Inc.).

The angiography of the left mammary artery was performed with a Progreat Microcatheter (Cordis Corp., Warren, NJ) and showed active bleeding from a distal lateral branch of the artery (Figure 1C).

Selective embolization of the vessel was then carried out by coil placement (Truefill® 3 × 2 mm, Cordis Corp.) in proximity to the site of blood leakage, obtaining complete hemostasis as documented by the control angiography (Figure 2A). CT evaluation after 48 h (Figure 2B) showed resolution of the hemothorax and a significant volumetric decrease of the mediastinal hematoma. The patient was discharged after an uneventful recovery 6 days after embolization.

DISCUSSION

Accidental IMA injury is an uncommon complication of blunt chest trauma. It may follow relatively minor trauma and could result in a self-limited hematoma within the parietal pleura and the transversus thoracic muscle or in extra-thoracic hematoma (1–3). However, it may lead to a mediastinal hematoma with cardiac compression if it is not correctly managed (4,5). Hemothorax with hemorrhagic shock has been reported (6). Furthermore, it is frequently associated with injuries of other vessels, such as the thoracic aorta or aortic arch branches, lung contusions, bone fractures and dislocations, and neurological impairment due to hypovolemia (1,7).

This lesion is commonly diagnosed by an angiogram or during a thoracotomy or sternotomy performed for great vessel injuries (3–5). The chest X-ray studies may have distinctive signs, including the presence of an anterior retrosternal blood effusion with a defined outline or a “D” shape. It is not usually associated with pleural effusion (1).

Few cases of isolated non-iatrogenic lesions of IMA after blunt trauma have been reported in medical literature.

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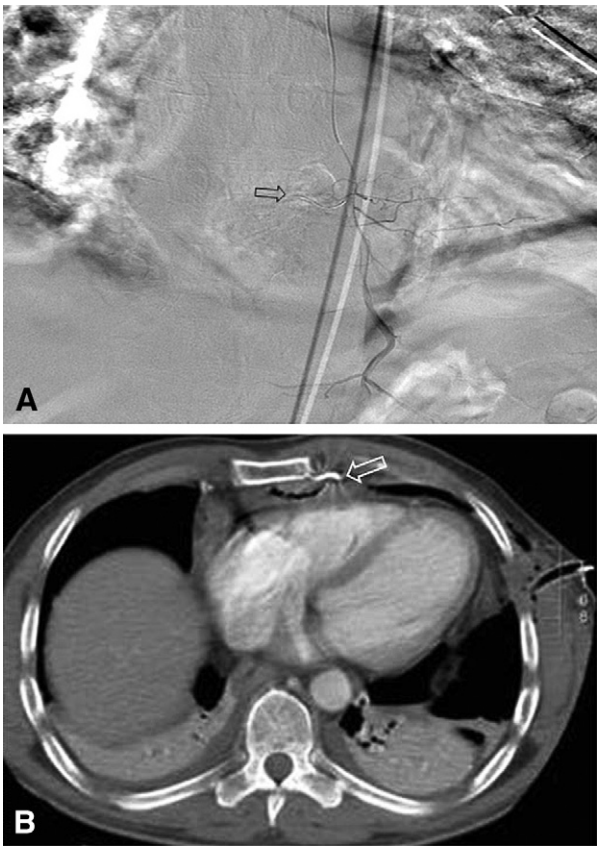

Figure 2. Transarterial embolization of a collateral branch of left mammary artery and screen shot angiography (A) along with computed tomography scan (B) 48 h after chest drain shows a complete bleeding control (arrow in A) and a reduction of the anterior mediastinal hematoma (arrow in B).

In 2006, Kawamura et al. reported their experience of three cases of IMA injuries being successfully treated with arterial embolization (7). In all cases, the patients suffered major blunt trauma and had associated visceral lesions. In this series, the rupture was detected using selective angiography. In our experience, as quoted by Braatz et al., CT was adequate to detect the mediastinal hematoma and the active contrast outflow from a branch of the IMA (8). This result confirms the role of CT in the evaluation of major arterial injuries as reported in medical literature (1,9). A thoracotomy is the standard treatment for IMA injuries; however, an endovascular procedure is less invasive than a thoracotomy and represents a feasible therapeutic option (4).

CONCLUSION

In the reported case, contrast-enhanced chest CT permitted the detection of active anterior mediastinal bleeding caused by an IMA injury and was essential for a rapid diagnosis and for prompt, minimally invasive treatment. In blunt chest trauma, even if the physical examination is negative and in the presence of sternal lesion or anterior mediastinal hematoma, elevated clinical suspicion and strict adherence to protocols are imperative in preventing a missed diagnosis of IMA injury.

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