

IMAGES IN EMERGENCY MEDICINE

Trauma

A bolt out of the blue

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CASE PRESENTATION

A 7-year-old female presented to our university children's emergency department with 3 weeks of right shoulder pain, worse after falling from a bunk bed at summer camp 2 days before. Three weeks earlier, her brother accidentally shot a pistol crossbow bolt that grazed her right lateral chest. At that time, she had no immediate symptoms apart from a bleeding laceration. After evaluation in the clinic for shoulder pain, she was diagnosed with muscle strain and resumed activities, including sports. In our emergency department (ED), examination revealed normal vital signs, right shoulder pain on abduction, and a well-healed 2 cm thoracic laceration.

X-rays and computed tomography imaging identified a 10 cm bolt fully embedded in her chest (Figures 1 to 4).

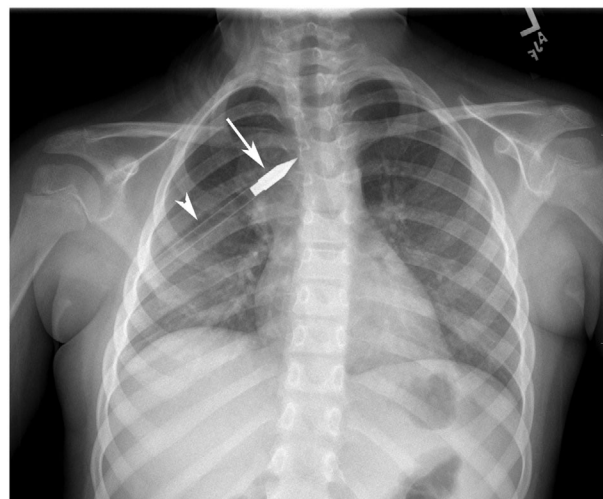


FIGURE 1 AP chest: Remote penetrating injury. Crossbow bolt in the right hemithorax with the metallic, radiodense field tip (marked with an arrow) extending to the superior mediastinum. Notice the shaft of the bolt is radiolucent (marked with an arrowhead)

DIAGNOSIS

Missed penetrating thoracic trauma.

DISCUSSION

Although trauma is the leading cause of mortality in children, penetrating chest trauma is uncommon. This case was unique in its mild initial symptoms, potential for life-threatening consequences, and remarkably delayed presentation. Delayed diagnosis of injury in pediatric trauma increases the risk of morbidity and mortality.¹ Thoracic walls in children are notably compliant, making serious intrathoracic trauma

possible without obvious external injury.² Although arrow injuries are infrequent, pistol crossbows are easily accessible and easy to use with little training.^{3,4} Crossbow bolts have high penetration force that can cause little to no surface lacerations or crushing defects.⁵ The head of this bolt was a *field point*, a tip widely used for target practice or hunting small game that can cause circular or slit-like external defects, as in our patient. In contrast, *broadhead* tips can cause more obvious radiating incisions owing to their multisided blades.⁶ Physicians must fully

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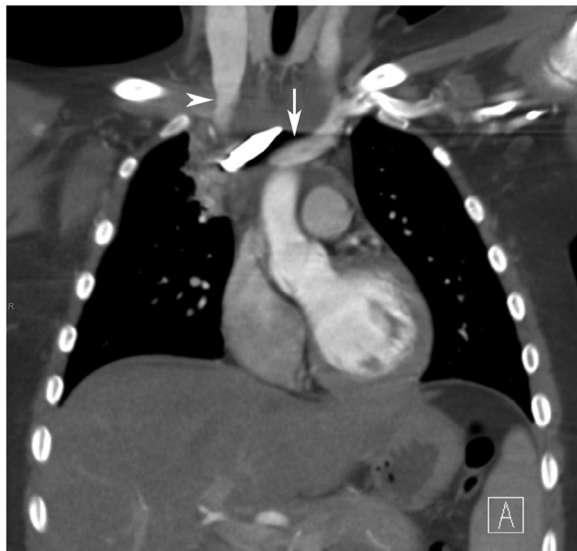


FIGURE 2 Coronal computed tomography (CT): Coronal CT of the chest with intravenous contrast in the coronal plane. The penetrating foreign body extends into the mediastinum and has narrowly missed the left innominate vein (marked with an arrow). The bolt head is just anterior to the right innominate vein (marked with an arrowhead). The adjacent aortic arch (inferior to the left innominate vein) and its cervical branches (specifically the right brachiocephalic artery) were in close proximity to the foreign body but were intact

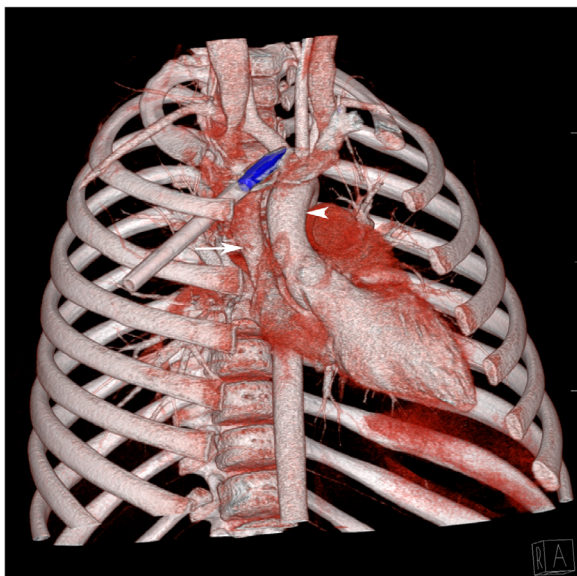


FIGURE 3 Reconstructed computed tomography (CT) coronal oblique: Volume rendered 3-dimensional image of the chest in the coronal oblique plane. Obtained using post-processing software on the chest CT angiogram. The metallic tip of the bolt is blue. Notice how close in proximity the bolt is to the thoracic vasculature, including the aorta (marked with an arrowhead) and its branches. Along the inferior margin and just behind the bolt is the superior vena cava (marked with an arrow)

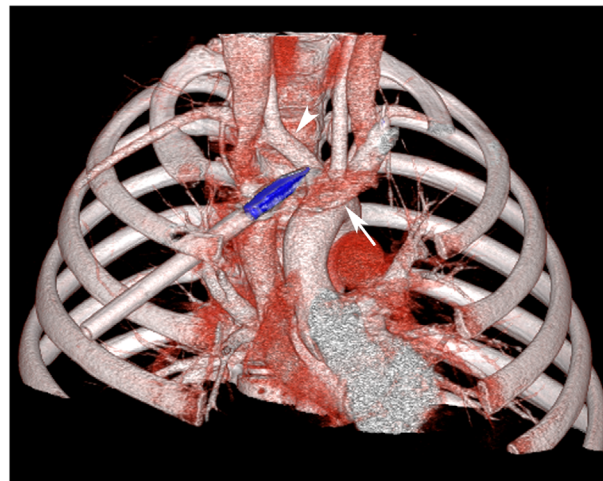


FIGURE 4 Reconstructed computed tomography coronal: Volume rendered 3-dimensional image of the chest in the coronal plane. Metallic tip of the bolt is blue. In this plane we can see how the bolt tip is in close proximity to the origin or base of the brachiocephalic artery (marked with an arrowhead) and the left innominate vein (the horizontal, faint red structure marked by the arrow)

evaluate suspicious penetrating trauma, even with minimal surface abnormalities.

Our patient was admitted to trauma surgery. Fortunately, the bolt was removed without complications under fluoroscopic guidance, and she has continued to do well.

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