Case Report

A Rare, Combined Cardiac and Hepatic Crossbow Injury

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A 32-year-old man presented to our hospital after a failed suicide attempt using a crossbow. The patient had shot himself in close range with a double-barreled crossbow, simultaneously two arrows, in the chest. In spite of his life-threatening injuries, the man survived. The lodged arrows helped to avoid tremendous loss of blood. After his arrival in the hospital, the surgical removal of the arrows proceeded under direct visualization with corresponding sutures on the heart and liver. The patient’s postoperative course was uneventful.

Keywords: crossbow, penetrating cardiac injuries, suicide

Introduction

Traumatic injuries caused by crossbows are rare in our modern day society.1–3) Crossbow arrows have a high penetrative energy and can even shatter bone. Crossbows pose a high risk to their owners through easy access and careless handling. The tissue elasticity often allows the arrow to lodge in the wound canal and stop further bleeding.1 Other cases of penetrating crossbow injuries were already reported,1–3) but our case is the first one to describe combined cardiac and hepatic wounds caused by two simultaneously shot arrows.

Case Report

A 32-year-old man who attempted to commit suicide by firing two bolts into his chest with a double-barreled crossbow was admitted to the hospital. One bolt entered the chest wall on the left border of the corpus sterni, the other one stuck under the right costal arch (Fig. 1A).

Upon his arrival, clinical evaluation of his lungs and the rest of his body did not reveal any other injuries. Stable circulatory and respiratory conditions allowed a CT-scan, demonstrating that one arrowhead penetrated anteriorly through the mediastinum into the right ventricle; the other one was lodged in the right hepatic lobe (Fig. 1B and 1C, axial view, arrow) without any bleeding signs. Pericardial tamponade, pneumothorax and pleural effusion were excluded. The patient was immediately taken to the operating room. Following a median sternotomy, pericardiotomy, and removal of the arrows without need for use of a heart-lung machine, corresponding sutures were placed at the anterior wall of the right ventricle and the right hepatic lobe (following laparotomy). The postoperative course was uneventful.

Discussion

The penetrating mechanism from an arrow is very different than that of a firearm’s projectile. In comparison to bullets, arrows require less impulse, kinetic energy, and force to penetrate tissue.2) Even despite the friction caused by the shaft of an arrow, the bolts are able to obtain about the same depth in bone-free tissue as bullets while only using a fraction of the kinetic energy. Due to the “clear-cut” penetration of the arrow, the injury to the tissue is confined to the material which comes in direct contact to the arrow’s tip.2) Because the energy from the arrow is not relayed to the surrounding tissue, the normally associated contusions and blast-tearing do not occur in contrast to...
bullet-induced damages. It is not uncommon, that patients do not lose consciousness and can perform tasks following a crossbow trauma for a prolonged period. 4–9) Krukemeyer reported that the arrow’s shaft can act as a plug, causing an incomplete tamponade and hindering further blood loss. 1) This clearly indicates the removal of the arrow in a specialized hospital setting, where bleeding can be better managed. 1) The penetrative capacity of a crossbow is high enough to wreak havoc deep into the body cavity and cause potential damage to the heart, large blood vessels, or the brain. 5,8) Such crossbow injuries are most often lethal- and only rarely do people survive two simultaneous crossbow shots as did our patient. The main damage is caused by a combination of cutting and stabbing. At removal, it is imperative that rotation of the arrow or shaft be avoided. The arrow should be left in situ and be fixated during transport to avoid further injury. 1)

**Conclusion**

In most countries, the purchase of a crossbow requires no legal requirements aside from an age limit. In contrast to a bow and arrow, aiming with a crossbow does not need instruction or aptness. The crossbow can both be set aside and used while loaded and taut. The sale of this noiseless weapon, because of the high risks that come along with it, should be more restricted by means of weapon license or other limitations making the purchase of a crossbow more difficult.

**Disclosure Statement**

No Disclosures.

**References**