



### G11 Delayed Death Following Penetrating Stab Wound to the Heart

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After attending this presentation, the attendees will: (1) better understand characteristics of delayed cardiac tamponade, as described in a case presenting for medicolegal autopsy in which the medical examiner determined that death resulted from a homicidal stab wound three weeks following the event; (2) evaluate the role of medical records, police report, and time course in determining the cause and manner of death in such cases; and, (3) evaluate impact of such characterization of cause and manner of death on courtroom testimony.

This presentation will impact the forensic science community by utilizing a case presentation with literature review to evaluate the common factors which should be present in order to assign a remote injury a role in certification of medicolegal death.

A 24-year-old man was stabbed in the left lateral chest during an altercation three weeks prior to his death. He was admitted to the hospital for treatment. A computed tomography scan on the day of injury showed a mild pericardial effusion with pneumopericardium and a moderate left hemothorax. An area of linear hyperenhancement was noted near the left ventricular apex. A chest tube was placed and drained a large (800mL) left hemothorax. Follow-up X-rays showed normal mediastinal contours and cardiac silhouette with resolution of the hemothorax. The patient remained stable and was released from the hospital after three days and did not seek any follow-up care.

After a symptom-free interval of three weeks, he was brought back to the hospital by EMS complaining of sudden-onset, left-sided chest pain and syncope. He stated that he "had to take a knee" and said, "I feel like there is air in my lungs." While being evaluated, he deteriorated suddenly and an emergency intubation was performed. Ultrasound revealed a large pericardial effusion. 30mL blood was removed via pericardiocentesis. Due to persistent pericardial effusion, thoracotomy was performed with the evacuation of an additional 150mL of mixed clot and fresh blood. Despite these interventions, the patient could not be resuscitated.

At autopsy, the decedent was noted to be well-developed and muscular. Multiple fresh puncture wounds of the subxiphoid region, a nine-inch stapled thoracotomy incision, and a one-inch healing linear scar with evidence of suturing (believed to the site of chest tube placement during initial hospitalization) were noted. A one and one quarter-inch obliquely oriented healing linear scar was present on the skin of the left chest just below the sixth rib and slightly anterior to the mid-axillary line.

On internal examination, there was 500mL bloody left pleural fluid, an additional 500mL bloody peritoneal fluid, and abundant clot within the pericardial sac, left pleural cavity, and peritoneal cavity. Indistinct fibrous scarring marked the site of injury on the parietal pleura. Areas of scarring (likely healed injuries) were noted in the lingular portion of the left lung. A one-quarter-inch defect with surrounding hemorrhage was present in the pericardium overlying the apical portion of the anterior left ventricle.

There was a large area of epicardial hemorrhage over the apex of the heart. A half-inch-in-diameter defect of the anterior apical left ventricular myocardium was identified underlying the pericardial defect. Surrounding the defect was a zone of softened and hemorrhagic myocardium measuring up to one inch in diameter. Upon sectioning, it was revealed that the defect perforated the left ventricular wall. Microscopic sections of the injured myocardium showed extensive hemorrhage and necrosis with evidence of chronicity (hemosiderin deposition and fibroblast proliferation).

A large percentage of patients with stab wounds to the heart, between 80% and 90%, develop acute cardiac tamponade. Delayed cardiac tamponade, however, is a rare complication of stab wounds to the chest, with delays of up to 100 days between injury and development of tamponade reported. The causes of delayed cardiac tamponade vary and may include displacement of thrombus from a cardiac mural wound, tearing of adhesions formed during wound healing, or pericarditis due to postcardiac injury syndrome.

It is believed that the initial injury to this decedent's heart penetrated, but did not perforate, the left ventricular wall and that the injury resulted in infarction and necrosis leading to a weakening of the heart wall with subsequent perforation and tamponade.

**Tamponade, Stab, Heart**