



H23 Delayed Subdural Hematomas in Decedents on Anticoagulation Medication in the County of Santa Clara, California

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Learning Overview: The goal of this presentation is to discuss several delayed subdural hematomas observed in a variety of manners of death at the Santa Clara county medical examiner/coroner's office from 2016 through mid-2018.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by showing how decedents who are on anticoagulants and suffer a head injury do not necessarily present immediately with a subdural hematoma, which was also similar to the cohort not on anticoagulation. This finding underscores that a delayed subdural hematoma in these patients must be considered by the medical examiner as cause and manner of death may be affected.

The medical examiner/coroner's office has observed that decedents taking anticoagulant medication are not immediately presenting with evidence of traumatic brain injury in a variety of manners of death. Anticoagulation therapy is used for a multitude of medical illnesses, and the purported consequences of taking anticoagulation when sustaining a head injury are well established. While anticoagulant medications, such as warfarin, work to block the factors responsible for the coagulation of blood, there have been noticeable delays between injury and the presentation of symptoms of subdural hematoma. This poses a particularly interesting problem for medical examiners when rendering cause and manner of death, as traumatic brain injuries in anticoagulated patients may not always be acute. According to a study conducted by Rust et al., patients on warfarin are 42.5 times more likely to develop a chronic subdural hematoma.¹

A retrospective search of the Santa Clara county medical examiner/coroner's database was performed for the years 2016 through mid-2018 with key words "subdural hematoma" and/or "blunt head trauma" encompassing all manners of death. The search resulted in 127 cases. The goal was to analyze basic demographics, time of injury to clinical presentation if known, and whether the decedent was on anticoagulation. One hundred five total accidental deaths (85 of which were accidental falls and 20 motor vehicle accidents), six homicides, eight undetermined, and eight natural deaths were identified. Of the 127, 38.5% of the decedents were on an anticoagulant medication, including warfarin, aspirin, clopidogrel, apixaban, rivaroxaban, ticagrelor, and one unknown. The most common anticoagulant medication was warfarin at 55%. The age range for all decedents in this study, whether on anticoagulation or not, was 5 months to 104 years of age, with average age at death being 71 years. The average age of decedents on anticoagulant medication was 81 as opposed to an average age of 65 for those not on anticoagulation. Of the 127 cases, 73% of individuals presented within the first 24 hours (range of minutes to 19 hours), whereas 27% of individuals presented after 24 hours; in these cases, clinical symptoms were more apparent (headache, vomiting, sleeping). In 77 cases in which exact time intervals from injury to clinical presentation were known, the average was 1.8 days.

The greatest percentage of deaths (68.5%) were related to accidental falls relating to traumatic head injuries. Of the 49 decedents on anticoagulant medications, 48 experienced an accidental fall; the average age at death for these decedents was 81 years. Of the 47 decedents who experienced falls while on anticoagulants, the average time from injury to clinical presentation among these decedents was 2.5 days. The reported timeframe corresponds with that presented by Volans, whose clinical study found that patients presented with complaints of headache up to three days after experiencing a fall.² There were an additional nine decedents for whom specific times to clinical presentation were not captured. Also of interest were three decedents who experienced a fall and had negative Computed Tomography (CT) scans initially; however, scans in the following days demonstrated subdural hematomas.

Of the six homicide cases, one decedent was taking anticoagulant medication and suffered craniocerebral injuries due to blunt head trauma. Four of the six homicide cases had thin subdural hematomas documented in addition to craniocerebral injuries, and all were pronounced deceased at scene.

Research on the delayed presentation of subdural hematomas in patients taking anticoagulant medication is limited, particularly from the perspective of the medical examiner.

Reference(s):

- ¹ Rust T, Kiemer N, Erasmus A. Chronic Subdural Hematomas and Anticoagulation of Anti-Thrombotic Therapy. *Journal of Clinical Neuroscience*. 13 (2006): 823-827.
- ² Volans A.P. The Risks of Minor Head Injury in the Warfarinized Patient. *Journal of Accident and Emergency Medicine*. 15 (1998): 159-161.

Subdural Hematoma, Anticoagulation, Delayed Clinical Presentation