



Pathology Biology Section – 2007

G20 Neck and Scleral Hemorrhage Due to Drowning

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The goal of this presentation is to review a case of drowning associated with extensive bilateral scleral and neck hemorrhage.

This presentation will impact the forensic community and/or humanity by discussing the occurrence and possible mechanisms for the creation of scleral and neck hemorrhage in drowning related deaths.

The decedent was a 30-year-old male who was found with his 5-year-old stepson at the bottom of a nine foot deep hotel pool after hotel workers noted two of the decedent's other young children playing unattended on the steps in the shallow end of the pool. The decedent and his stepson were pulled unresponsive from the pool. Firefighters arrived at the scene and started CPR after finding the decedent pulseless and not breathing. After 30 minutes of resuscitative efforts, he was declared dead at the scene. The child was taken in "critical" condition to a nearby children's hospital, and was discharged the next day with no neurological deficits. At that time, the stepchild reported that the last thing he remembered was falling into the pool.

The decedent's wife last saw him alive 2.5 hours before he was found. She thought he and the three children were going back to their room to watch television. She did not know why they would go to the pool, since he and the children were unable to swim. An investigation by law enforcement found no evidence of foul play.

A "foam cone" was at the mouth and nose of the decedent at the scene. At autopsy, there was marked bilateral scleral hemorrhage. No abrasions or contusions were on the anterior or posterior neck. Internally, the lungs were hyperinflated. Frothy fluid filled the airways and exuded from the cut surfaces of the lungs. The sphenoid sinus contained 3 ml of bloody fluid. Blood was in the mastoid air cells bilaterally. The right ventricle of the heart was dilated and the thyroid gland was markedly congested. A layered anterior neck dissection revealed hemorrhage on the surface of multiple strap muscles that was confined to the fascial surfaces of the muscle; sectioning did not reveal contusion within the substance of the muscle. A comprehensive toxicology screen did not detect alcohol or drugs within iliac blood. A vitreous electrolyte screen was within normal limits. The cause of death was determined to be drowning. The manner of death was accident.

Despite the assertion that anterior neck muscle hemorrhage "do not occur in drowning and should always raise the suspicion of foul play" (Spitz, 2006), others have reported this finding (Carter et al., 1998; Puschel et al., 1999). This hemorrhage has been attributed to hypostasis (livor mortis), muscular injury due to violent neck movements or an artifact of decomposition (Carter et al., 1998). Conjunctival and facial petechiae are due to increased cephalic venous pressure; a phenomena that may be exaggerated by coughing, gagging or a struggle that increases cardiac output and blood pressure (Ely and Hirsch, 1999).

Increased central venous pressure due to coughing and gagging, as well as increased cardiac output and blood pressure during the struggle of the drowning process, led to the scleral and neck hemorrhages described in this case. The elevated central venous pressure would be transmitted through valveless veins to the neck musculature as well as the head. Such elevated pressure could also cause right heart dilation and congestion of the thyroid gland.

Strangulation can result in neck and scleral hemorrhages similar to those described in the current case. Direct trauma to the neck during strangulation would typically cause hemorrhage within the substance of the muscle rather than just fascial hemorrhage. When a body recovered from water has these findings, it is imperative to consider all scene, autopsy, and toxicology findings to arrive at the proper cause and manner of death.

This case presentation demonstrates that drowning can result in significant neck and scleral hemorrhage, probably due to increased central venous pressure during the drowning process.

Drowning, Hemorrhage, Strangulation