H35 Patterns of Blunt Force Trauma Induced by Motorboat and Ferry Propellers as Illustrated by Three Known Cases From Rhode Island

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After attending this presentation, attendees will have a better understanding of the typical locations and injuries induced by motorboat and ferryboat propellers.

This presentation will impact the forensic community by illustrating three cases of propeller-associated fatalities. This information can be used as exemplar patterns of trauma when dealing with cases of remains recovered from marine contexts with unknown circumstances surrounding the death.

Understanding patterns of trauma is important when dealing with skeletonized remains as it may influence the determination of cause and manner of death. Further, an understanding of taphonomy and bone fracture mechanics is necessary in order to reconstruct the timing of injuries (peri- vs. postmortem) and establish or rule out fatal injuries. In cases of decomposed bodies recovered from marine environments, skeletal trauma analysis can be even more significant because of the multitude of confounding variables affecting the soft tissue. In these cases, it is the ability to recognize patterns of skeletal injuries and reconstruction of the taphonomic history of the individual that can be most helpful in understanding the circumstances of the death event.

Previously, Kroman *et al.* (2007) discussed experimental patterns of injury and injury mechanics from propellers in relation to speed at impact and propeller style. Their research discussed trauma in terms of blunt and sharp force trauma to human cadavers and euthanized pigs in an experimental setting. The present paper will attempt to further examine the skeletal trauma caused by similar mechanisms in terms of wound characteristics and location. With this information investigators may be able to identify propeller trauma, even in severely decomposed bodies.

In 2007, the Rhode Island Office of State Medical Examiners investigated three unrelated cases involving decedents who had been struck by boat propellers.

Case 1: A young male decedent was struck by the propeller of an open motorboat as it approached him at a reportedly low speed in the water.

Case 2: A young male decedent was struck by the propeller of an open motorboat traveling at a relatively high speed after falling overboard at the front of the boat.

Case 3: An elderly male decedent fell from a pier and was struck by the propeller of a ferry as it was leaving the dock.

The first two cases exhibit similar patterns with longitudinal parallel propeller blade impacts that traverse portions of the body. In each case the propeller impacted the cranium and the extremities. While impacts to the extremities and torso created skeletal trauma easily recognizable as blunt force, impacts to the cranium created somewhat linear fractures with primarily smooth fracture edges that could be mistaken for sharp force. However, they are considered the result of blunt impacts because the shape of the edge on a standard propeller blade is “squared-off,” rather than beveled, which would result in sharp trauma. Due to the squared edges of the propeller blade, “scoring” can and does occur on the bone, however, this is not true sharp force trauma because of the lack of edge bevel. The decedent in Case 2 sustained blunt force lacerations to the lungs and liver which appear as linear defects, yet are the result of tears in the soft tissue rather than incised cuts.

In Case 3, the impact from the ferry propeller caused significant damage to the decedent. In this case the body was completely severed in the abdominal region and only the upper portion was recovered. The torso showed fractures to every rib as well as both forearms; the left radius displayed a classic butterfly fracture. In this case, the blade of the propeller also impacted the cranium and caused delamination of the outer table, a characteristic of slow load blunt force trauma to the cranial vault. Vital organs were no longer present to evaluate at autopsy and cause of death was undetermined, however it was determined that the injuries caused by the ferry propeller were sustained postmortem.

These case studies review the traumatic blunt force characteristics caused by propeller injuries as well as highlight the anatomic regions most likely to sustain skeletal trauma. The first two cases exhibit blunt skeletal injuries caused by standard propellers at different speeds reflecting similar patterns of trauma. The third case sustained blunt trauma to the majority of the body due to the greater sized blade and energy associated with the large ferry propeller.

These case descriptions, coupled with an understanding of blunt force trauma biomechanics to bone, should allow the examiner to compare injuries, even in severely decomposed bodies, to patterns of documented propeller blade trauma as an aid to determining cause and manner of death in marine fatalities.

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