H110 Multidisciplinary Combination of Traditional and New Techniques in the Determination of Identity: The Utility of the Sphenoid Sinus Rediscovered

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After attending this presentation, attendees will learn of factors limiting the usefulness of the frontal sinuses in identification of unknown decedents by radiological comparison. A model of multidisciplinary cooperation will demonstrate the utility of the sphenoid sinus for that purpose.

This presentation will impact the forensic science community by demonstrating how successful comparison of the sphenoid sinus or other structures difficult to image by conventional x-ray examination can be achieved with CT equipment available in almost any community hospital or diagnostic center.

For 85 years the frontal sinuses have enjoyed the enthusiastic focus of forensic investigators as a prime site for identification by radiological comparison. The usefulness of other paranasal sinuses, particularly the sphenoid sinuses, has been largely ignored. Increasing acceptance and availability of CT as the primary method of imaging the skull promotes utilization of the more protected and, hence, most imperishable of the paranasal sinuses for the same purpose.

Boaters discovered a human skull on the tidal flats of the Delaware River just 300 yards south of the Port of Wilmington. The skull was removed from its original site to higher ground and the police were notified. The skull was discolored, covered and impregnated with gravely mud from the waterway. A portion of the skull had been damaged, and the mandible was missing. A single maxillary tooth (#2) was in place and contained an occlusal restoration. Photographs of the skull were sent to a physical anthropologist who provisionally reported them as an adult male, probably under 50, with possible Asian or Native American morphology.

There were several persons missing from aquatic accidents or suicides in the area. This description best fit a 43-year-old male who had fallen off a boat into a tributary of the Delaware River 38 months earlier— but he was listed as Black.

The skull was sent to a forensic odontologist along with dental radiographs of the possible decedent. The single tooth in the skull (#2) was compared with the antemortem radiographs. The occlusal amalgam restoration in that tooth had a similar radiographic outline consistent with a match but not sufficient to reach the level of positive dental identification.

The skull was then sent to the anthropologist who confirmed the initial assessment from the photographs as to age and sex, refining the age estimate to 35-46, and suggesting a postmortem interval less than five years. She reiterated that the cranium exhibited primarily mongoloid characteristics, supported with a FORDISC 3.0 osteometric assessment, although with very few (non-metric) African-American traits. In view of the racial ambiguity, she requested further interrogation of the presumed victim's family. They readily revealed that there was Native American ancestry in both maternal and paternal lines, and added that their missing relative had a CT examination of the head a year prior to his disappearance. This examination (actually a CT of the paranasal sinuses in the coronal plane) was compared with a frontal x-ray of his skull obtained by the anthropologist, who could not rule out the match. She suggested the case be referred for forensic radiology for possible identification.

The postmortem x-ray and the antemortem CT were examined by forensic radiologists who confirmed some similarity, but successfully argued the necessity of a postmortem CT of the skull. Meticulous positioning of the skull enabled reconstruction of images to almost exactly replicate the antemortem CT, which produced many compelling, matching features, particularly in the sphenoid sinuses and, finally, an unequivocal positive identification.

This case is presented as a model of multidisciplinary cooperation and tenacity. We believe it is the first successful identification of an unknown body by comparison of the sphenoid sinuses on CT images of a skull when visualization of frontal sinus by conventional radiology was compromised.

Identification, Computed Tomography, Sphenoid Sinuses

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