A114 The Application of Dental Cementochronology in Unidentified Migrants in South Texas

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Learning Overview: After attending this presentation, attendees will understand the correlation of histological and skeletal morphological methods used for estimating age at death of Latin American migrants along the United States-Mexico border.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing an additional aging technique for Latin American migrants when macroscopic and rib histological aging techniques are not possible.

The number of reported deaths of undocumented border crossers along the United States-Mexico border has been steadily increasing despite a decrease in apprehensions since the early 1990s.[1] This is due to the "Prevention Through Deterrence" policy, implemented by the Clinton administration and enforced by the United States Border Patrol.[1] This policy has inadvertently pressured undocumented migrants away from urban communities and into the hostile desert environment in which many individuals succumb to exposure to dehydration, heat, and hunger. The humanitarian effort to put names to the unidentified migrant remains that are found in Texas is referred to as Operation Identification (OpID). A total of 279 individuals have been transferred to Texas State University for anthropological analysis.

One of the critical factors to consider when comparing potential identification matches between missing persons reports and forensic anthropology reports, is an accurate age-at-death estimate. Previous studies have examined the accuracy of macromorphoscopic aging techniques based on the Anthropological Database at Odense University (ADBOU) scoring procedures and rib histological analysis.[2] The goal of the current study is to examine the utility of cementochronology as an additional aging technique for Latin American migrants when ribs or ossa coxae are not preserved. Additionally, the outermost annulation of each tooth section was used to estimate season of death based on recommendations suggested by Dr. Wedel.[3]

One single rooted tooth was sampled from 48 individuals from the OpID cases (18 females and 30 males). Thirty of the individuals included in this study had rib histological aging analysis completed. The rib histology ages were gathered from case reports. The cementochronology age estimates were compared to rib histology and ADBOU skeletal age estimates. Point age estimates were used to test the correlation among the three methods. A Wilcoxen rank signed test was used to test the consistency between annulation counts among the three observations. This test showed that the annulation counts per individual were consistent throughout all the observations (90% of the counts had a count difference of 2 or less). For 9 of the 48 cases, the known season of death was established based on Accumulated Degree Days (ADD), which were then compared to the estimated season of death based on the outermost annulation of the dental cementum.

Results indicate that the rib histology, ADBOU, and cementochronology aging methods had statistically significant positive correlations based on scatterplot matrices based on the Kendall's Tau correlation coefficients (p <0.05). These results indicate that cementochronology point age estimates were consistent with the rib histology point age estimates. There have been two positive identifications of individuals that were included in this sample. The cementochronology point age estimates were consistent with the known age, whereas the ADBOU ages tended to overage young individuals and underage older individuals. The rib histology age ranges encompassed the known age of the two identified individuals; however, this age range is rather large and was likely to capture the known age. The cementochronology age ranges for the two identified individuals were narrower. The estimated season of death for six of the nine cases matched the known season of death. Once more positive identifications are made, the accuracy of season of death from cementochronology can be further investigated. Additionally, the correlation of age estimates derived from ADBOU, rib histology, and cementochronology can be examined for more individuals as more identifications occur.

Reference(s):

1. León J. (2015). *The Land of Open Graves Living and Dying on the Migrant Trail*: 29-34.
2. Mavroudas S., Spradley K.M., Fancher J.P., Duecker H., and Crowe N.M. (2015). The Identification of Undocumented Border Crossers Along the U.S.-Mexico Border: A Case for Bone Histology. *Anthropology.* FACTS Texas State University, San Marcos.
3. Wedel V.L. (2007). Determination of Season at Death Using Dental Cementum Increment Analysis. *Journal of Forensic Sciences.* (Wiley-Blackwell) 52(6):1334-1337.

Dental Histology, Aging, Operation Identification