F12 Forensic Dental Analysis of Degraded, Fragmented, and Commingled Human Remains

Diana Aparicio, DDS, and Soledad Martinez, MD, Servicio Médico Legal, Avenida La Paz 1012, Independencia, Santiago, CHILE*

After attending this presentation, attendees will recognize the morphological, anatomical, and pathological criteria used in forensic dentistry and its application as an important tool in identifying commingled remains of skeletonized bodies in a mass grave intentionally disturbed.

This presentation will impact the forensic science community by demonstrating how an accurate forensic dental analysis of degraded, fragmented, and commingled human remains can be essential for individual identification even when antemortem records are not available.

During the military regime in Chile, thousands of people were killed. In many cases, they were caught and killed in groups and illegally buried in mass grave sites. After a period of five to ten years, when some of the graves were discovered, the military carried out an operation to remove the bodies from the mass graves to make evidence disappear. At that time, bodies were skeletonized so they could not remove all the remains, leaving in place bone fragments, teeth, and other small evidence. With democracy, judicial investigation of these cases started and the state forensic institution “Servicio Medico Legal” (SML) was called to perform exhumations of remains in different disturbed burial sites.

This particular case involves a group of farmers killed in a creek and buried in a mass grave that was disturbed from remotion five years later. Despite this, the SML was able to recover human bone fragments, dental remains, ballistic evidence, personal objects, and non-human skeletal remains, all commingled, incomplete, and degraded.

Forensic dentistry is a useful tool in human identification, which achieves its goal through the comparison of antemortem and postmortem information. The postmortem examination is affected in this case by the admixture of remains as well as postmortem tooth loss caused by the intentional relocation process. Additional difficulties derived from the long interim from burial to judicial exhumation (30 years). Performing a thorough dental macroscopic study using morphological, anatomical, and pathological criteria, evidence was organized in skeletal and dental clusters, partially or completely reconstructing the dental arches and providing the minimum number of individuals present in the mass grave.

One hundred and twenty-seven human remains good for dental analysis were recovered: 111 (87%) consisted of isolated teeth (including crown fragments), ten (8%) were mandibular fragments (four with *in situ* teeth), five (4%) were maxillary fragments (three with *in situ* teeth), and one consisted of a removable upper dental prosthesis. All specimens presented taphonomic erosion with the teeth being the least affected due to dental enamel resistance.

Odontological analysis classified 87 of 127 specimens into 21 groups obtaining two complete upper arches, one complete lower arch, two partial upper arches and one partial lower arch, and other smaller parts. This led to a minimum of nine individuals for the burial site, considering only the odontological point of view.

The lack of adequate antemortem dental records ruled out postmortem comparison for identification purposes, thus genetic testing appeared as the only possibility to get individual identities. Teeth from some of these twenty-one groups and eight ungrouped teeth were subjected to nuclear DNA sampling; one to three samples from each group were sent separately. A consistency up to 100% was obtained between odontological analysis and DNA testing: identical genetic profiles in all loci typed for teeth coming from the same group. The genetic testing results confirmed the odontological clusters and also provided other associations between upper and lower arcades and ungrouped teeth.

The dental analysis methodology and evidence organization allowed grouping and adequate selection of samples for genetic analysis that led to successfull identification of individuals, preserving dental remains suitable to be returned individually to relatives, and terminate the grieving process. Multidisciplinary approach integrating judicial information, forensic archaeology, forensic anthropology, forensic odontology, forensic pathology, and forensic genetics was essential for this goal.

Commingled Remains, Odontology, Identification

