G32 Using More Than Radiographs in Identification: A Crown, a Scanner, and a Denture

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After attending this presentation, attendees will better understand how dental information other than radiographs can be used to assist in the identification of individuals, and why it is vital to have all dental antemortem information available.

This presentation will impact the forensic science community by illustrating the need to collect all available antemortem dental information and by discussing ways in which valuable aids to identification can be found in sources other than dental radiographs.

Case 1: On October 30, 2015, a home in Cayuga Ontario, Canada, was leveled to the foundations by a fire which was so intense that the entire house collapsed into the basement. The remains of two severely burned individuals, presumed to be the couple who owned the home, were retrieved.

The first victim was the wife who had been to the dentist just two months prior to the fire and had bitewing radiographs taken. She was quickly and positively identified by dental radiographs with no inconsistencies found.

The body of the second victim suffered more severe damage. The forensic anthropologist determined that the victim had suffered gunshot damage to the head as well as severe thermal damage. Examination revealed a large hole in the cranium, macerated brain tissue, and separate areas of internal and external beveling. These findings are indicative of gunshot damage and not thermal damage. The cephalogram also displayed multiple small radio-opacities known as "lead snow storm," also the result of a gunshot injury to the head. The mandible was found underneath the body of the victim and the maxilla was near the body. This damage is also consistent with the cranium nearly exploding from the gunshot injury at close range to the cranium.

The forensic anthropologist was able to retrieve bits of calcined jaw bones and seven roots. Also found were a gold crown and the shell of two porcelain-fused-to-metal crowns, which had fused together by the melting of the porcelain from the heat of the fire. The antemortem dental records included 2-month-old bitewing radiographs as well as models for crowns on the maxillary right premolar teeth and the opposing mandibular model.

Three methods were used to compare the antemortem and postmortem records: (1) radiographic comparison of the gold crown and the antemortem radiographs; (2) the gold crown and the mandibular model were digitally scanned and a comparison of the dimensions of the two scans was completed; and, (3) the occlusal profile of the gold crown was also captured in impression putty and sectioned at various intervals. These indices were then placed on the antemortem model and the fit was compared.

Case 2: On May 11, 2016, a body was retrieved from the Niagara Whirlpool in the Niagara River and brought to Hamilton, Ontario, for identification. The only identification found on the decedent was her Casino Niagara Players Advantage Card. The card was last used on March 29, 2016. Investigation by Canadian and American Border Agencies determined that the decedent may have been an Australian national who had been traveling for two years with infrequent contact with family in New South Wales, Australia, with a history of depression and suicide attempts.

After the initial dental examination in May, it was determined that antemortem dental records were not available, and identification would be attempted by DNA. The request for a DNA swab from the presumptive son in Australia brought to light the fact that a denture existed in Australia which belonged to the suspected decedent.

The denture and swab arrived in Canada on June 7, 2016, and the denture was swabbed for DNA analysis. At that time, it was also made known that the decedent was wearing a partial denture when retrieved from the Niagara River, which was being held by the police. Both dentures fit well in the decedent's mouth.

An impression of the tissue surface of the two dentures was made and positive models of the tissue surface were produced. A comparison of the tissue surfaces of the two dentures and of the decedent's palate was completed.

Summary: The basis of most dental identifications is a comparison of antemortem and postmortem radiographs. When antemortem or postmortem records are limited by availability or damage of the oral structures, peri-mortem or postmortem, other sources of comparison must be sought and used.

Prosthesis, 3D Scanner, Complete Dental Records