F13 Positive Forensic Dental Identification Based on Visual Enhancement of a Conventional Pulp Chamber Radiograph

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The goal of this presentation is to demonstrate the possible forensic identification value of conventional radiograph enhancement using 3-dimensional techniques.

This presentation will impact the forensic community and/or humanity by demonstrating a 3-dimensional software application to conventional radiographs can be of significant value in examining isolated dental structures during the forensic dental identification process. Any tool, which improves the potential to identify decedents, has value to the forensic community, as well as to the family and loved ones involved.

An 18-year-old male was returning home with his date after a high school prom at 5:30 a.m. He was intoxicated by (history). His vehicle impacted a tree at a high speed resulting in multiple rotations and impacts. His date was ejected from the vehicle and was unconscious, in a field. When she regained consciousness, the vehicle was on fire. The occupant was incinerated. A recovery effort was attempted after the fire was extinguished. Due to the extreme temperature of the fire, the degree of incineration was extensive. The medical examiner was able to recover small fragments, three of which were teeth fragments.

Dental records were obtained form the treating dentist, based on a tentative identification. Duplicates of written clinical records and bitewing radiographs were surrendered. Initial examination of the three fragmented teeth, along with multiple angulations of postmortem radiographs was undertaken. Comparison to antemortem radiographs was non-productive. The treating dentist produced the original bitewing radiographs following an additional request, at which time the need for better resolution of the radiographs was explained.

An additional attempt to resolve the identification was made using the original bitewing radiographs. The pulp chamber of tooth #14 appeared to have similar characteristics when the antemortem radiographs were com- pared to the postmortem radiographs under 3X magnification. Enhancement of the images for the purpose of detailed comparison was indicated.

The antemortem and postmortem images of the crown and coronal 1/3 of the roots were scanned using a HP scanjet 5470c and digitized using Forensic IQ software. This software allows for each grayscale shade to be assigned a pixel height and depicted on the z-axis, thus, rendering a 3-dimensional image. Rather than viewing 32 shades of gray as seen with the human eye, the software allows visualization of all 256 grayscale shades. Filtering the images and adjusting the contrast of the images visu- alized multiple points of concordance. The angulation of the coronal 1/3 of the buccal root canals was also consistent.

Application of this software to the antemortem and postmortem images involved in this particular case allowed a positive identification to be made and closure of this tragic event brought to the family. 3-dimen- sional visual enhancement of conventional radiographs appears to have value for the purposes of selected forensic dental identification cases.

Forensic Dental Identification, Conventional Radiographs, Visual Software Enhancement