Dental Identification

Dental identification, similar to all forms of identification, involves the comparison of an unknown object – the dental structures including the teeth and their supporting structures – to a known object – the dental findings recorded during life of the suspected decedent. If a sufficient number of concordant points can be established and no points of difference are observed, the forensic dentist may render the opinion that the two objects derive from a common source – an identification.
The most commonly used method is a comparison of dental radiographs taken by treating dentists during life with radiographs acquired from the remains in question (Figure 1). The use of digital radiography in clinical situations as well as in the morgue has revolutionized this aspect of forensic odontology (Tabor & Schrader, 2010).

Advances in computer technology coupled with improvement in sensor technology over the past 25 years have resulted in the adoption of digital radiography systems in dental practice. These now include the ability to image orthopanographic, cephalographic, and computed tomographic images for nearly instant delivery to clinical workstations. This stands in marked contrast to film-based dental radiography, particularly in forensic applications, and holds many advantages for the forensic dentist. The dentist-investigator is able to speedily discern whether or not features that might serve to confirm or refute a suspected identification are visible and order re-imaging if needed while the specimen is available. In addition, postmortem and antemortem images can be rapidly transmitted across great distances without any loss of fidelity, questions of orientation (left versus right side), or acquisition date and other provenance issues. In the past, film-based images were first reproduced or copied onto additional film substrates and then hand-delivered (mail, courier, etc.) for comparison. Loss of detail and possible loss of the original image were not uncommon. Older, film-based images can, by the use of optical scanning hardware and software, be converted to an electronic image (data set) which can be treated similarly to original digital radiographs (transmission, optimization, storage, etc.) (Weems 2010).

Digital radiographic imaging software also allows the investigator to optimize or enhance the image as viewed onscreen, resulting in visualization of greater detail in the captured image—again increasing the likelihood of an identification or exclusion. Many investigators are working to perfect comparative systems (digital image-subtraction, image rectification, point-to-point analysis, etc.) to assist the forensic dentist in analyzing radiographic images.

Although there are many avenues available to authorities to arrive at the identity of unknown human remains, dental identification is rapid, reliable, readily available in most situations, and relatively inexpensive in comparison. For example, DNA requires time-consuming testing and collection of samples. Fingerprinting requires that the unknown remains retain soft tissue suitable for lifting print exemplars as well as the availability of fingerprint records on file. Nowhere is this more evident than in cases involving multiple fatalities. DVI (disaster victim identification) or MFI (multiple fatality incident) situations tax the resources of the medical examiner. In today’s fast-paced world, rapid identification is expected, if not demanded, by the next of kin and the press. Digital radiography coupled with computer-aided methods of comparing the postmortem dental information gathered in the morgue to antemortem dental information provided by the families of the missing and law enforcement allows rapid resolution and identification (Molina 2010; Smith & Sweet 2010; Ulhe 2010).