Abstract

Traditional forensic dentistry identification techniques rely on comparing isolated teeth or dentures to the most likely missing person and the dental features of a deceased person.

When ante-mortem records are insufficient for comparison or an isolated tooth radiograph is not available, examination of images of the teeth of a deceased over those of an image of a missing person has been sometimes used with successful outcomes.

Introduction

Forensic identification is the most common procedure performed in routine forensic odontology practice. Although odontograms and written notes are the two most frequently used strategies for identification, we believe that the preferred method should be image comparison. We also note that the CT images are more easily obtained than conventional dentography. When comparing corresponding post-mortem images, they often provie a higher level of certainty on which to base an opinion on the likelihood of a match. An image can provide a wealth of anatomical and morphological data that is not available from a written record, and as such is more definitive from the individual. We demonstrate the utility of ante-mortem information is contaminated by error or fraud.

Where written notes and radiographs are not available, we have successfully superimposed post-mortem images over ante-mortem photographs where the ante-mortem photograph clearly displays the teeth and is the definitive file. We superimpose the requirement that the geometric parameters of both ante-mortem and post-mortem images are similar; in practice this may be both difficult and time consuming. We describe the superimposition as a method for obtaining the ante-mortem image and the supplied photograph is better than that of the photographic superimposition due to the better control over the superimposition.

We describe two cases whereirk of lack of dental treatment and lack of adequate traditional dental records including radiographs, superimpose ante-mortem and CERN images using an ante-mortem photograph was used to confirm identity. Both post-mortem photographs and post-mortem CERN images were superimposed on the ante-mortem images, we did not label latter as being a novel method and outline the parameters for its successful application.

Discussion

As CT scanning technology becomes more commonly available for post-mortem investigation, reported applications of this technology to identification in Forensic Odontology include its use as a screening tool or aid in dental identification (3, 4). In our experience, the use of CERN data in forensic identification is becoming accepted by Coroners as a valid technique as we demonstrate its probity.

The greatest advantage of using the 3D CERN reformatted data is perspective to identification. These PM photographs serve as a comparison to the 3D CERN reformatted data of the dental arch of the deceased. Each successive picture in the block shows a decrease in opacity of the CT data by 20% until the original photograph is seen in the lower right box.

The AM dental records contained little information. Examination of the deceased revealed no restorations or other notable features useful for comparison with the AM dental record.

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Method

Suitable ante-mortem (AM) photographs, showing upper front teeth were cropped by investigating police, and the teeth shown were examined visually to determine that they had distinctive visual features. The supplied ante-mortem images were cropped in Adobe Photoshop CS2 to show only the region showing the teeth of interest. Post-mortem (PM) photographs were taken using Canon EOS 350D still digital cameras. Images were saved in JPEG format. Photographs of the teeth were taken in hard tissue density mode to eliminate soft tissues. The images were viewed in virtual space so that they were viewed from a vantage point similar to that of the ante-mortem photographic images. Single pictures of the PM data were secured using a "snapshot" tool in 3D viewing mode and saved as JPEG digital files.

Digital Image superimposition was performed using Adobe Photoshop CS2 by placing each image in a separate image layer and varying the opacity of the overlapping layers. JPEG files of the PM images superimposed on the AM images were saved at 100%, 80%, 60%, 40%, 20%, and 0% opacity of the underlying layer to demonstrate the correspondence between the two images.

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Case 1

AM dental records in this case were unobtainable due to a paucity of identifying features including dental fillings. We superimpose the reconstructed 3D CT images with the AM Facebook image of the deceased. Each successive picture in the block shows a decrease in opacity of the CT data by 20% until the original photograph is seen in the lower right box.

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References