Image comparison versus written records in forensic odontology: a matter of confidence

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Abstract
The purpose of comparison of records of a missing person with those derived from examination of a deceased person is to establish the identity of the deceased. The certainty of the conclusion has significant consequences in terms of the outcomes for families, investigators, coroners and the administration of justice.

We discuss the issues relating to the use of comparison of images deriving directly from individuals as opposed to comparison of written dental records in forensic odontology identification, and analyse the pattern of use of images in routine Queensland forensic odontology in response to the changing forensic environment between 1994 and the present.

Written Dental Records
Is a picture worth a thousand words? In the case of dental records the answer will almost always be “no”. Written dental records can be extremely difficult to manage. Many, they are handwritten, so an ability to interpret poor handwriting is a good skill to have. Dentists tend to refer to using professional jargon, often shortened to cryptic acronyms. Many of these are standard across a large proportion of the profession, but dentists tend to develop their own “shortcuts” which adds them in writing in a busy practice. This can make dental records extremely difficult to interpret, even by other dentists, and especially if we are not provided with the contextual details of the dental by an investigating police officer so we can confer directly with them.

Because records are written by hands, they are prone to error. And all use of professional jargon is subject to individual interpretation, especially that used to describe fillings. All of these factors make handwritten records a subjective, often incomplete, basic account that is open to interpretation, and certainly contains little information about the detailed characteristics of individual filling and tooth morphology. These constraints prevent us from using them to definitively confirm identification unless extraordinary evidence is contained within them (Figure 4).

Image Comparison and Image Superimposition
Depending on the types of ante-mortem images available, the forensic odontologist may choose to compare them with post-mortem images, or to superimpose them, to demonstrate that they were derived from the same person. The examples below (Table 1) show the comparison of radiographs (Figure 2), superimposition of a dental model and original teeth (Figure 3), and a radiographic superimposition (Figure 4).

With the comparison of the entire spectrum of available minutiae, the degree of confidence in the extent of the similarity is enhanced to a degree simply not possible with written records. Additionally, image comparison can be understood and evaluated by the non-dentist, so the scientific basis of the comparison and consequent opinion is made accessible to a lay audience. This helps to satisfy the Basis Rule of expert evidence.

The percentage of cases in each period between 1994 and August 2008 in which advice of identification was provided without images only in compelling cases where unusual and diagnostic confirmation of identity using images was provided in Queensland is shown in the table below (Table 2). We can see that images are increasingly used in forensic identification, and so dental records that are retrieved may contain only partial (and possibly outdated) information. Written dental records can be extremely difficult to manage. Mostly, they are handwritten, so an ability to interpret poor handwriting is a good skill to have. Further, should records be obtained from overseas, they may be in an unfamiliar language.

Can we be sure other written records do not contain errors that are more difficult to observe? Image Superimposition with Study Case
Superimposition of a photograph of the teeth of a deceased person and a dental study cast obtained from the treating dentist demonstrates the high degree of similarity between the morphological features of both.

A similar comparison between the photographs and the study model of the upper teeth reveals a similar degree of similarity.

While a measurement scale is absent, we can observe that this comparison of morphological characteristics is in no way less satisfactory than comparing written notes.

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