

Accuracy of dental identification of adults with unrestored teeth comparing previous radiographs of mixed dentition

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ABSTRACT

Comparative dental identification is a primary method for the identification of human remains: post-mortem (PM) findings are compared with ante-mortem (AM) dental records of supposed matches. A minimum number of concordant points is not necessary, as the accuracy depends on the examiner's expertise and quality of information. Dental comparison requires the availability of AM dental records and relies on the diverse dental pattern and dental treatments among different people. However, in the recent decades, dental interventions have become less necessary and invasive; additionally, the time-lapse between dental records has increased significantly, so the latest radiographs may be dated back to childhood. Consequently, when dental identification is required, the most updated AM data may lack in distinctive or comparable features. Only a few studies evaluated the reliability of comparing dental records with mixed dentition to unrestored permanent dentition.

The primary aim of this study is to evaluate the specificity, sensitivity and overall accuracy of dental identification of adults with unrestored teeth when the most recent AM radiograph was taken during mixed dentition; the secondary aim is to investigate which anatomic features were chosen by the experts in order to reach a conclusion for identification.

The radiographic collection of private dental clinics in Italy and the Dental School of Dundee University were scrutinized to select 15 orthopantomogram (OPG) from male and female adults with healthy permanent dentition; if the patients had completed an orthodontic treatment, they were included in the selection. Radiographs with the presence of any retained deciduous tooth, restorations, root canal treatments and untreated cavities were excluded. Those selected radiographs were considered as post-mortem OPG. From each patient, a previous OPG taken during their childhood or adolescence were selected for comparison; the inclusion criteria were: presence of restored or unrestored deciduous teeth, permanent central incisors or first molars at least partially erupted. Another 30 OPG from other children and adolescents were added to the comparison and also worked as ante-mortem OPG.

A number of 10 forensic dentists received a private invitation to an online survey, which included 15 sections. Each session contained: one PM OPG of one adult and three different AM OPG and two sets of questions. The first question asked to identify the correct match by visual comparison according to

the following options: positive, possible, impossible because of insufficient data and excluded; within the same section, the experts could provide two possible matches, specifying which one was the most suitable. The second question asked to write which features were taken into consideration, in order of importance; no suggestions were provided. There was no time limit for the completion of the survey but the experts could declare the time spent.

Generally, trabeculae patterns and bone marrow cavities are expected to be the most stable and reliable features in time. By contrast, with a long time-lapse between AM and PM radiographs, teeth, inter-radicular, inter-dental and crestal alveolar bone undergo severe changes due to tooth eruption and root formation.