

Semi-automatic forensic approach using mandibular lingual canals as fingerprint

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ABSTRACT

Teeth have been widely used for forensic victim identification. Since the mandible is the strongest bone of the skeleton of the face, it is often preserved after death. Therefore, previous research investigated the mandibular midline neurovascular canal structures as a forensic fingerprint. In their research, observers evaluated cone beam computer tomography (CBCT) data of ante-mortem (AM) and post-mortem (PM) showing an average score of 95% correct identification. In this work, we present a semi-automatic approach to replace the observers with a computer recognition protocol and validate the accuracy of this newly proposed method.

CBCT of mandibles scanned at 2 different moments were collected to simulate an AM and PM situation where the first scan presented AM and the second scan was used to simulate PM. For every scan, the region of interest (ROI) around the mandibular midline was segmented and labelled. Every PM case was compared to all AM and other PM cases via image voxel based registration with mutual information giving a score value between 0 and 1. The case with the highest score was then considered the matched AM of the corresponding PM. This procedure was then repeated one week later to assess the reproducibility of the method via intra class correlation test (ICC).

We hypothesize that this method once validated would be one step closer to a fully automatic identification procedure for victim identification based on the mandibular midline canals only in cases when CBCT is available AM and PM.