

DENTAL ANOMALIES AND THEIR VALUE IN HUMAN IDENTIFICATION: A CASE REPORT

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ABSTRACT

Forensic odontology and anthropology provide valuable support with regard to human identification. In some cases, when soft tissue is destroyed, carbonized or absent for whatever reason, bones and teeth become the only source of information about the identity of the deceased. In human identification, anything different, such as variation from normality, becomes an important tool when trying to establish the identity of the deceased. This paper illustrates a positive identification case achieved by the diagnosis of an anomaly of tooth position, with confirmation using skull-photo superimposition. Even though forensic science presents modern techniques, in this particular case, the anomalous position of the canine played a key role on the identification, showing that the presence of a forensic dentist on the forensic team can be of great value.

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Running title: Dental anomalies and human identification

INTRODUCTION

Anthropologists and odontologists usually have a leading role in the forensic team when dental structures are the only source of information for the identification of human remains. The resistance of teeth and their supporting tissues, even to fire and decomposition, makes them extremely useful for identification purposes.¹⁻⁴ In cases of carbonization, advanced decomposition, or partial destruction, all attention turns to the analysis of bones and teeth, and forensic experts need support from the family of suspected victims, on providing clear and

complete antemortem medical and/or dental records, to be compared with the remains.⁵⁻⁹

For the identification of human remains, anything that distinguishes one person from another, such as a tattoo, or a variation from normality, becomes very important to the forensic team, greatly assisting the identification process. This is the reason why literature shows cases of abnormality, asymmetry and pathology narrowing the search within missing persons files.^{3,10} However, few authors discuss the forensic value of dental anomalies that are commonly missed by medical examiners. These variations, analyzed by dental examiners, can potentially lead to a positive identification.^{2,3,6,7,11}

In the absence of antemortem information, the forensic team search for alternative sources of reference, such as photographs¹²⁻¹⁴ and videotapes¹⁵ for personal features that may be identifiable at the postmortem examination. One of the techniques used in these cases is the skull-photo superimposition. Identification by this method is based on the matching of the outline and positional relationships between anatomical points on the face, and their locations on the skull.¹⁶⁻²⁰

This paper reports a recent positive identification case of a Brazilian girl, achieved by the discovery of an anomaly of tooth position and confirmed by skull-photo superimposition, showing the importance of the odontological analysis in this case, along with the anthropological evaluation of personal photographs for human identification.

CASE REPORT

The remains of a caucasoid female, with an age estimation between 18 and 30 years, was found in an advanced stage of decomposition, on the banks of a river, in São Paulo, SP - BRAZIL. The forensic odontology team noticed that there were five teeth lost postmortem, and no restorations or decay present in any of the remaining dentition, but there was a positional anomaly: the upper left canine (23¹) was quite buccally displaced (Fig. 1), allowing proximal contact between the lateral incisor (22) and the first premolar (24).

Approximately one month later, a man went to the local Medico-Legal Institute, searching for information about his 23 year-old missing niece. When asked about dental records, the man said she never had dental decay or restorations, but one tooth was “displaced forward.” This information drew the attention of the experts, who requested smiling antemortem photographs of the young woman. The images provided were digitalized, stored in a database, and analyzed by the graphic manager Adobe Photoshop,[™] allowing the forensic experts to identify the same dental anomaly (23), in the exact position as observed on the skull (Fig. 2), as well as all the other remaining visible teeth.

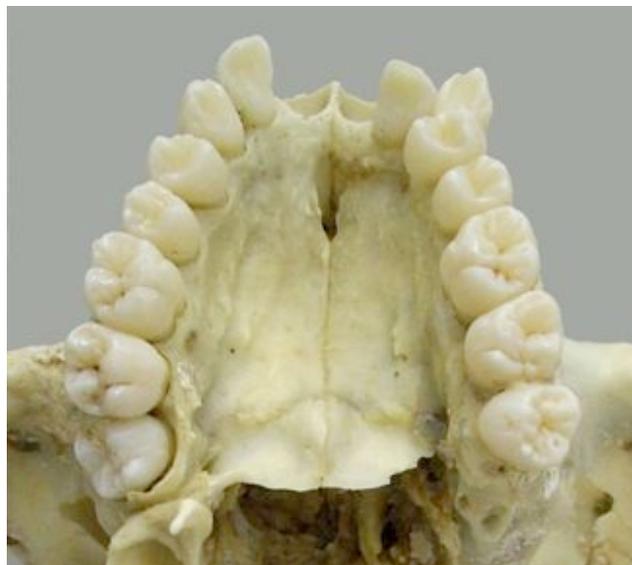


Figure 1: Upper dental arch, with buccally placed left canine



Figure 2: Submitted antemortem photograph

After that coincidence, which, according to many authors, is sufficient to establish a positive identification,^{3,4,14} the team took pictures of the skull using a digital camera of 6.0 megapixels, in an attempt to reproduce the angle of the face as shown on the photograph (Fig. 3). Following storage in the database, the size of the images ante and

* The dental notation adopted is advocated by the FDI World Dental Federation

postmortem were adjusted, using dental structures, interpupilar distance, and facial contour as size reference, achieving the same scale on both images, followed by the skull-photo superimposition and craniofacial analysis (Fig. 4). Computer-assisted craniofacial superimposition allows the operator to evaluate the fit between the skull and facial images by morphometrical analysis.¹⁹ The correct sizing and positioning of the images is essential - the image of the skull must be in exactly the same scale and angulation as the photograph.

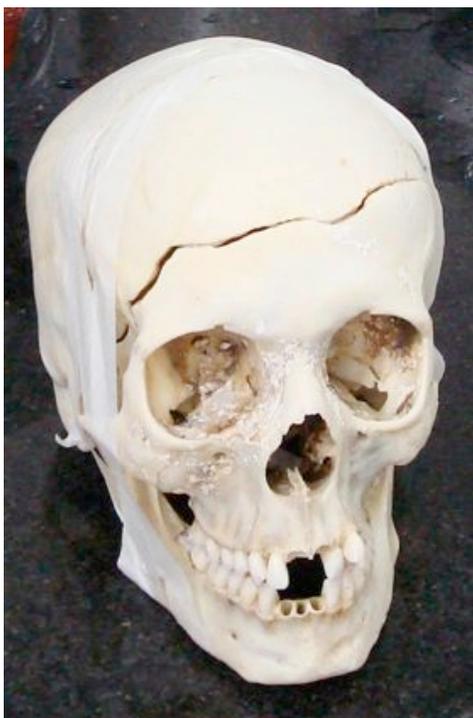


Figure 3: Skull articulated and placed reproducing the angle of the photo.

The criteria used to judge the matching between the skull and photo, were the same as those suggested by Austin-Smith and Maples,²¹ and presented as follows:

1. The length of the skull considered from bregma to menton fits within the face, and the bregma is covered with hair;

2. The width of the cranium fills the forehead area of the face;
3. The eyebrow follows the supraorbital margin over the medial two-thirds. At the lateral superior one-third or the orbit the eyebrow continues horizontally as the orbital margin begins to curve inferiorly;
4. The orbits completely encase the eye including the medial and lateral folds;
5. The width and length of the pyriform aperture falls inside the borders of the nose;
6. The line of the mandible corresponds to the line of the face
7. The mandible curve is similar to that of the facial jaw; at no point does the bone appear to project from the flesh.
8. The prominence of the glabella and the depth of the nasal bridge are closely approximated by soft tissue covering this area; the nasal bones fall within the structure of the nose, and the imaginary continued line, composed of lateral nasal cartilages in life, conforms to the shape of the nose.
9. The prosthion lies posterior to the anterior edge of the upper lip;
10. The mental protuberance of the mandible lies posterior to the point of the chin.



Figure 4: Superimposition skull-photo with two degrees of opacity

DISCUSSION

Inexperienced observers may not be able to easily notice proportional and feature variation between skulls. However, an expert can demonstrate unlimited variation in shape, size, proportion and detail between skulls, showing that each skull is as individual as each face.²²

Each dentition is considered to be unique, although to the non-dental eye they all may look the same. Variations in shape, color, position, age changes, wear patterns, caries and periodontitis, and all associated dental restorations and prosthetic work, make the dentition as individual as fingerprints.^{2-4,11}

Although forensic odontology and anthropology are extremely valuable when traditional identification methods are unsuitable or have failed (fingerprints, DNA), sometimes they also can be unproductive for various reasons. A very common reason is the absence or inaccuracy of dental records. In these situations, the analysis of any available social and family photographs may help forensic professionals to identify the deceased.¹⁴

When the anterior dentition is recovered with the skull and a smiling antemortem photograph is available, the shapes of the individual teeth and their relative positions are considered sufficiently distinctive for a positive identification.^{14,21} In this particular case, computer-assisted craniofacial superimposition was used to corroborate the positive identification, acting as additional criteria, allowing the team to confirm the identification achieved initially by odontological analysis of a smiling picture. Other elements such as a relationship between the time of the body decomposition and the period of disappearance of the victim, personal characteristics such as sex, age, height, estimated weight were also considered.

CONCLUSION

This particular positional anomaly of the canine, which played a key role in the identification process, had not been noticed by the medical examiner. This case report, emphasises the value of a forensic dental examiner being present as part of the

forensic team during the investigation to seek identification of human remains.

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