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Positive identification of a burned body using an implanted orthopedic plate

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ABSTRACT

Human identification is usually obtained by comparing fingerprints, antemortem and postmortem radiographs, dental records and also by DNA profiling. Sometimes forensic investigators come across some medical appliances such as orthopedic devices. These medical devices may be useful to achieve positive human identification. This paper aims to present a positive identification of a burned human body by tracking batch numbers engraved in an implanted orthopedic device found in the decedent's left ulna bone. The examiners also collected and analyzed other valuable hints related to the case. Forensic examination can provide reliable positive human identification, even if few, but precise information can be obtained from antemortem and postmortem records. The present report illustrates a set of valuable techniques and how identifying numbers in orthopedic devices are helpful to determine positive human identification in cases of carbonization. As seen in this case, the forensic experts used low-cost identification procedures with accurate results, avoiding DNA profiling method that would be of higher cost and time consuming. Considering social and legal aspects, it is quite important that physicians and dentists understand that correct and accurate records of surgeries they perform, such as fixation of orthopedic devices and dental implants, are utterly relevant and helpful in cases of human identification.

1. Introduction

Identification procedures are very important to the human being when alive and so when deceased, concerning legal aspects (citizens' rights and duties). Considering the social aspect, *postmortem* identification of an unidentified body or of human remains is extremely helpful in easing the suffering of a missing person's family.

Generally, positive identification is achieved by fingerprints, dental records, comparison of *antemortem*/*postmortem* radiographs and DNA profile analysis [1–3]. However, establishing positive identification in cases involving extensive thermal alteration is often difficult given the fragmentary condition of the remains and the fragile nature of the material which may hamper the use of standard identification techniques [4]. Prosthetic implants, unlikely organic tissues, can survive many different situations, including cremation [5] and they had been used within recent decades due to specific marks or serial numbers that allow forensic investigators to track the manufacturer of the implanted devices or the location where the surgical procedures had occurred [6].

The human identification by means of radiographic comparison needs a minimum of information about the decedent's identity (a closed population), as opposed to a typical mass disaster case (an open population), which lacks this prior knowledge [7]. Once present, by means of an orthopedic appliance it is possible to individuate characteristics that differentiate one set of remains from another. If experts find a device implanted to human remains they can approach to valuable information about the decedent.

Device presence brings out some of the following information: (i) an injury or disease existed which required device implantation, that friends and family members may be familiar with and remember; (ii) the victim at least had access to the means required to have major surgery, which may be relevant specially in certain areas of the world with regard to narrowing down a search; and/or (iii) it may provide some helpful suggestion about possible middle or advanced age of the individual, depending on the kind of implant. In both open and closed-population situations, having this basic information at the outset of a search is at least a beginning and is actually more information than can be obtained from the biological profile alone [7].

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As an orthopedic appliance is different and its anatomical location is unique, such information can provide excellent comparability for radiographs in a closed-population situation [8,9]. Not only the identifying numbers and the device itself can be analyzed, but also screws can be useful in *antemortem*/*postmortem* radiographic comparisons providing important data due to their placements in a device, their lengths, and orientations in a set of device-bone, in human identification procedures [7].

The aim of this paper is to present a positive human identification of an unknown burned body by tracking identifying numbers engraved in a surgically implanted orthopedic device, which was found in the left ulna bone of the deceased, in addition to the *antemortem*/*postmortem* radiographic comparisons and clinical findings.

2. Materials and methods

2.1. Case history

On April 25th, 2011 the Forensic Dentistry and Anthropology Center of the Dental Faculty of Piracicaba – State University of Campinas (FOP-UNICAMP – São Paulo – Brazil) was demanded to perform identification procedures of an unknown burned human body found in a sugarcane plantation in Piracicaba City (São Paulo, Brazil).

While at the crime scene, in a preliminary examination, investigators supposed that the corpse was a young male adult.

The individual presented a tattoo of a soccer team fan association, in the upper third of his right arm. The body presented strips gagging the mouth and fastening both hands. He was not nude and was next to an empty plastic bucket smelling gasoline.

Three meters far from the body, there was a broken hoe handle.

The burned body was taken to the Institute of Legal Medicine of Piracicaba City (IML-Piracicaba, São Paulo, Brazil). See Fig. 1.

At that same day, police investigators were able to find two women looking for a missing family member with the same characteristics of that unknown burned body.

2.2. Forensic anthropological findings for identification (summary)

The forensic experts interviewed the claimant women, obtaining the following information: (1) they both did not know the dentist their missing family member used to visit; (2) their missing one was a member of a soccer team fan association; (3) he had a tattoo of a symbol and inscriptions related to that association; (4) they reported an orthopedic surgery to repair a bone fracture in his left forearm, by June 2009.

The experts requested them to look for radiographs of his left forearm and other medical records about the mentioned surgery. Experts expected to find identifying numbers of the orthopedic devices possibly used.

At the morgue of the Institute of Legal Medicine, the forensic experts realized they could not to identify the body collecting fingerprints, because of the damage caused by the fire (see Fig. 2), however some important dental events were found such as missing teeth, amalgam restorations and esthetic fillings (see Fig. 3A and B).

There was a partially visible tattoo in green color in the upper third of his right arm, where could be seen the following letters: "RDE". An indefinite green tattoo could also be seen below those mentioned letters. See Fig. 4.

The forensic examiners took two radiographs to confirm the presence of an orthopedic device (both left forearm and left arm of the body) and dissected that (see Fig. 5). Then, the examiners analyzed the metal plate fixed in his left ulna bone.

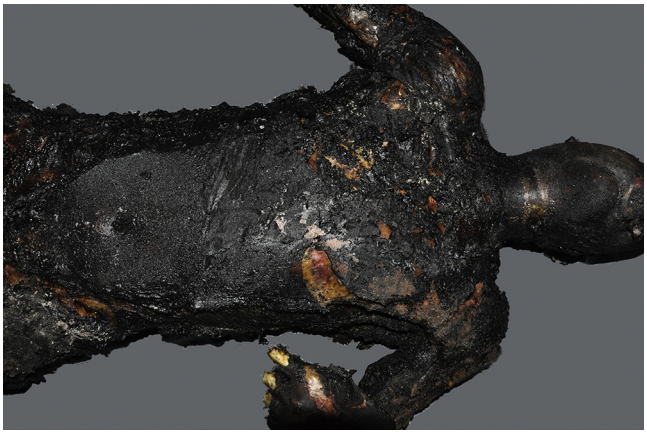

Fig. 1. Unknown dead body found burned.

Fig. 2. Fingerprints were badly damaged by the fire (left hand of the unknown body).

3. Results

3.1. Comparison between the information provided by the supposed family members and the postmortem findings

According to the information given by those supposed family members, the experts were able to compare *antemortem* and *postmortem* data.

Fig. 3. (A, B) Dental events of the victim were clearly observed to fulfill *postmortem* records.