

Comparative Human Identification in two Charred Cars Accidents



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Abstract

The carbonization of a body due to a vehicle accident can require human identification through examination of the dental arches. The aim of this study was to analyze two cases of automobile accidents, each with three burnt victims, and to determine way in which the individuals were identified. This was a retrospective, exploratory, descriptive study with qualitative data analysis. The investigation used data from examination reports carried out by the Legal Medicine Institute of Roraima, Brazil. Two accidents involving pickup trucks occurred, one in 2011 and another in 2015. In each accident, there were three passengers who were charred. The cases were classified as fact A and B, and the reports were studied, seeking information about the material forwarded for identification and highlighting the information used for successful or unsuccessful human identification. Accidents denominated as fact A and B presented three bodies each, classified as A1, A2, or A3 and B1, B2 or B3. There were two male and one female in fact A, and in fact B, three male individuals. Dental records were sent for cases A1 and A3 by including a photograph of a gypsum model for A1 and a dental description for A3. Cases B1 and B2 were studied based on dental records, and in the B2 case, a radiograph of the foot was presented. Cases A2 and B3 had no dental records. The comparative study of cases of carbonized bodies with similar origins, automobile accidents, made it possible to verify congruence in the identification methods, which were carried out by scientific dental comparison. Whether there was insufficient information, another technique must be applied.

Keywords: Human identification; Forensic dentistry; Carbonization

Introduction

Forensic dentists play an important role in human identification, bite mark analysis, maxillofacial trauma, and malpractice and can be extremely important in the process of grief resolution for a victim's family and friends [1]. Teeth and dental traits are recognized as one of the most valuable individualizing features of the human body, and dentists are in an ideal position to provide the needed skills and expertise to accurately identify humans [2]. Forensic dentistry plays an important role in the identification of decomposed and charred bodies, such as victims of drowning, burns and aviation accidents [3]. In charred bodies, facial recognition is often impossible and digital identification may be impossible because of its degree of destruction [4]. In many cases, craniofacial identification of burnt bodies can be achieved using only the cranial structures not destroyed by thermal injuries. Previous studies presented

two case reports about men found in burnt cars. Radiographies was used in human identification. The first case used all morphologic features observed for teeth and the frontal sinus for positive identification. In the other case, only a few fragments of the jaw were essential for identification. Details present in the molar roots from an endodontic treatment were present in post-mortem radiography [5].

Dental and radiographic procedures are powerful methods when dealing with burn victims. In an accident involving a bus, 28 victims were charred, and the advantages and limitations of the identification methods were presented. Dental identification was used in 57% of cases, and in 43% of these, the structures were destroyed or there was no ante-mortem documentation for comparison. The authors recommended that dental procedures should be used for human identification after mass disasters [4].

Dental examination based on prior documentation is reliable and faster when records are available, allowing a body release for customary funeral procedures. Thus, study of identification methods for human victims was carried out in two cases of similar automobile accidents and is important to guide academic education as well as to reiterate the need for adequate production and storage of dental records. The aim of this study was to analyze two cases of automobile accidents with three burnt victims in each of the disasters and the ways in which the victims were identified.

Materials and Methods

This was a retrospective, exploratory descriptive study with qualitative data analysis. The investigation used data from examination reports carried out by the Legal Medicine Institute of Roraima, Brazil. Two accidents involving pickup trucks occurred, one in 2011 and another in 2015. In each accident, there were three passengers who were charred. The cases were classified as fact A and B, and the reports were studied, seeking information about the material forwarded for identification and highlighting the information used for successful or unsuccessful

human identification. The analyzed variables were sex, age, cause of death, material presented for the identification process and method of identification. The data were recorded and analyzed in Microsoft Excel®.

Results

Accidents denominated as facts A and B presented three bodies each, which were classified as A1, A2, or A3 and B1, B2 or B3. There were two male and one female in fact A, and in fact B, three male individuals. The causes of death were primarily by thermal action with carbonization of the bodies: four deaths were by thermal action with carbonization, and two bodies presented blunt trauma to the head with carbonization occurring as a later cause. Fact B, with deaths due to head trauma, presented as a fallen tree on the vehicle. Dental records were sent for cases A1 (Figure 1) and A3, including a photograph of a gypsum model for A1 and a dental description for A3. Cases B1 and B2 were studied based on dental records, and in case B2, a foot radiograph was presented. Cases A2 (Figure 2) and B3 had no dental records (Table 1).



Figure 1: (a) Facial aspect in a carbonized body; (b) Dissection and exposure of dental arches; (c) Ante-mortem photograph of cast model sent to forensic experts by the dentist. The cast model showed specific features in teeth - incisal wear (green arrows) and cervical wear (blue arrow); (d) Post-mortem record: anterior view of the mandible showing features in the teeth - incisal wear (green arrows) and cervical wear (blue arrow).

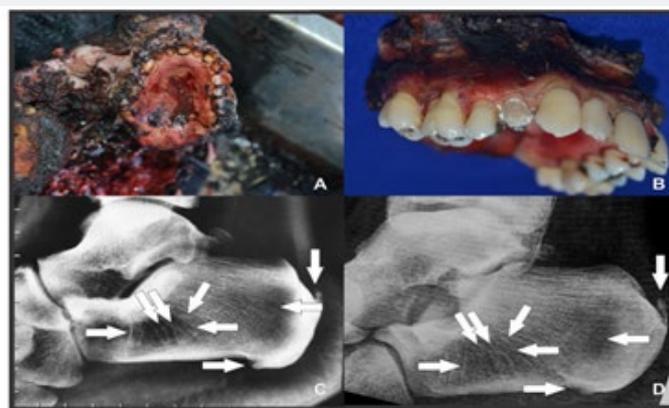


Figure 2: (a) Head trauma with maxillary exposure; (b) Removal of the maxilla and its cleaning to visualize the dental treatments; (c) Ante-mortem radiography of the calcaneus region; (d) Post-mortem radiograph of the region of the calcaneus bone. The arrows indicate points of the bone trabeculae analyzed.

Table 1: Presentation of The Descriptions of the Fact, Sex, Age and Material Presented for Human Identification Purposes.

Fact	Sex	Age	Material Presented for Identification	
A1	M	61.2	Dental record	Gypsum model
A2	M	38.3	Document absence	-----
A3	F	52.3	Dental record	Description of procedures signed by dentist
B1	M	61.7	Dental record	-----
B2	M	44.4	Dental record	Foot radiography
B3	M	-----	Document absence	-----

Discussion

Human identification by the dental method can avoid the application of the DNA profiling method in cases of carbonized bodies [6,7] as well as in the identification of a body in the final phase of putrefaction and the beginning of skeletonization [8]. In both facts, the positive identification of three cases was performed through the study of dental arches and foot radiography. The majority of deaths were male individuals, corroborating the records of accidents of vehicles with male victims [9]. The fact A victims had a mean age of 50.6 years, similar to the 50.7-year average age in fact B, with no significant difference between the two groups. There were no young people in the accidents, distancing these accidents from the age group more prone to death by automobile accidents. Thus, it was observed that these facts occurred randomly. Two bodies (A2 and B3) were not identified due to an absence of dental records. Case A1 presented a dental record and images of a gypsum model that served as the basis for the planning of implant surgeries. Case A3 received a dental record from a description of treatment signed by a dental surgeon.

Case B1 had dental records indicating care between the years 2003 and 2014, with a prosthesis procedure. Case B2 was represented by observations of a fixed prosthesis, but a single record was insufficient for identification. This fact corresponds to the American Board of Forensic Odontology’s (ABFO) guidelines that if there are 5 coincidences or less, there is a need for other techniques to determine identity [10]. Even though a retrospective study analyzing 690 skills affirms that there is no basis for the definition of a minimum number of points of coincidence necessary to carry out a positive identification through dental evidence and that each case has its specific particularities [11] our study showed that only one item, which could only be sufficient if there was adequate registration, did not occur. Still, according to ABFO guidelines, the radiograph of the right foot allowed another radiographic comparison technique to be performed. The scientific literature affirms the importance of dental records [12-14] and dental records were instrumental in achieving a positive identification. The dental record is indispensable for the administrative control of dental activity and is efficiently provided to support the scientific process of dental comparison in cases where unrecognizable bodies are referred for study. In addition, it also lends itself to decreasing the necessary time for case analysis.

Identification procedures performed by four odontologists were finalized after a total of 90 hours for a bus accident in Spain, in which 28 charred victims were examined. Thus, the mean time required for identification by victim was 3 hours of work [4]. Dental identification is accurate and can be performed quickly when information prior to death is available, especially when information related to teeth care is available, and the dental records are accessible.

The average study time for fact A was 01 hour and 49 minutes, and that for fact B was 03 hours and 33 minutes. Dental documentation made quickly by the family members allowed a quick analysis of the A1 case. The A2 case had a minimum time of 24 minutes due to the absence of ante-mortem records. The A3 case was developed over a duration of 04 hours and 13 minutes. The observation of the photographic records demonstrated that because of the extensive destruction of the anatomical structures, the skill lengthened for a longer period. Fact B presented average times superior to those for fact A. The reception of ante mortem documentation was fundamental for identification over a short time. Carbonized bodies in vehicles, whether by crime or accident, are not rare. In these facts, the thermal action changed the external structures and, depending on the time and intensity, damaged the internal ones as well. Teeth are protected by the epidermis, dermis, subcutaneous tissues and muscle tissues that provide important barriers when heat transforms these tissues. In these processes, bodies become unrecognizable, and the preservation of hard tissues such as the teeth may establish them as the fulcrum of the scientific process of human identification.

The processes of dental identification carried out on these cases were successful because the dental records of the victims were present, facilitating every method of identification. Thus, the results indicate that the routing of the dental records was fundamental, delivering decisive information sufficient for positive identification. The comparative study of cases of carbonized bodies with similar origins, automobile accidents, made it possible to verify congruence in the identification methods, which was carried out by scientific dental comparison. In the case where insufficient information was present, another technique was applied. Therefore, it is important that the forensic scientist is made aware of the possibility of other methods beyond dental exams. Accurate documentation will ensure that the examination is completed swiftly and that the

suffering of families is minimized, at least in the first mandatory phase of establishing the identity of unrecognizable bodies.

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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