







Clinical Case Report

Identification of a charred body by comparative analysis of surgically removed jaws: A case report



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ABSTRACT

This case report aims to highlight the importance of comparative analysis of surgically removed jaws, especially when expert human identification is required. In this study's case, a charred body was discovered inside a burnt-out vehicle on the side of a highway. Initially, the vehicle was identified, and its registration and electronic documentation were verified with the competent traffic authorities. The possible victim's family was contacted and interviewed. Given the impossibility of a dactyloscopy due to the destruction of the necessary structures and the possible time and cost limitations associated with DNA identification, the family was asked if the possible victim had any medical or dental history records. The victim's jaws were surgically removed and compared with the dental documentation kept by the possible victim's dental surgeon. Identification using the dental method proved to be viable. The process of forensic dentistry identification is essentially comparative, involving the clinical evaluation of the victim's surgically removed jaws compared to their dental records (forensic dentistry documents). This approach represents a crucial contribution and, in some cases, might be the main or only reference for resolving legal human identification. (Rev Port Estomatol Med Dent Cir Maxilofac. 2025;66(1):44-48)

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Introduction

Forensic dentistry stands out because it provides assistance in human identification in legal cases. In addition, anatomical features of the stomatognathic system can be a preponderant factor in differentiating and analyzing individuals before and after death.¹

Human identification is necessary for criminal or civil purposes in many situations. The more traditional methods often become limited, namely, when bodies are disfigured by burns, drowning, or mass air or sea disasters, leaving dental science with the task of assisting justice in the identification.²

The main task of forensic dentistry is to identify human beings based on the individual characteristics of their teeth. In the case of charred bodies, fingerprints, facial recognition, and even DNA testing become difficult or impossible to carry out. Comparing dental records with surgically removed anatomical parts is one of the most efficient scientific methods for recognizing post-mortem individuals. Forensic dentistry identification methods include comparing bite marks, lip prints, and radiographic evidence with previous records, such as photographs, plaster models, dental radiographs, and cone-beam computed tomography (CT) scans.³

Although the characteristics of an individual's teeth may change as a result of treatments throughout life, the combination of healthy, decayed, missing, and restored teeth is reproducible and can be compared at any time. Therefore, correctly preparing dental records with accurate information is fundamental for teeth to serve as the foundation of a human identification process.⁴ In view of the above, we present a clinical case report on the identification of a charred body by comparing surgically removed anatomical parts with dental documents to prove the victim's identity.

Case Report

The body of an adult was found charred in a vehicle that had left the roadway and overturned several times, bursting into flames with the driver inside. Visual inspection determined that the individual was male. The body was found sitting in the driver's seat, secured to the car's frame and the seatbelt. The collection and analysis of the remains followed a Standard Operating Procedure (SOP). The accident area was cordoned off, and the forensic team wore appropriate protective equipment, such as fire-resistant clothing, gloves, boots, and protective masks, while recovering the body. They took necessary precautions to prevent further exposure to toxic gases and flammable materials at the scene. Before removing the body, the entire scene was carefully documented with photographs and written notes, including details of the damage caused by the accident (such as the vehicle's position, impact marks, skid marks, and material fragments) and fire damage. During the documentation process, evidence associated with the body, including personal items, was collected and packaged. After these procedures, the body was removed with the aid of a stretcher, wrapped in a transport bag, and taken to the forensic medical unit of the Instituto Geral de Perícias in Passo Fundo, Rio Grande do Sul, Brazil, for necroscopic examinations.

Initially, the vehicle was identified, along with its registration and electronic documentation, which were verified with the competent traffic authorities. The possible victim's family members were contacted and interviewed, and secondary data, such as age and clothing, was collected. The family was asked if the possible victim had any medical or dental history records. Although the dental documents provided did not contain standardized data and had been poorly completed, they provided sufficient support for the identification method by comparing data recorded before and after the death. The statement and periapical radiograph provided by the possible victim's dental surgeon included an endodontic treatment with an intraradicular space on tooth 22, which was compatible with the expert results for the same tooth. The ante (Figure 1a) and post-mortem radiographic comparison (Figure 1b) showed a total of seven coinciding points (Figure 2).

A clinical visual examination of the upper (Figure 3) and lower jaws (Figure 4) surgically removed from the skull was also carried out using an adapted Luntz and Luntz technique,⁵ with a horizontal "V"-shaped incision made on both cheeks, with the opening facing the posterior region, starting from the labial commissure. After removing the soft tissue, the ascending branches of the mandible were sectioned, disarticulating the temporomandibular joint (TMJ) and completely isolating it. The maxilla was also isolated by horizontal cutting.

The maxilla exhibited the following situation: teeth 11, 12, 13, 14, 15, 16, 26, and 28 missing; a silver amalgam restoration on the distal and occlusal faces of tooth 18; silver amalgam restorations on the mesial and occlusal surfaces of tooth 17; presence of residual root without clinical crown in teeth 21 and 22; composite resin restorations on the mesial, palatal, and distal surfaces of tooth 23; tooth 24 healthy; a composite resin restoration on the occlusal surface of tooth 25; two occlusal silver amalgam restorations in tooth 27. The mandible had the following scenario: teeth 35, 37, 38, 44, 46, and 47 missing; mesio-occlusal silver amalgam restoration in element 48; residual roots without a clinical crown in teeth 31, 41, 42, 43, and 45; teeth 32 and 33 healthy; a silver amalgam



Figure 1. Ante-mortem (A) and post-mortem (B) radiographs of the region of teeth 22, 23, 24, and 25.

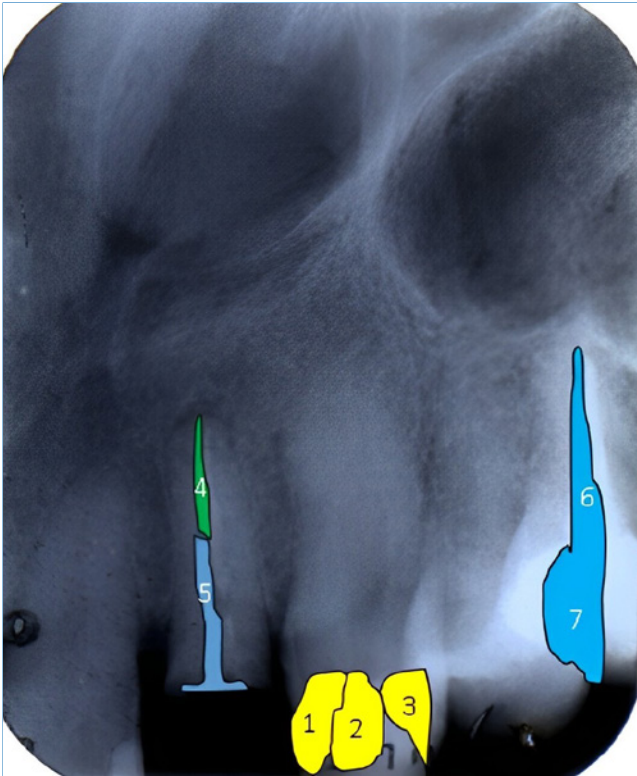


Figure 2. Common aspects of ante-mortem and post-mortem radiographs: restorations on the mesial, occlusal, and distal surfaces of tooth 23 (1, 2, and 3); endodontic treatment (4) with an intraradicular space in tooth 22 (5); endodontic treatment in tooth 25 (6); restoration covering the mesial, occlusal, and distal surfaces of tooth 25 (7).



Figure 3. Upper jaw surgically removed from the victim's body.

restoration on the distal face of tooth 34; a crown with extensive destruction and possible filling material near the root canals in tooth 36.



Figure 4. Lower jaw surgically removed from the victim's body.

Based on the clinical and documentary examinations, the victim's identity was confirmed by comparing ante and post-mortem radiographs. There was no need to apply additional methods, such as dental age estimation. The victim was then sent to his relatives for burial.

Regarding the ethical aspects surrounding this case report, neither the identity nor any data of the victim were ever revealed. Moreover, prior to writing this paper, the head of the General Forensic Institute of the region of Passo Fundo, RS, Brazil, granted permission to access the expert report and images of the case, for strictly academic and scientific purposes. The work was approved by the UPF Human Research Ethics Committee (opinion no. 6.565.956).

Discussion and Conclusions

Human identification is the process that determines a person's identity based on the characteristics or qualities that differentiate them from others and are inherent only to themselves. In post-mortem identification, the most commonly used methods are DNA testing, papilloscopy, iris analysis, and dental analysis, with the latter standing out for its high resolution and low cost.⁶

The process of human identification in dentistry is practical and fast and can be carried out regardless of the corpse's state, depending on a sample in suitable conditions for analysis. For forensic dentistry identification, the individual's treating dental surgeon must have organized and stored the victim's dental records properly, as these are important not only for recording the patient's planning and history but also for potential human identification. Then, the dental examiner's role includes comparing the dental characteristics of the victim's sample in the civil and criminal areas, using bite marks, lip impressions, and imaging evidence with previous records, such as photographs, plaster models, and dental radiographs or CT scans.³

In this study's case, an ante- and post-mortem radiographic comparison was carried out, and no discrepancies or dis-

agreements were noted during the examination using the comparative technique. It should be highlighted that the identification process was only possible because the victim's dental surgeon correctly recorded and stored the information and radiographic images.

When comparing ante and post-mortem radiographs in terms of the number and quality of matches, our report indicated that the radiographic delimitation of composite resin restorations on the mesial, distal, and occlusal faces of tooth 23 and the mesial, occlusal, and distal faces of tooth 25, the endodontic treatment and intraradicular space of tooth 22, and the endodontics of tooth 25 were fundamental, totaling seven points of agreement. The related literature highlights that there is no minimum number of corresponding points in the comparison for positive identification by the Forensic Odontology method since dental particularities vary from case to case and qualitative analysis of these points is ultimately prominent. Thus, the focus is on the individualization potential of a given coinciding point, i.e., there is a variation of converging points in each specific case, and just one coinciding point might be enough to establish identity.⁷

In line with our report, the literature defends that, when carefully produced and correctly archived, radiographic examinations allow the individualization of any person, besides representing an inexpensive method.⁸ Therefore, analysis of dental records accompanied by ante and post-mortem radiographs has become a fundamental tool in forensic dentistry identification.

In order to enable radiographic examination of the remains, the Luntz and Luntz⁵ surgical approach was performed. This technique involves making incisions at specific points of the face and jaw to carefully cut the muscles that stabilize the jaw, facilitating the release of the TMJ. In this case, a horizontal "V"-shaped incision was made on both cheeks, with the opening facing the posterior region, starting at the labial commissure. Incisions in the cheeks cause aesthetic damage that is difficult to hide if the corpse is to be returned to the relatives and veiled before burial. However, in the case described here, because the body was disfigured and there were no conditions for a wake before burial, the Luntz and Luntz's⁵ surgical approach was considered the most appropriate.

Alternatively, more conservative surgical approaches that do not mutilate the corpse should be adopted when the corpse is handed over to the family for a wake after the autopsy. Examples include Keiser Nielsen's approach,⁹ which recommends making wide facial incisions in inconspicuous areas, such as along the natural lines of the face or in less visible regions. This procedure may involve areas around the mouth or jaw or, in some cases, an incision inside the mouth to expose the teeth without needing a visible external incision. The resulting space is then filled with absorbent cotton to restore the cadaver's anterior appearance. Nakayama's¹⁰ approach also advocates making small external facial incisions along the angle of the jaw, near the TMJ, aimed at releasing the TMJ and facilitating jaw mobilization in cases of jaw stiffness. This technique is characterized as easy to conceal but laborious due to the dissection of soft tissues.

Finally, the approach proposed by Heit et al.¹¹ focuses on improving the traditional method of dental autopsy in cases

of gunshot wounds to the oral cavity. Instead of resorting to large and invasive incisions, the emphasis is on a detailed examination of the oral structures without requiring extensive incisions, only wide bilateral incisions in the region of the ramus, angle, and body of the mandible. This technique is particularly suited for cases involving gunshot wounds and is especially useful for examining damage to the teeth and bones in the oral region, which is crucial for determining the trajectory of the projectile and the nature of the injury. Thus, while it is considered a less invasive technique, as it prioritizes methods that minimize cuts and preserve the body's integrity, it may not be as effective in cases where the body is in an advanced state of decomposition or where the damage is extensive, making it difficult to visualize the teeth in detail without making an incision.

It is important that the dental surgeon records in a medical chart the written and imaging information pertinent to the oral condition and procedures carried out on their patients since dental documentation is a key resource for post-mortem human identification. The dental examiner must be aware of the surgical access indicated for dental structures and validate convergent items with criteria during a comparative identification process.

Conflict of interest

The authors have no conflicts of interest to declare.

Ethical disclosures

Protection of human and animal subjects. The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Confidentiality of data. The authors declare that they have followed their work center protocols on access to patient data and for its publication.







Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

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Identificação de um corpo carbonizado por meio da análise comparativa de maxila e mandíbula removidas cirurgicamente: Caso clínico

R E S U M O

Este caso clínico tem como objetivo destacar a importância da análise comparativa de mandíbulas removidas cirurgicamente, especialmente quando a identificação humana especializada é necessária. No presente caso, um corpo carbonizado foi descoberto dentro de um veículo incendiado na beira de uma estrada. Inicialmente, foi feita a identificação do veículo e o seu registo e documentação eletrónica foram verificados junto das autoridades de trânsito competentes. Os familiares da possível vítima foram contactados e entrevistados. Dada a impossibilidade do método datiloscópico devido à destruição das estruturas necessárias e as possíveis limitações em termos de tempo e custos da identificação de ADN, foi perguntado se havia algum registo de história clínica ou dentária da vítima. Os maxilares da vítima foram removidos cirurgicamente e comparados com a documentação dentária mantida pelo médico dentista da possível vítima. No cenário apresentado, a identificação usando o método odontológico mostrou-se viável. O processo de identificação dentária forense é essencialmente comparativo, envolvendo a avaliação clínica dos maxilares removidos cirurgicamente da vítima comparativamente aos registos dentários (documentos dentários forenses). Esta abordagem representa uma contribuição crucial e, em alguns casos, pode ser a principal ou única referência para a resolução da identificação humana forense. (*Rev Port Estomatol Med Dent Cir Maxilofac.* 2025;66(1):44-48)

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