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Case Report

Human identification through the patella—Report of two cases

Rhonan Ferreira Silva [a,c,*], Ademir Franco [b], Solon Diego Santos Carvalho Mendes [a,c], Fernando Fortes Picoli [a,c], Décio Ernesto de Azevedo Marinho [c,d]

[a] Forensic Odontology, Federal University of Goias, Brazil
[b] Forensic Odontology, Katholieke Universiteit Leuven, Belgium
[c] Forensic Anthropology and Legal Odontology, Scientific Police of Goias, Brazil
[d] Forensic Medicine, Federal University of Goias, Brazil

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ABSTRACT

The human identification process is often performed by the comparison between acquired post-mortem (PM) fingerprints, dental patterns, or DNA sample with ante-mortem (AM) databases. However, in some special situations alternative sources of human identifiers reveal valuable part as forensic tools. In this context, medical records of surgical interventions and morphological bone traits are useful in the anthropological environment, specifically for the PM examination of skeletal remains. The present study reports two cases of positive human identifications by the comparative analysis between AM and PM radiographic medical records of surgically treated human patella. The present outcome highlights the importance of storing and updating medical records in order to aid human identification processes in special forensic situations.

1. Introduction

Human identifications are mostly performed by means of dental [1], medical [2], anthropological [3] and laboratorial approaches [4], in which fingerprints [5], dental patterns [6] and DNA tests [7] are the addressed scientific methods. In this context, the traditional identification process consists of comparing post-mortem (PM) human identifiers, acquired both clinically and radiographically, to ante-mortem (AM) databases [8]. However, in special situations the lack of commonly used identifiers makes necessary targeting alternative sources. From an anthropological point of view, several skeletal traits can be considered unique for each person, such as the bone morphology [9], bone pathology [10] and human intervention [11] (e.g. placement of surgical plates on the bones), enabling the identification process. In this context, the present study aims to report two cases of human identification of decomposed and partially skeletonized bodies, which were identified by medical radiographic records of previous surgical intervention in the patella.

2. Case report

2.1. Case 1

In 2008, an unknown body, compatible with a male adult, was found near to a Forest region in the state of Goias, Brazil. After the crime scene investigation the body was referred to the local medico-legal institute for the investigation of identity and cause of death. In this occasion, the fingerprint analysis was not possible due to advanced decomposition. Based on a police list of missing persons, a male individual, aging 45 years old and missing for 10 days, was pointed out. Relatives of the potential victim were contacted and asked to provide any kind of medical, dental or photographic records, contributing for an optimal investigation.

The Police investigation led to three AM post-surgical radiographs of the left knee (Fig. 1). According to the medical report, the images were produced in order to treat a patient who accidentally fell on the ground. The first two images dated from January/2008, revealing the lateral and anteroposterior views of the knee, in which stainless steel wires and pins were crossing the patella for internal fixation. Yet, in the third image, which dated from April/2008, the fixation apparatus was removed.

In this context, the right and left patella of the cadaver was dissected out for PM examination. The right patella was intact, while the left patella presented a transversal fracture. In addition,

* Corresponding author at: Forensic Odontology, Federal University of Goias, Av. Universitaria, Esquina com 1ª Avenida s/n, Setor Universitario, Postal code: 74605-220 Goiania, Goias, Brazil. Tel.: +55 62 3209 6051.
E-mail address: rhonanfs@terra.com.br (R.F. Silva).

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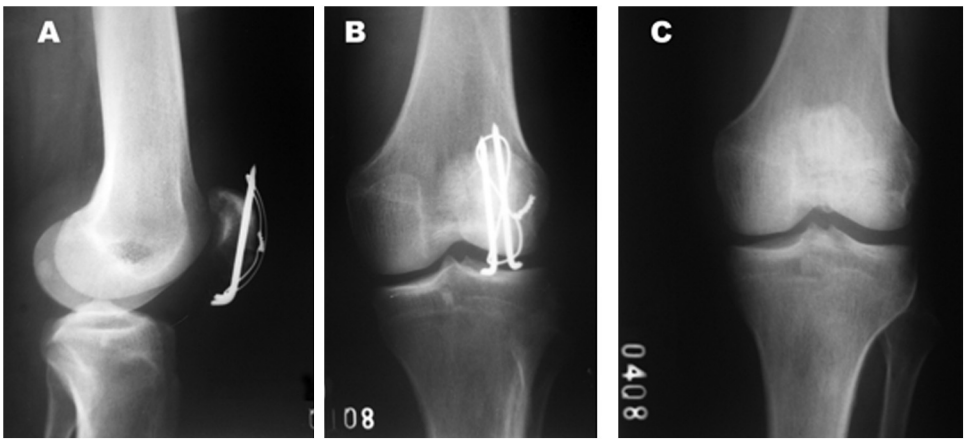

Fig. 1. Lateral (A) and frontal (B) ante-mortem radiographs revealing the internal fixation of the fractured patella with metallic surgical wires, and frontal ante-mortem radiograph showing the post-surgical knee without the internal fixation (C).

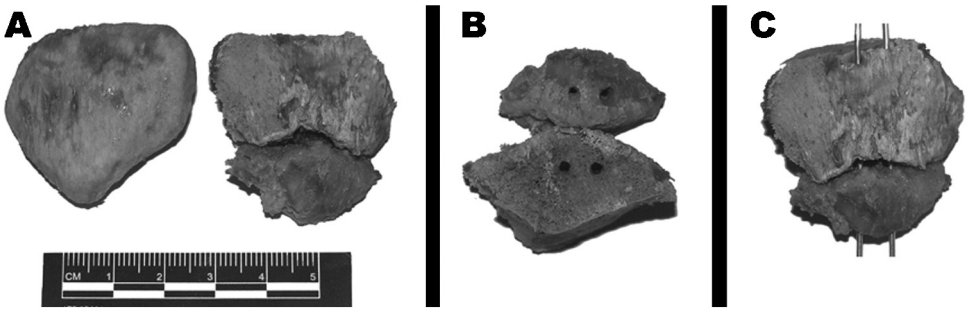

Fig. 2. Right (intact) and left (fractured) patella (A); close view of the bone channels present after the removal of the surgical metallic wires and pins (B); illustration of the bone channels direction by placing metallic wires (C).

two bone channels were detected vertically crossing the fractured patella, which diameter and position were compatible with the post-surgical metallic pins radiographically detected AM (Fig. 2).

The confrontation between the AM radiographic data and the PM autopsy findings allowed for a positive identification of the victim, which cause of death remained unknown.

2.2. Case 2

In 2013, unknown skeletal remains were found near to a highway in the state of Goias, Brazil. After the crime scene investigation, the skeleton was referred to the local medico-legal institute, in which an anthropological examination was performed. Cranial and pelvic traits were confirmative for the male gender. Additionally, osteophytes on the thoracic and lumbar vertebrae, and partially erased cranial sutures pointed out that the victim was aged over 40 years old. Further on, it was observed that the right patella was intact, while the left one was transversally fractured presenting a metallic apparatus composed by stainless steel surgical wires and pins for internal fracture fixation (Fig. 3).

The police investigation led to a 50-years-old man who was missing for 2 months. The potential victim had a history of fractured left patella, in which the surgical approach was performed in 2011 with a anterior tension band wiring. A lateral radiograph of the reported surgical approach was obtained out of the medical records of the missing man (Fig. 4).

Considering the compatibility between the AM radiographic data and the autopsy findings of the left patella, a PM radiographic registration of the left patella was performed for imaging comparison (Fig. 5). The AM/PM radiographic comparison resulted in a positive identification.

3. Discussion

The human identification of carbonized and decomposed bodies, as well as skeletal remains, consists of a complex procedure which often demands a multidisciplinary approach. The present case report illustrates two situations in which medical, anthropological and radiographic information were addressed multidisciplinarily,

Fig. 3. Post-mortem view of the skeletal region of the left knee, and left patella presenting a metallic surgical apparatus.