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Short communication

Technical note and forensic lessons from the past: Radiological examination of human immature remains

Philippe Charlier [a,*], Thibault Monier [b], Sophie Jacqueline [a], Anaïs Augias [a], Isabelle Huynh-Charlier [a,c]

[a] Section of Medical and Forensic Anthropology, University of Health Sciences (UVSQ - Paris 5 University, AP-HP), 2 avenue de la source de la Bièvre, 78180 Montigny-Le-Bretonneux, France
[b] Dental School, Paris V Descartes University, 51 rue Marguerite, 94210 Saint Maur des Fossés, France
[c] Department of Radiology, University Hospital Pitié-Salpétrière (AP-HP), boulevard de l'hôpital, 75013 Paris, France

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1. Introduction

In France, experimentation is considered illegal on human remains submitted to a forensic examination. As a consequence, research in forensic anthropology is currently carried out on archaeological remains with a morphology that resembles current altered remains (such as cremated bones, mummified body, and/or skeletonised corpses) [1].

The purpose of this paper is to present how the radiological examination of ancient Egyptian mummies presented as foetal or neonatal human ones may be of great interest for the forensic pathologist: how it may improve knowledge about taphonomy, i.e. post-mortem displacements and modifications. But also, as forensic practitioners are more and more requested to examine archaeological artefacts, how it may help during the inter-disciplinary authentification process.

2. Material and methods

Since the 1980s, many mummies from the Louvre Museum (Paris, France) and the National Museum of Natural History (NMNH, Paris, France) have been examined using portable radiographic devices. Radiological images were secondarily analysed by both egyptologists and medical examiners (radiologist, forensic pathologist). This paper features 4 special cases of high interest for forensic anthropology and forensic radiology.

3. Results

Case 1 is presented as the mummy of a female baby of around 6 months (MH 24382) conserved in the NMNH, measuring 69 cm-length with a maximal width of 17.4 cm (Fig. 1a). The exact archaeological origin is unknown, but the datation can be approximate to the Ptolemaic period (3rd BC). Radiological examination showed the presence of an incomplete embalmed body with ceramic artefacts associated with the corpse (Fig. 1b). The developmental age was confirmed by the radiological examination (femoral shaft length of 12.6 cm). The skull was empty due to an excerebration, but abdominal and thoracic organs were still present and retracted within both cavities (i.e. no evisceration). All appendicular muscle masses present the classical modifications due to Egyptian embalming process, i.e. clear irregular striations related to dense and hot bitumen application on the surface of the skin. No bone dislocation is visible, as the embalming seems to have been carried out without any important delay after death.

Case 2 corresponds to the back pillar of a statue of Ptah-Sokar-Osiris (E3708/N3959) held by the Louvre Museum; it consists in a rectangular painted box measuring $29.4 \times 20.5 \times 10\ cm^3$ (Fig. 2a). Its radiological examination put to light a previously unknown filling with a human foetus of 3–4 months measuring 12 cm (Fig. 2b). Medical analysis of the radiography does not

* Corresponding author. Tel. + 33 1 70 42 92 72.
E-mail address: philippe.charlier@uvsq.fr (P. Charlier).

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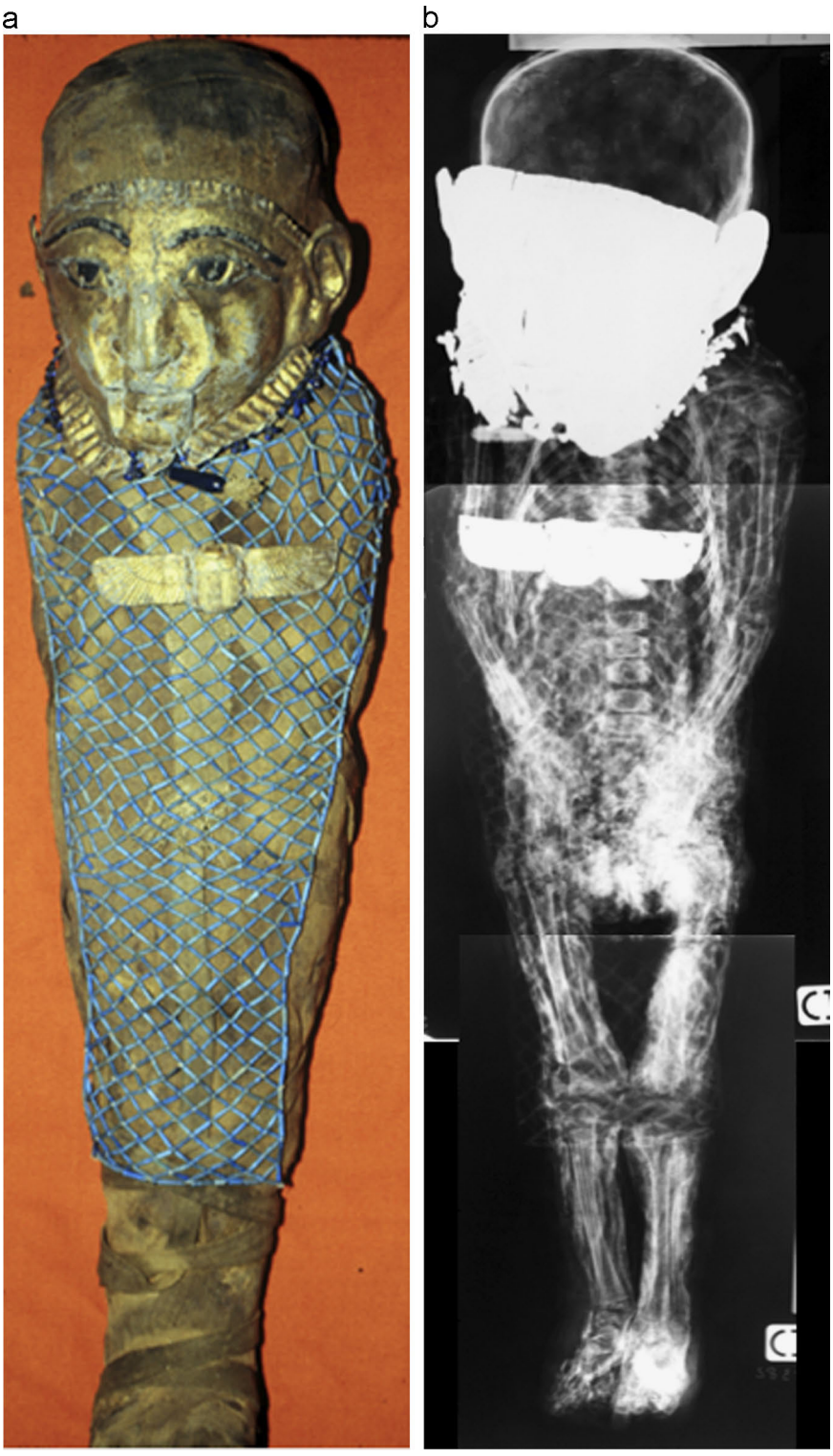

Fig. 1. Infant mummy (MH 24382), picture by T. Monier, radiography by P. Vasseur.

show any apparent malformation; the complete absence of any dislocation could be related to a kind of embalming and/or covering of the dead body with textile. The extreme visibility of the whole "skeleton" on a so premature embryo (in fact, it is rather a cartilage at this stage of development) may be explained by the embalming products increasing the density of the skeletal tissues [2].

Case 3 corresponds to an almost complete immature mummy (MH 25211) conserved by the NMNH (Fig. 3a). It is supposed to originate from the ancient city of Axoum (archaeological excavations by Lefebvre). The radiological examination put to light the presence of long and short bones from a single older child of 4–6 year-old (Fig. 3b): 2 femurs, 2 tibias, 2 fibulas and elements of a foot, without any developmental anomaly.