

A Possible Stroke Victim from Pharaonic Egypt

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■ **OBJECTIVE:** We describe the consequences of a stroke in an adult mummy from ancient Egypt including the differential diagnosis. To our knowledge this is the oldest hemiparalysis to be published in the scientific literature.

■ **METHODS:** The mummy, from the 25th Dynasty (c. 747–656 B.C.), was found during excavation of the tomb chapel of Hery (TT 12) and Baqi, of the early 18th Dynasty (c. 1550–1292 B.C.). Seventeen mummified bodies were found in a small corridor connecting the 2 tombs. The mummy labeled Individual 6833 was studied macroscopically and radiologically and was unique in its positioning, the presence of a crutch, and the use of sticks as supports.

■ **RESULTS:** The body belonged to a woman, between 25 and 40 years of age. The type of mummification was of a high level, with excerebration and evisceration carefully performed.

■ **CONCLUSIONS:** The woman suffered a stroke late in life, with left hemiparalysis after bone growth was completed, and she lived with the results for several years.

INTRODUCTION

Strokes occur when blood supply is disrupted, resulting in necrosis of brain parenchyma. They represent the second cause of mortality in patients older than 60 years old and are a main cause of disability.¹ Indubitably strokes have occurred historically. The first conclusive anatomically proven diagnosis of a stroke was reported in 2017 in the body of an 18th century 73-year-old Italian priest,² Don Giovanni Arcangeli (1677/78–1751). In their macroscopic examination, the authors described “an eye-catching unilateral gzyposis of the left hand, absent in the

contralateral limb. ... Additionally, the left hand seems to show a rather striking degree of contracture of the tendons of the dorsum of the hand.” Furthermore, the Church’s documentary sources state that “the Reverend don Giovanni Arcangeli, as a result of his poor health caused by an apoplectic illness”

We have identified one of the, if not the, earliest examples of a stroke in an Egyptian mummy, tentatively dated to Egypt’s 25th Dynasty (c. 747–656 B.C.) and the focus of this report. This is the twilight of Egyptian history, when Egypt was ruled by Nubian pharaohs who had appropriated pharaonic religion and customs.

MATERIAL AND METHODS

The Spanish Archaeological Mission to Dra Abu el-Naga (Proyecto Djehuty) has been working on the west bank of the Nile at Luxor (Egypt) since 2002. Excavations revealed dozens of well-preserved mummies including Individual 6833, missing only the feet. This mummy was studied macroscopically and radiographically on site with portable radiographs using the 9020 HF Clarox Equino, of 1.35 kW, 90 kV, and 15 mA. Due to Egyptian law, it was impossible to remove the mummy from the site for computed tomography scanning (Practice C.V.M S.L., Navarra, Spain).

The mummy was unusual in that a red linen shroud of loose weave covered its head and just above its knees, which, based on similar cases, is typical of the 25th Dynasty.³ A stick was positioned at the right side, outside the wrappings and secured by 2 transverse bandages (Figure 1A).

RESULTS

Radiography identified the body as female, based on pelvic features,⁴ between 25 and 40 years of age.

The individual was positioned straight, with the legs together. The right arm is stretched alongside the body with the palm facing the femoral trochanter. The left arm was flexed in the elbow with the forearm over the chest and the left hand hyperflexed. The head was facing down, with contracted shoulders. Although the head of children’s mummies are often thus positioned⁵ (and personal

Key words

- Egyptian mummies
- Stroke
- Twenty-fifth Dynasty

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Citation: *World Neurosurg.* (2022).
<https://doi.org/10.1016/j.wneu.2022.06.123>

Journal homepage: www.journals.elsevier.com/world-neurosurgery

Available online: www.sciencedirect.com

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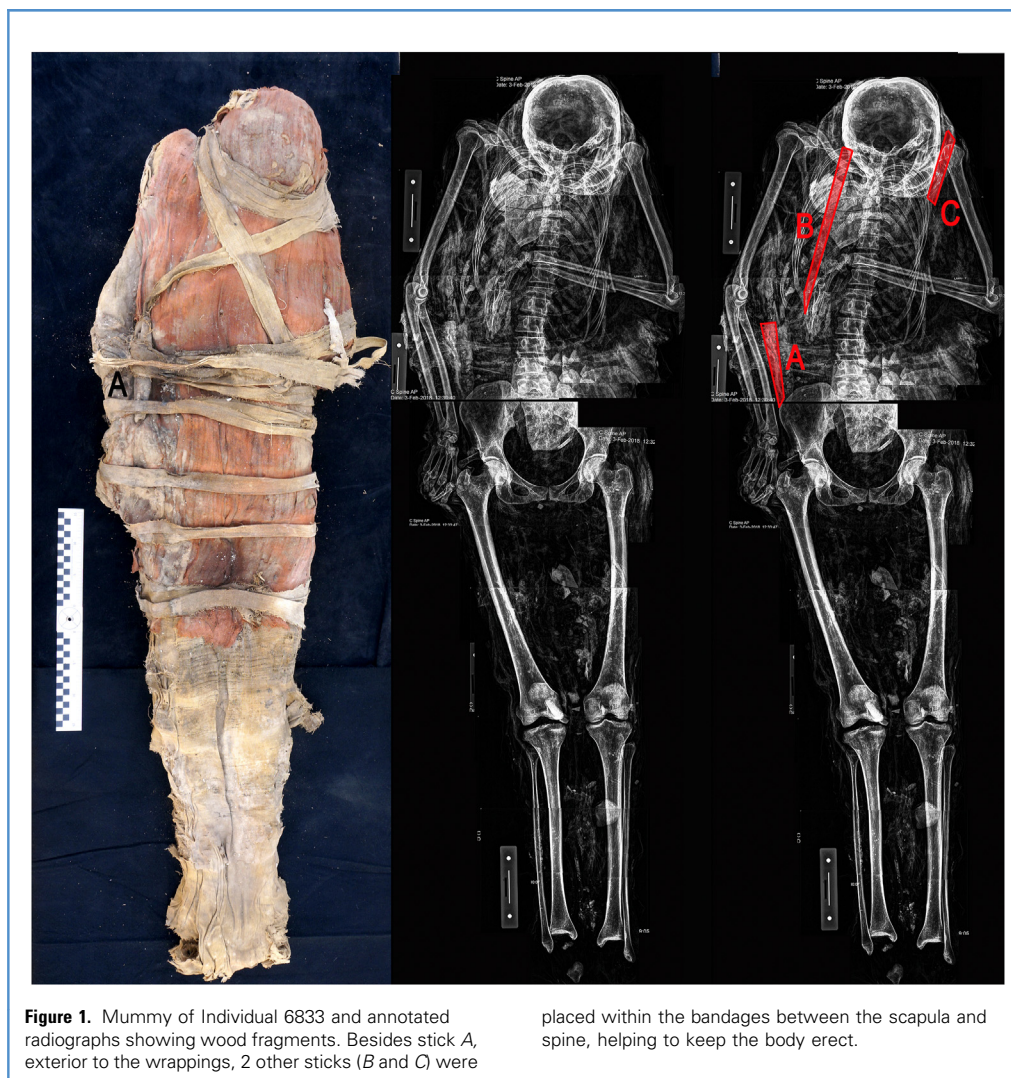


Figure 1. Mummy of Individual 6833 and annotated radiographs showing wood fragments. Besides stick A, exterior to the wrappings, 2 other sticks (B and C) were

placed within the bandages between the scapula and spine, helping to keep the body erect.

observations), this is rare in adults. The left fibula is more anteriorly placed than the right, which indicates that the foot was turned inward (see [Figure 1](#)).

The position of left hand is unique in the experience of the authors and with regard to published accounts of mummies.^{6,7} Mummies can be buried with both hands over the trochanters, thighs, crossed over the pelvis, or with the forearms over the thorax, with 1 hand over the chest and the other alongside the body. The position that is described, with 1 arm extended and the other crossed over the chest with a contracted hand, has never been reported and the radiologic picture is typical of a patient suffering a stroke.

The lengths of the long bones of the legs were basically symmetric. However, the thickness of the cortex was greater in the right leg in most of the measured areas ([Figure 2](#)).

Besides stick A, exterior to the wrappings, 2 other sticks, B and C, were placed within the bandages (see [Figure 1](#)), between the scapula and spine, helping to keep the body erect. Stick A has a

circular section, about 4 cm in diameter, with a shiny surface indicating continued use and contact with the hand. The pieces of wood B and C are squarish, about 2 cm wide, have pointed ends, and were roughly fashioned.

Walking sticks were often placed in burials, though infrequently after the New Kingdom (c. 1550–1070 B.C.E.).^{8,9} We propose that the fragment of stick A was used during life as a walking aid, probably a crutch, while B and C served as postmortem support of the body.

DISCUSSION

The position of the shoulders, head, flexed arm, and, to a lesser extent, the probable inward turning of the left foot suggests that the woman was suffering from a right brain insult.

The typical pattern of neuromusculoskeletal involvement in individuals affected is characterized by 1) painful shoulder in adduction and internal rotation (due to a scapulohumeral

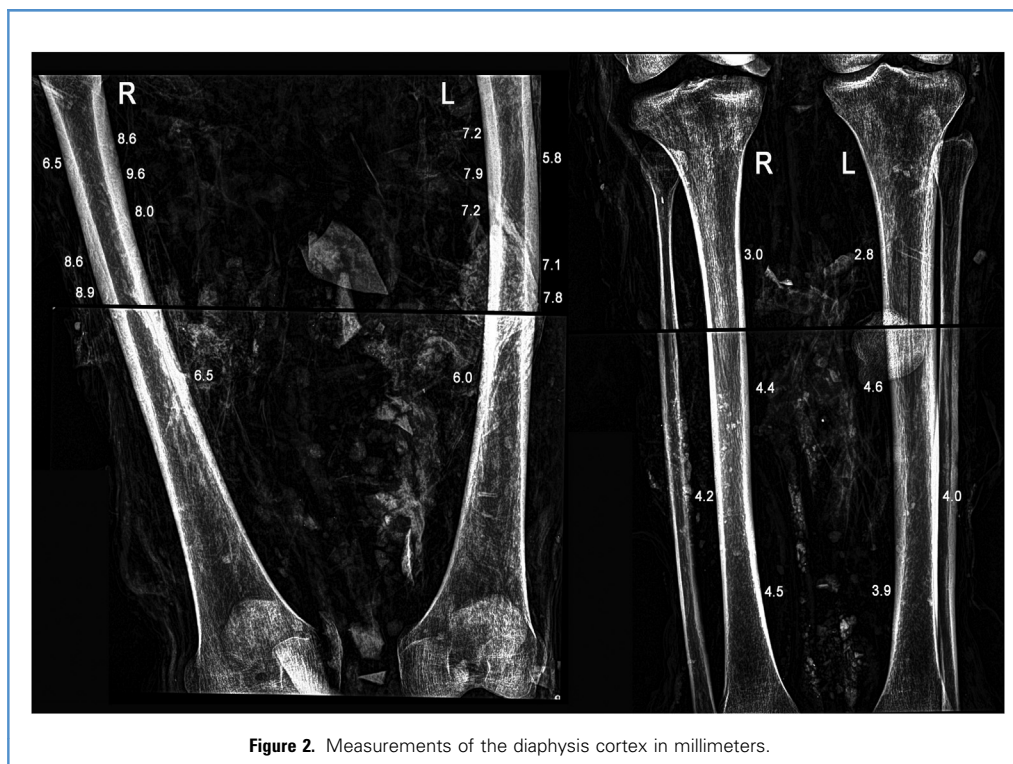


Figure 2. Measurements of the diaphysis cortex in millimeters.

subluxation, causing an abnormal position of the head); 2) elbow flexed, forearm in pronation, wrist in flexion and claw fingers (continued palmar flexion causes a nonfunctional hand); and 3) the hip is in flexion causing the trunk to lean forward, the knee flexed and turned inwards. The foot is almost always on tiptoe, turned inwards and the heel is difficult to support, in a clubfoot manner.¹⁰

Individual 6833 shows the first 2 signs (the feet were lost), but the left fibula is in a more anterior position than the right, indicating that the foot was most likely turned inward originally (see [Figure 1](#)).

The elevated shoulders make the neck appear contracted, and the face looks down, typical of strokes and not due to the mummification process. Up to 72% of stroke patients experience at least 1 painful shoulder episode during the first year after a stroke, usually related to spasticity.¹¹

Some female mummies from earlier periods are found with 1 arm bent and the other alongside the body.^{7,12} This is uncommon thereafter. Hands lie either alongside the body or crossed on the chest.¹² The arm and hand position of this mummy is unique.¹³ The left side shows typical signs of an individual affected by left hemiplegia, indicating damage to the right hemisphere of the brain.

We can conclude that bone growth was not altered by the cerebrovascular accident, since than the event must have occurred after bone growth had finished, at about 23–25 years of age. The difference in thickness in the cortical bone of both legs indicates a differential use of the limbs over a significant period of time,

caused by muscle paralysis on the left side. Therefore although the paralysis occurred once bone growth had ended, it was considerably before the woman's death, and she lived with the disease and her disabilities for a long time. There are examples of individuals who were maimed or suffered from a disease surviving for a long time and receiving care from their family members.¹⁴

The differential diagnosis includes ischemic strokes, ruptured aneurysms, head injuries, brain tumors, meningitis or encephalitis, multiple sclerosis, cerebral palsy, and hereditary diseases (leukodystrophies).¹⁵

Head injuries can be dismissed as none are visible in the multiple x-ray images, and in the absence of the brain that was removed during mummification, we cannot comment on brain tumors. As meningitis and encephalitis leave no mark, they cannot be excluded. However, they tend to cause death in a short time, particularly in the preantibiotic era. Multiple sclerosis manifests itself in a varied manner including muscle spasms, difficulty walking, or loss of control of voluntary movements in 1 or both hands.¹⁶ We cannot rule out that this woman suffered from an early stage of this disease. Also, the presence of asymmetry in the thickness of the cortex of the leg bones (see [Figure 2](#)) indicates that a significant time elapsed between the stroke and her death, during which time the right part of the body was mobile, which is unusual for multiple sclerosis.

Cerebral palsy and other causes mentioned previously are extremely unlikely because of the woman's age and the described findings. There was no difference in the length of both legs, and neither was there evidence of scoliosis. Hereditary diseases often

cause mechanical and physiologic disturbances, although they are rarely unilateral, as in the case of this mummified woman.¹⁷

CONCLUSIONS

The radiologic examination of this female mummy, aged 25–40 years, who died about 2700 years ago, reveals an abnormal position of her body, with indications that she suffered a right cerebral stroke with the expected left hemiplegia. During the mummification process an attempt was made to correct the position of her head and chest by including 2 sticks at her back, giving her an erect posture for eternity. A stick or a crutch was also provided for her, most likely the one she used in life. The presence of the rare red fabric, known from only a handful of burials,³ also suggests a higher social status, in death as in life. To our knowledge this is the oldest radiologically documented case of stroke described in the paleopathologic literature.

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Received 30 April 2022; accepted 23 June 2022

Citation: World Neurosurg. (2022). <https://doi.org/10.1016/j.wneu.2022.06.123>

Journal homepage: www.journals.elsevier.com/world-neurosurgery

Available online: www.sciencedirect.com

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