ANTHROPOLOGIE • XLIII/1 • pp. 51–55 • 2005

ABDULLA AL-SHORMAN

FORENSIC EXAMINATION OF A DESICCATED BODY FROM SOUTHERN JORDAN VALLEY

ABSTRACT: This study details the forensic examination of a recent mummy that was found at the southern tip of the Dead Sea in Jordan. The mummy belonged to an adult female who died at an age approaching the forties. Visual and radiological examinations have pointed to a woman who possibly died during a difficult childbirth.

KEYWORDS: Jordan – Mummies – Forensics – Radiology – Pathology

INTRODUCTION

Understanding the intention behind mummification has greatly contributed to the understanding of the mortuary practices of a given extinct community. Unlike spontaneous mummification that occurs naturally, anthropogenic mummification requires certain body preparations to ensure longer survival and meet the intentions. In ancient Egypt and the Inca, for example, mummification aimed at enhancing claim for royal divinity of the reigning monarchy, which increased authority and power of the throne (Auferheide 2003: 28). The Jivaros in northwestern Ecuador mummified the heads of their enemies to avenge the living relatives who then accrued social status after displaying the head in a ritual ceremony (Harner 1990). The Popoyan population from southern Columbia mummified their enemies and displayed them on the walls of their dwellings as war trophies (Stirling 1938). The Mundurucus of Brazil mummified the heads of their relatives to acquire status (Prioreschi 1990), which resembles the act of plastering skulls recovered from the Neolithic Ain Ghazal in Jordan (Rollefson 1986) and the bodies of the Aleuts of Alaska (Laughlin 1980).

No anthropogenic mummification has been reported in the ancient Middle East except for Egypt, which was only fully developed during the New Kingdom 3500 years ago (Notman, Aufderheide 1995). Not until 1994 that Jordan had its first mummy after the rescue excavation at Khirbit Qazone at the southern tip of the Dead Sea (Gruspier 1997). The mummy belonged to an adult male that was spontaneously mummified, carbon dating pointed to a date ca. 1450 AD (Lucas *et al.* 2000). The mummy was found in a cave that probably maintained a low and constant temperature year around. Accompanied by dry airflow into the cave, the body was well preserved. These same conditions preserved the bodies of 10 individuals in the al Hadath Cave in Lebanon, which enjoyed the same environmental conditions (Abi-Aoun *et al.* 1994: 35–57) and dated ca. 1290 AD (Hourani 2000).

Continuous looting of antiquities south to the Dead Sea has revealed another number of mummified remains, but these remained to be investigated. That particular part of Jordan is characterized by very hot and dry climate conditions, and by very high soil salinity. Altogether these had worked as standard desiccation conditions suitable for spontaneous mummification (Politis, Granger-Taylor 2003). Such arid conditions were reported to preserve bodies in different parts of the world like Egypt (Aufderheide *et al.* 1999), northern Chile (Aufderheide 1996) and southwestern United States of America (El-Najjar *et al.* 1985).

The Department of Antiquities in Amman brought the mummy of our study to the Faculty of Archaeology and

FIGURE 1. General view of the mummy. Photographed by Y. Al-Zu'bi.

Anthropology / Yarmuk University for examination. The mummy was confiscated from antiquity looters who tried to sell and export it outside the country. Looters claimed to have found the mummy in the southern Jordan Valley south of the Dead Sea. Rumours spread out in newspapers talking about a thousands years old mummy (*The Dhamurian Society Incorporation* 2000). Upon arrival, the unclothed mummy was stored in standard conditions to ensure longer survival and minimum deterioration. The storage closet was maintained dry at a temperature of less than 15º C but then it was preferred to freeze it at a temperature below 4º C to stop any potential fungal and microbial proliferation. Frequent monitoring of the mummy reported no further deterioration nor decay.

The higher temperature at the Dead Sea region had dehydrated the soft tissues of the body very rapidly, which altered the bacterial growth and then stopped further decay (Rodriguez-Martin 1995). It is known that the absence of water in the mummified tissues retards the action of many autolytic enzymes (Aufderheide *et al*. 1993). These particular enzymes work better at a certain temperature, so at a higher temperature enzyme inhibition would also take place. Salty soils are not favoured by soil-dwelling microorganisms that contributed to the decay; such soils enhance the process of water movement from the body to the surrounding soil leading to dehydration (Aufderheide 2003). These factors collectively enhanced mummification and would have probably preserved the corpse even for thousands of years if it had remained buried.

In this paper we detail the forensic examination of this mummy. The goals were to estimate a date and to establish an age, sex, pathologies, age at death, the cause of death and the method of inhumation. To achieve these goals the following methodologies were carried out.

METHODS

Autopsy was not allowed for purposes of display at the Natural History Museum at Yarmouk University. For this reason our entire methods were based on visual examination of the mummy and radiography. The visual examination included the hair, the skin, the genital area, the mouth, the ears, the nose, the body posture, and the associated materials. The radiological examination focused on the epiphyseal union of long bones, tooth development and pathologies, pre-mortem skeletal fractures, the presence of foreign bodies inside the body, detecting hidden pathologies like, for example, kidney stones and gallbladder stones; and finally it was necessary to take a decision on whether autopsy is needed.

Visual examination

The mummy is in a very good preservation condition (*Figure 1*). It was fully desiccated with no missing body parts. The visual examination of the external genital organs refers to a female sex. The lower extremities were abducted, both knees are slightly flexed and the toes are also flexed. The right arm is slightly abducted with flexion of the fingers, while the left arm is adducted with the fingers extended. The face is directed to the right side with no flexion of the cervical vertebrae. The mouth is open and completely blocked with a protruding tongue that is slightly directed to the right side probably as a result of gravity.

The above posture imitates the rigor mortis that usually occurs in large muscles 4–6 hours after death and becomes very pronounced after 12 hours after death and it remains until the corpse starts to decay (Osterburg, Ward 2000) probably after 48 hours (Amendt *et al*. 2004). Rigor mortis is characterized by muscle contractions and stiffness,

FIGURE 2. The neck defect. Photographed by Y. Al-Zu'bi.

which results in joint flexion (DiMaio, DiMaio 1993). At the time of death, corpses are usually aligned properly and then wrapped by the event attendants (mostly relatives) to minimize the effect of the rigor mortis and to allow easier inhumation. According to the above-mentioned posture it is substantial that the person was passing through the death process unattended.

Close inspection of the back of the mummy revealed the presence of textile impressions that were very fine and squarely knotted. This strongly indicates that the mummy died laying down on a mattress or a piece of cloth or it could be the impressions of the wrapping cloth. No marks were found on the anterior part or the sides of the body except for the skin of the right cheek bone (maxilla), which actually was in touch with the ground in the supine position. After death, the body is no longer biologically active; instead it will be subordinate to the physical laws. The skin then, as being soft like rubber, would have the impression of the material in touch with due to the gravity imposed by body weight. In the case of death in a supine position the skin of the back will have these impressions. As desiccation was very rapid these impressions remained intact. No attempts were made to fix the position of the body before inhumation as no fractures were found or revealed by radiography.

The method of inhumation inside the burial was straightforward; preliminary decay of the body started on the back; the area that was in touch with the ground but then ceased due to the rapid dehydration process. What maintained the rigor mortis alignment could be the rapid desiccation of less than two days and/or the soil fill around the mummy inside the burial.

No cloth materials were found with the mummy. They were probably removed by the looters or decayed as textile usually deteriorates fast in dry conditions (Cronyn 1990: 287). A piece of reed leaf was found stuck in the hair of the mummy as well as brown soil especially in the rotted back cavities. Informants who currently live in the region where the mummy was found, reported that long time ago (more than 50 years) locals used to dig their graves in the ground and then after inhumation cover the graves with reeds and on top of them soil. This was probably the type of grave the corpse was inhumed in.

The hair of the mummy is black and curly. No lice were found upon the examination of the hair and the scalp. Grey hairs were totally absent. There is no definite style of the hair; untied and do not exceed the level of the shoulders. No injuries were found in the scalp or the underlying skull as revealed by visual examination and palpation. No skin injuries, scars or tattoos were found on the skin. We were not able to determine if the ears were pierced. The only probable skin defect would be the depression seen on the right side of the neck (*Figure 2*). This defect is about 10 cm long and 1 mm deep, it is wide posteriorly and narrow anteriorly. Such pattern was probably caused by tying the wrappings below the head where the knot would have been placed on the anterior side of the neck.

Radiological examination

X-rays were obtained for the head and neck, the chest, the abdomen, the upper extremities and the lower extremities. No fractures were noticed. Radiological examination revealed a complete fusion of the bones and a complete eruption of third molars, which indicates an age above 20 years. The only exposed teeth are the lower incisors, which have moderate occlusal wear – no longer resembling a line according to the standards of Buikstra and Ubelaker

FIGURE 3. Dental restorations. Photographed by Y. Al-Zu'bi.

FIGURE 4. Pelvic dislocation. Photographed by Y. Al-Zu'bi.

(1994). Such a wear indicates an age that approximates 40 years.

No pathological lesions could be detected on the skeleton neither on the soft tissues. The spine shows moderate scoliosis probably caused by the rigor mortis. The skull shows no deformities or fractures. The upper incisors were artificially replaced and tooth fillings were clear on the upper right second molar and the lower right first molar, ante-mortem tooth loss was identified on the upper and lower left molars (*Figure 3*). This substantially indicates a recent burial, where modern dental care and technologies were recently introduced to that particular part of the country.

Severe dislocation of the symphysis pubis was clear in radiography (*Figure 4*). The dislocation caused a visually clear protrusion of the lower anterior abdominal wall indicating ante-mortem dislocation. This dislocation is not associated with ileum or ischium fractures, but it is associated with left sacroiliac joint dislocation. Zwolak (1999) found a similar dislocation in a 900 BC Egyptian mummy from Thebes. He interpreted this dislocation as the cause of death during a difficult childbirth. “Diastasis of the symphysis pubis commonly occurs during pregnancy due to ligamentous response to the hormones Progesterone and Relaxin. Rupture of the symphysis may occur at the end of pregnancy, especially during labour and delivery” (Resnick 2001: 1). Dislocation of the symphysis pubis, if accompanied by sacroiliac joint dislocation, is one of the high energetic injuries that frequently associated with multiple organ system injury and severe blood loss (Al Khayarin, Rysavy 2004) that possibly caused the death of the woman.

A radiological pelvimetry result in an obstetrical conjugate (antero-posterior diameter of the pelvic inlet) is about 12.5 cm, which could be estimated by measuring the distance between the inferior pubic symphysis and the sacral promontory minus 2 cm. The average obstetrical conjugate in normal pelvises is of 11–12 cm. The biischial diameter, which is the distance between the ischial tuberosities, is of 13.5 cm, where the average in normal pelvises is of about 8 cm (Benson 1983: 121). Based on pelvimetry results, it is substantial that the cause of the difficult childbirth was not an abnormal pelvis. Other factors could be the breech position of the foetus or the immature uterine contractions (Benson 1983).

CONCLUSIONS

Due to the environmental and physical conditions at the Dead Sea region, spontaneous mummification is likely to happen. Although the studied mummy is fairly recent, archaeological survey at the region would uncover mummies of older ages. Such a recovery would help understand the biology of the people who inhabited the area thousands of years ago. As the cause of death of our mummy becomes clear, we recommend no further autopsies.

ACKNOWLEDGMENTS

I would like to thank the Director of the Department of Antiquities Professor Fawaz Khraisha for allowing the study of the mummy. I also would like to extend my thanks to the Dean of the Faculty of Archaeology and Anthropology Professor Ziad Al-Sa'ad for the financial and technical aids. I am in great debt to Yousef Al-Zu'bi who photographed the mummy and produced the paper copies. The staff of the archaeometry lab at the faculty contributed to the accomplishment of the study and I appreciate their efforts very much.

REFERENCES

ABI-AOUN B., BAROUDI F., GHAOUCHE A., MAROUN A., MAROUN R., KARAM R., 1994: *Mommies du Liban*. Antelias-Liban, Gersl. 210 pp.

AL-KHAYARIN M., RYSAVY M., 2004: Bilateral sacroilliac joint fracture dislocation. *The Middle East J. of Emergency Medicine* 3, 1: 6.

AMENDT J., KRETTCK R., ZEHNER R., 2004: Forensic entomology. *Naturwissenschaften* 91: 51–65.

AUFDERHEIDE A., 1996: Secondary applications of bioanthropological studies on South American Andean mummies. In: K. Spindler, H. Wilfing, E. Rastbichler-Zissernig, D. zur-Nedden, H. Nothdurfter (Eds.): *Human Mummies: A Global Survey of their Status and the Techniques of Conservation*. Pp. 141–151. Springer-Verlag, New York.

AUFDERHEIDE A., 2003: *The Scientific Study of Mummies*. Cambridge University Press, Cambridge. 608 pp.

AUFDERHEIDE A., MUNOZ I., ARRIZA B., 1993: Seven Chinchorro mummies and the prehistory of Northern Chile. *Amer. J. of Phys. Anthrop.* 91: 189–201.

AUFDERHEIDE A., ZOLINIS M., CARTMELL L., ZIMMERMAN M., SHELDRICK P., MOLTO J., 1999: Human mummification practices at Ismant El-Kharab. *J. of Egyptian Archaeology* 85: 197–210.

BENSON R., 1983: *Handbook of Obstetrics and Gynecology*. Lange Medical Publications, Los Altos, California. 804 pp.

BUIKSTRA J., UBELAKER D., 1994: *Standards for data collection from human skeletal remains*. Arkansas Archaeological Survey Series No. 44, Arkansas. 218 pp.

CRONYN J., 1990: *The Elements of Archaeological Conservation*. Routledge, London. 384 pp.

The Dhamurian Society Incorporation, 2000: Bid to Sell Two Mummies Backfire.

DIMAIO D., DIMAIO V., 1993: *Forensic Pathology*. CRC Press, Boca Raton. 503 pp.

EL-NAJJAR M., AUFDERHEIDE A., ORTNER D., 1985: Preserved human remains from the southern region of the North American continent: Report of autopsy findings. *Human Pathology* 16: 273–276.

GRUSPIER K., 1997: The mummified remains from Qazone, Jordan (Poster). Papers in pathology, presented at the 24th Annual Meeting of the Paleopathology Association at St. Louis, Missouri, April 1–2. *Paleopathology Newsletter* S31: 7.

HARNER M., 1990: *The Jivaro: People of the Sacred Waterfalls*. Berkeley, University of California Press, California. 233 pp.

HOURANI G., 2000: The mummies of the Holy Valley of Qannobine in Lebanon. *Chungara* 32: 103–109.

LAUPHLIN W., 1980: Aleut mummies. *Alaska Geographic Society* 7, 3: 90–91.

LUCAS M., AUFDERHEIDE A., EL-NAJJAR M., 2000: The identification and analysis of Jordan's first mummy. *Amer. J. of Phys. Anthrop.* Suppl. 30: 214.

NOTMAN D., AUFDERHEIDE A., 1995: Experimental mummification and computed imaging. *Proceedings of the First World Congress on Mummy Studies*, February, 1992, Vol. 2. Pp. 587–592. Archaeological and Ethnographical Museum of Tenerife, Santa Cruz, Tenerife, Canary Islands.

OSTERBURG J., WARD R., 2000: *Criminal Investigation: A Method for Reconstructing the Past*. Anderson Publishing Company, Cincinnati, Ohio, USA. 403 pp.

POLITIS K., GRANGER-TAYLOR H., 2003: Nabateans on the Dead Sea littoral. In: G. Maroke (Ed.): *Petra Rediscovered: Lost City of the Nabateans*. Pp. 106–108. Thames and Hudson, USA.

PRIORESCHI P., 1990: *A History of Human Response to Death*. Studies in Health and Human Services, Vol. 17. Lewiston, Edwin Mellen Press, New York. 504 pp.

RESNICK D., 2001: Musculoskeletal imaging. In: H. Petterson (Ed.): *The Encyclopaedia of Medical Imaging*, volume III: 1. Lund University, Denmark. 528 pp.

RODRIGUEZ-MARTIN C., 1995: A history of Guanche mummies. *Proceedings of the First World Congress on Mummy Studies*, February, 1992, Vol. 1. Pp. 151–162. Santa Cruz, Tenerife, Canary Islands: Archaeological and Ethnographical Museum of Tenerife.

ROLLEFSON G., 1986: Neolithic 'Ain Ghazal (Jordan). Ritual and Ceremony II. *Paleorient* 12, 1: 45–52.

STIRLING M., 1938: *Historical and Ethnographical Material on the Jivaro Indians*. Smithsonian Institution, US Bureau of American Ethnology, Bulletin No. 117. Washington, DC, US Government Printing Office. 398 pp.

ZOWLAK J., 1999: A tale of two mummies. *Tulane University Magazine*, May 8th.

Abdulla Al-Shorman
Department of Anthropology
Faculty of Archaeology and Anthropology
Yarmouk University
Irbid, Jordan
E-mail: abedakam@yahoo.com