A Mummified Child

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Abstract: The investigation of the mummified child from the Graeco-Roman Period, as part of the Melbourne Mummy Project, has produced some interesting results that may offer an explanation for its poor condition. The body wrapped in linen and decorated with mismatched cartonnage coverings shows signs of being interred for some time before mummification. Although removal of the brain and internal organs has occurred post mortem, there is other evidence suggesting that the body has suffered unexplained injuries and damage not necessarily due to poor mummification techniques.

Key Words: Mummification; radiology; cartonnage

Introduction

Publications on the subject of mummification in the Graeco-Roman Period in ancient Egypt generally indicate a decline in the standards of mummification. Recent studies of mummies (Filer 1997:121-124) pose a number of questions about the theory of poorly mummified bodies of the Graeco-Roman Period. Reproductions of the x-rays show that the skeletons in two out of seven of the mummies studied (Filer 1997: pls 44, 45 & 46) were in some disorder or poor anatomical order. The poor condition of one was possibly caused by decomposition after wrapping (Filer 1997:12) and extremely tight bandaging, causing the dislocation of bones, in the other mummy (Filer 1997:124). The remaining five mummies' skeletons were in good to excellent anatomical condition, which suggests some level of competence in the mummification process.

Recent investigation of unwrapped children's mummies in the British Museum collection show that all are extremely well mummified and in excellent condition. (Dawson 1968:pl XIX, a. 71, b. 72, and c. 73) A mummified child's head from the same period, that is held in the collection of the Australian Institute of Archaeology, is also in excellent condition.

Questions must be asked about how representative of the period were the specimens that were originally published and how accurate is the assumption that poor mummification techniques were universal in the Graeco-Roman Period. The only way to challenge this assumption is to investigate more mummies and mummification practices from all eras and areas of ancient Egypt, using modern medical technology.

When a complete mummy of a child featuring an early Graeco/Roman style mask was examined, the question of whether the mummification practices of the period have been accurately published was originally not a

Figure 1: *Mummified child with cartonnage mask and body panels over linen wrappings.*

consideration for the investigating team. Questions about the condition of the body, cause of death and the age of the child prompted the investigation by a multi-disciplinary team of experts and associates.

Description of the Specimen

The complete fully wrapped mummy, of unknown provenance, is described in a Sotheby and Company's 1965 catalogue as that of a child from the Ptolemaic Period, however, recent studies suggest a more general description of being from the Graeco-Roman Period is more appropriate. (Crocker 1990:70) The Australian Institute of Archaeology purchased the specimen at Sotheby's auction house in London on the twenty sixth of April 1965 for one hundred and thirty pounds sterling (Sotheby & Co. 1965:26). (Figure 1)

After arriving in Australia amidst much media attention, the Institute displayed the mummy in the small Melbourne museum, Ancient Times House, until 1999 when it closed this part of its operations. The specimen and a mummified head of a child were moved to forensic storage at The University of Melbourne's School of Dental Science Forensic Odontology Unit to enable the current research. Photographic slides of the mummy have provided images for further investigation of the cartonnage coverings and linen wrappings. The mummy requires extensive conservation as the linen is brittle and paint on the cartonnage needs to be stabilised. (Figure 2)

Linen and Cartonnage

The specimen is fully encased in linen wrappings and bindings with a cartonnage mask covering the face, neck and upper chest. Two separate cartonnage panels have been placed over the remainder of the front of the body extending from mid thorax to just above the ankle area. The mask and the body panels show different styles of decoration and paint colours.

Figure 2: *British Museum conservator, Dr Jenny Potter and Janet Davey examining the polychrome paintings on the child's mummy at the University of Melbourne's School of Dental Sciences. Damage to the mummy is clearly visible where the body panels of cartonnage meet.*

Figure 3: *Linen wrappings around the mummified child's feet showing varying thicknesses and types of weaving.*

Investigations of the cartonnage decoration suggest that it may have been originally designed to fit an adult mummy, but were later cut to size to partially enclose this mummified child. Another possibility is that the mask and panels may have been added later for commercial reasons. The British Museum has at least one example of a mummy from the Graeco-Roman Period with pieces of cartonnage that are of different styles and construction (Dawson 1968:23 & plate a. 43 *(6694)*). These unexplained variations may have existed at the time of burial because the pieces were taken from other mummies, or they may have been added in more recent times to make the specimen more attractive for sale.

It is also possible that the panels and mask are original and for some reason have been painted in different styles, then partially enclosed by fine linen strips wound around the body on the diagonal in rhomboidal binding. There is an excellent example of this style of binding on the British Museum mummy (EA 24800) that does not entirely cover the mummy but is wound sparingly over the cartonnage panels to expose the decoration. In places it hides some of the artwork on the cartonnage panels and beautiful gold mask of the Graeco-Roman mummy (Taylor 1999:23); however, unlike the Melbourne mummy the mask and panels have the same decorative style and colours.

The child's mummy wrappings are of reddish brown unbleached linen, of varying qualities and thicknesses that is coarse in comparison with the finest linen from ancient Egypt but cannot be considered to be of poor quality. The warp and the weft are almost the same in the plain one over one under weave and the linen fabric is S spun in both directions, which is an indigenous weave of ancient Egypt. Inner bandages visible around the foot area, are of a coarse or possibly *tabby* weave. (Figure 3)

Many layers of linen impregnated with glue and plaster (Ikram & Dodson 1998:308), form the basis of the solid cartonnage mask. The mask has been roughly cut to cover the presumed facial area and upper chest. It does not extend beyond the ears or above the forehead. The eyes are clearly delineated with black paint in the typical ancient Egyptian style. (Figure 4)

The top of the mask reaches up to the mid crown level leaving the linen on the remainder of the crown area exposed. Below this area, the brow section is decorated with brown stripes on a white background, giving the appearance of a broad fillet or headband. The facial area shows two different colours including a yellowish flesh tint resembling gold, from just below the mouth up to the eyebrows. Extensive research to find a mask with similar decorations in international museum collections has been unsuccessful.

Figure 4: *Mummified child with a solid cartonnage mask and fine cartonnage panels decorated with funerary images. The Four Sons of Horus can be seen facing toward the polychrome djed pillar that has deteriorated significantly. Damage to the linen caused by poor storage conditions is visible.*

Gods and Goddesses

The two panels on the body are relatively thin compared with the more solid mask, however, they have been prepared in a similar manner. The upper cartonnage panel extends down and abuts the lower panel. Its shape follows the form of the mummification bandages and features four poorly executed Sons of Horus: Qebsennuef, Imsety, Hapi, and Duamutef. Each rectangular section is divided by two vertical stripes and the central section is decorated with small vertical marks. The purpose or significance of the small marks was unknown until a recent discovery of an old photograph of the mummy in the State Library of Victoria's collection, that shows a Djed pillar which has deteriorated so badly, it is unrecognisable.

Fine paintings on the adjacent lower panel are decorated with religious iconography. The upper central section shows canopic jars placed underneath a lion shaped bier on which a mummy reclines. Below the funerary scene lie five, white, perfectly formed eight-petalled flowers on a viridian ground. Two images of women possibly representing the protective goddesses Isis and Nephthys, with their arms upraised in the pose of mourning, sit on either side of an offering table in the middle panel. The lower panel features a falcon, presumably representing the god Horus. The lower end of this panel is damaged and its edge appears to have been roughly cut. The finely executed paintings of the lower panel are more luminous and brilliant than the upper section and the mask.

CT Scans and X-rays

The child's mummy was x-rayed and CT scanned in 1995 and again in 1999. These investigations were to search for any clues as to how the child died, the age at death, any medical or congenital conditions and the type of mummification used for preserving the body. A small sample of tissue was also taken and sent to the University of Manchester Tissue Bank for DNA testing. The studies began with the assumption that poor mummification practices were common in the Graeco-Roman Period and that resin continued to be extensively used to accelerate and facilitate preservation of flesh. (Aufderheide et al 99: 202 – 203)

A number of medical experts have viewed the plain films and the CT scans to assist with the identification of medical conditions and forensic pathology. The CT scans were particularly valuable in identifying foreign objects, their positions and parts of the skeleton that appear abnormal or damaged. The x-rays show that the small child's

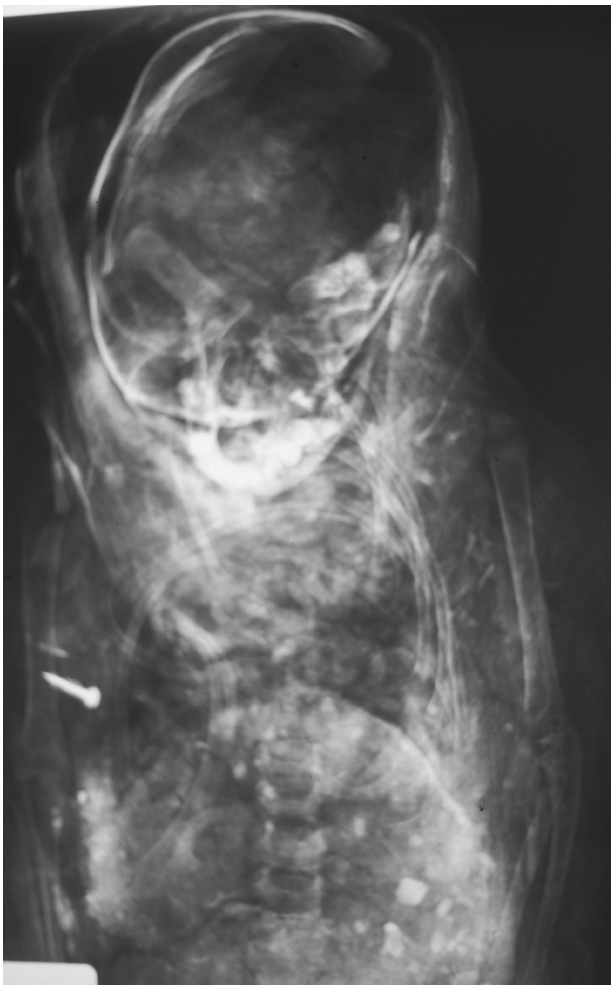

Figure 5: *X-ray of complete child's mummy showing extreme distortion of the bones and the surviving teeth. The intrusive adult metatarsal is visible on the right hand side of the child's cranium. A modern screw sits level with T8/T9 and posterior to the right humerus. A small artefact sits above and behind the screw.*

skeleton suffered from extreme distortion from the skull down to the pelvis with bones lacking correct anatomical alignment. (Figure 5)

The lateral view of the child's skull show that it is disarticulated from the cervical vertebra, with the face pointing down towards the chest. The reason for the unusual position is unknown but it may have been disarticulated for ritual purposes or to reshape the body to fit within the cartonnage mask. Another suggestion is that by forcing the head into an unnatural position it would allow the forehead to give a solid foundation for a portrait board (Filer 1997:121 & 125). This would require unnecessary effort when extra padding of bandages would give the same result to support a board or a cartonnage mask. (Figure 6)

Under the mask area the calverium is deformed and fractured in several places with an overlap of the flat bones. The suture lines have opened up post mortem, inside the wrappings and the right petrous temporal bone and the maxilla zygoma are not identifiable within the skeleton. There is a large deficiency in the posterior cranium through which folded membranous material is protruding. As the skull plates are not aligned, it was originally thought that the child might have suffered a major trauma causing a fatal head injury, possibly the result of a fall from a high structure. This hypothesis has since been discarded as it has become evident that decomposition caused the facial skin and scalp to partially deteriorate after the child's body had been wrapped in linen.

CT scans showed that the cranial cavity appeared large in proportion to the size of the face and the bones of the calverium appeared thinner than expected. The possibility of the child suffering from hydrocephalus was hypothesised. This was later discounted, as there was not any scalloping on the inner table of the bone and no enlargement of the pilituary fossa, which are both signs of hydrocephalus in children. (Gray 1994:35) If the skull had remained intact it would have appeared normal on x-rays.

To determine the age of the child it was necessary to determine the stage of development of the dentition in the mandible. Even though the mandible is fractured and dislocated, the developing crown of the lower left and right permanent molars can be seen clearly. The deciduous dentition in the mandible is complete with the exception of the lower right secondary and primary molar. The secondary dentition is unerupted. An estimate of four to four and a half years was determined by the stage of development of the first primary molar teeth. Several opaque objects resembling teeth can be seen elsewhere on

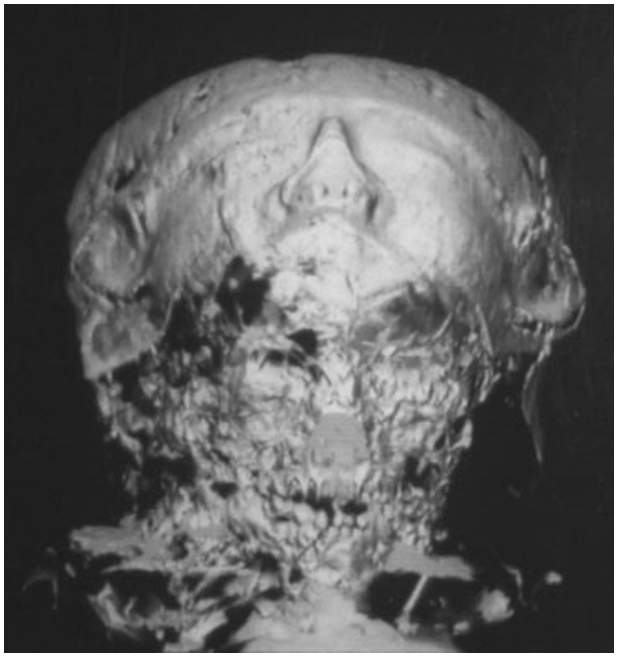

Figure 6: *3D reconstruction produced by a Toshiba X Press/SX with a workstation extension program of the complete mummy's head and mask.*

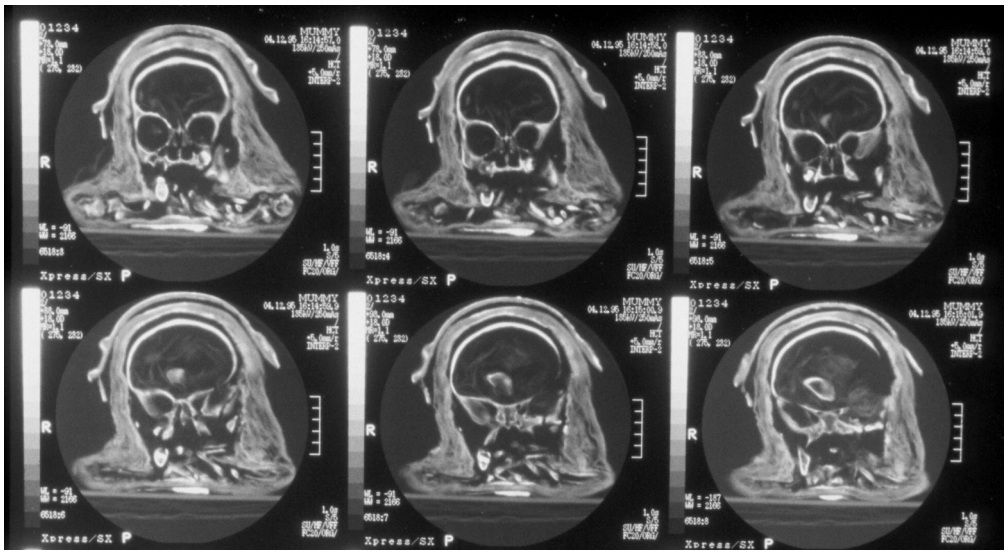

Figure 7: *CT-scans of the head of the complete mummified child showing the mask, the abnormal position of the damaged skull and the adult metatarsal in the cranium.*

the radiograph notably in the area of the left middle cranial fossa, the anterior cranial fossa and in the thorax. These objects sit adjacent to the temporal bone and behind the mastoid air cells and have been identified as the child's teeth that have fallen out after death.

Within the cranial vault there is fabric, presumed to be linen and an extraneous bone that has been identified as an adult metatarsal. (Figure 7) The reason for the inclusion of the metatarsal is unknown but one possibility is that it was used as a tool to push the fabric into the space that was originally occupied by the brain. The most elaborate and costliest mummification process included removal of the brain usually via the nasal passages and occasionally this may have been done through an opening near the base of the skull. Brain tissue deteriorates extremely quickly, especially in hot climates and may be removed relatively easily by manipulating a long hooked instrument up into the decomposing tissue. (Brier 1998)

The ancient Egyptians did not view the brain as an important part of the body and was therefore disposable and on a practical level it would have been almost impossible to preserve unless it was removed immediately after death. The ancient Egyptians believed that the heart, not the brain, to be the centre of intelligence and the organ that motivated good and bad behaviour. The retention of the heart in the body for the symbolic judgement in the *Hall of Two Truths* was absolutely necessary if the deceased was to pass the *Weighing of the Heart* test and go to the afterlife (Faulkner 1985:27-36).

No preserved organs are identified within the abdominal cavity. The treatment and storage of internal organs, during the mummification procedure, varied throughout ancient Egyptian history. In this case it is impossible to speculate about the fate of the child's internal organs. The child's spine shows cervical abnormalities and damage with multiple vertebrae between T1 and T12 absent or unidentifiable in the x-rays. The ribcage is collapsed and the bones in the thorax are compressed posteriorly and flattened to a height of less than five centimetres. The pelvis is similarly flattened and deformed with a fracture in the right iliac crest (Gray 1994:118). To cause such a fracture, direct force would be required on the area and it is possibly post-mortem damage. If this injury occurred during the child's life,the iliac artery may have been severed, causing death. (Figure 8)

Figure 8: *X-ray of child's mummy with a Y shaped fracture in the right iliac crest of the pelvis, cervical abnormalities and no preserved organs in the compressed thorax.*

Above the flattened bones of the torso and below the cartonnage decoration, linen wrappings with a thickness of approximately eight centimetres are clearly visible on the CT scans. The fabric directly over the chest appears to have been folded in places and also wrapped around the body. Strips of linen are clearly visible with the outer ones appearing to have been pulled taut over the inner wrappings that may have adjusted to the settling of the body after the wrapping process. Linen bandages underneath the torso are relatively thin, measuring approximately one and a half centimetres in width, which may have been caused by the weight of the body pressing on the linen. Wrappings around the legs are more evenly balanced with approximately the same amount of linen above and below the legs.

The humerus, radius and ulna in both arms are in good condition with the left arm turned in towards the body and slightly bent but not broken. The left hand is squashed right down against the sacrum and is level with the mid-thorax. Level with T8/T9 and immediately posterior to the right humerus and above the radius and ulna is a modern screw of unknown origin. The screw lies near to where the linen wrappings and possibly some of the mummified tissue have parted causing fine particles of dirt to fall from the mummy. The dirt may have accumulated because the mummy had been interred in a communal, underground burial gallery. (Hawass: 36-41) The damage to this tissue and linen suggests ancient or modern post mummification damage, possibly caused by movement. Sitting above and behind the screw is a small object or artefact, of unknown origin.

The long bones of the lower limbs are preserved in normal anatomical relationships common in bodies that have begun to decompose, the legs being the last part of the body to lose their integrity. Both tibiae are slightly bowed anteriorly. One knee is slightly lower than the other with the left patella present however the right patella is not obviously visible as there is a gap between the lower extremity of the femur and tibia. The feet are slightly crossed with the left foot in the uppermost position. There are growth arrest lines on the leg bones that may indicate malnutrition or disease. Growth arrest lines may also be non-specific as they record spurts of growth and of non-growth and have been identified in healthy children. Clearly visible on the plain films near the left patella is an area of opaque spots of varying shapes, which have the consistency of adipocere commonly known as “grave wax”. Adipocere, which becomes rancid, is caused by hydrolysis of body fat associated with the decomposition of the body. (Figure 9)

Investigation of the long bones, wrists and epiphyses confirmed the previous dental estimation of age. Radiologists, to estimate children’s ages, routinely use the stages of development of the epiphyses and apophyses. The epiphyses are of cartilaginous material that grow separately from the shaft of the bone, ossify during childhood then fuse during puberty (Sutton 1987:191). Between the ages of five and six years the radial head is in place below the capitellum, one of the bones that form the elbow joint, which develops between the ages of one to three years. At the head of the femur, the greater tracanta becomes visible between the ages of three to five years but not more than five years (Keats & Smith 1977:218). This hat-shaped apophysis is a secondary growth centre and is visible in the x-rays of the mummified child as is the capitellum. The proximal epiphysis is visible at the top end of the tibia, along with the distal tibial epiphysis. The distal fibula epiphysis is present in the right ankle. Both epiphyses confirm the age of the child as between four and four and a half years of age.

Extreme Trauma

The child’s body has suffered more than expected severe damage even if the mummification practices were sub-standard. The condition of the body is similar to that of bodies found in shallow graves where the weight of earth or sand has forced the skeleton to collapse. Therefore it is possible that the child may have been buried shortly after

Figure 9: *X-ray of the child’s mummy’s legs showing the long bones with both tibiae bowed anteriorly, “*grave wax” *near the left patella and the feet crossed.*

death, either to hide the body or to temporarily preserve it until mummification could take place. The usual method of determining if a body has been moved from one site to another after death is to look for *hypostatic morbidity*. Hypostasis occurs if body weight presses on a particular area and the blood cannot drain down causing a clearly visible whiter area on the flesh. Since the child's remains clearly show evidence of being mummified, if hypostatic morbidity were present all evidence has been lost due to the absorption properties of natron. As there is no conclusive evidence of foul play from the surviving remains it is more likely that temporary preservation was the motivation for the interment and the damage to the body was not necessarily all caused by poor mummification practices.

Conclusion

After extensive research into this mummy and comparison with other similar mummies it is impossible to ignore the evidence in regard to the varying standards of mummification that may challenge current beliefs and theories. The research suggests that mummification practices in the Graeco-Roman Period were indeed of a higher standard than is generally believed. At first glance the child's mummified body described here appears to have suffered from undergoing a poor mummification procedure. Further research has suggested that the child was buried in a shallow grave for some time before mummification and this may account for its poor condition. There is also some evidence of post mummification damage to the skull possibly caused by post mortem drying, which is a separate issue to the damage to the torso. Without the observations of a forensic pathologist, who distinguished the difference between the two different areas of the body, the theory of poor mummification would probably not have been questioned.

This allows the accepted notion that the quality of mummification was sub-standard in the Graeco-Roman Period to be challenged, even though there are many other specimens that are in poor condition. Perhaps the comparative number of bodies being mummified increased during that period, thus accounting for the survival of so many specimens in varying states of preservation. The recent discoveries of large numbers of mummies in subterranean galleries in the Western Desert of Egypt (Hawass 2000: 23) suggest that possibly more people in the Graeco-Roman Period could afford elaborate burials. If a similar number of New Kingdom mummies were found there may be some revision of the notion that New Kingdom mummification practices were superior or more widely available.

The ongoing study of mummification, bandages, cartonnage masks and adornments will add to the understanding of the crafts associated with burials, mummification practices and rituals. As more specialists become involved in mummy research there are more likely to be significant discoveries in many areas associated with the living and the dead in ancient Egypt. The rapid advancement of technology will allow for more new methods of non-invasive investigation to be practiced. The reason that new evidence is being found is because experts in many diverse fields are prepared to give their time to study the ancient mummies and their burials.

The development of the Melbourne Mummies Project and its investigations into ancient Egyptian mummified human remains is in response to medical, dental and provenance questions in regard to mummies and mummification practices. Its findings will expand the body of knowledge on the subject. The team is just one of many groups of specialists who are contributing to research into mummies and challenging previously held beliefs on ancient Egyptian health and funerary practices.

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