

Pisa 1

Impact ID: IMP00001

Institution: Museo di Anatomia Umana

Institution: Universita di Pisa

Designation: Pisa Inv. 1

Contact: Dr. Gianfranco

(gianfranco.natale@anist.med.unipi.it)

Image Modality: CT, x-ray

KVP: 120

X-Ray Tube Current: 365

Acquisition Date: N/A

Manufacturer: GE Medical Systems

Manufacturer Model Name: LightSpeed RT16

Country: Egypt

Time Period: Unknown

Dynasty: Unknown

Sex: Male

Age: 35-55 years

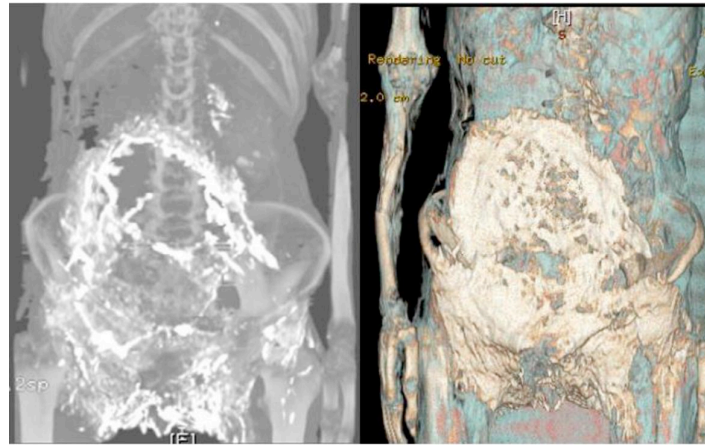


Figure 1. Pisa 1's Abdominal 3D Reconstruction
(Caramella et al., 2010)

Background:

This mummy is associated with an anthropoid coffin which is typical of the 25th and 26th Dynasty in Thebes, but the true origin of the mummy is not known (Silvano, 2007). There is no proof of donation to the museum either, but it was likely donated by one of the founders of the Pisa School of Medicine and Surgery (Silvano, 2007). Pisa 1 first appears in museum records in 1842 (Silvano, 2007). The front of the coffin was damaged in 1944, but has since been restored (Giuffra et al., 2009). Pisa 1 was fully unwrapped at some point, but there is no record as to when this happened (Giuffra et al., 2009). The incorrect orientation of the nose and unsupported, extended arm prove she was wrapped originally (Nelson et al., 2016).

A mass survey was carried out on all mummies on 33 whole-body mummies in Italian museums, all of them were x-rayed, while Pisa 1 had an additional CT examination performed at

the Santa Chiara Hospital in Pisa (Caramella et al., 2010; Giuffra et al., 2009). In 2011, the CT scan of this mummy was contributed to the IMPACT mummy database, but during its review Nelson et al. (2016) noticed several spinal abnormalities. This mummy is currently housed in the Museo di Anatomia Umana in Pisa, Italy (Nelson, 2016).

Pathological Features:

The sex of Pisa 1 is conclusively a male. Not only does the mummy have a penis, but the pelvis exhibits an acute subpubic angle and the skull exhibits squared mental eminence and prominent supraorbital ridges (Nelson et al., 2016).

The age estimation of this individual is not as straightforward. The cranial suture lines show localised fusion on the coronal and sagittal sutures, but due to the resolution the degree of the fusion cannot be confirmed (Nelson et al., 2016). The dentition is fully erupted meaning Pisa 1 was an adult, but the extreme dental wear seen in Egyptian mummies is also present obscuring the teeth (Nelson et al., 2016). Using the Brooks and Suchey (1990) standards to estimate age on the pubic symphyseal surface, Pisa 1 matches a 4-5 indicating a young to middle adult (23-66 years old) (Nelson et al., 2016). The low resolution of the CT scan makes age estimation of the first rib impossible due to dense soft tissue (Nelson et al., 2016). However, the 4th rib indicates a middle adult (mid-30s to mid-50s) (Nelson et al., 2016). Incomplete fusion in sacral vertebrae indicate a young adult, perhaps early 30s (Nelson et al., 2016). Using all this information, it is likely the mummy was a middle-age adult, between mid-30 and mid-50.

General appearance of Pisa 1 is good, along with state of preservation (Giuffra et al., 2009). Skin is very dark in colour. Hair is short and reddish in colour. Giuffra et al. (2009) noted that the eyes were removed, but Nelson et al. (2016) show that they are present but have shrunk into the posterior area of the orbit. Nose is deformed from compression of wrappings and the lips are closed (Giuffra et al., 2009). Tampon in the right nostril and the ethmoid bone is fractured, which is evidence of Pisa 1 undergoing a transnasal craniotomy, performed through the left nostril (Giuffra et al., 2009; Nelson et al., 2016). Spinal cord is visible beginning at the C1 vertebrae and continuing below (Nelson et al., 2016). There is a hole present under the chin (Giuffra et al., 2009).

Evisceration incision present on the left flank with all organs removed from the abdominal and thoracic cavities (Giuffra et al., 2009; Nelson et al., 2016). The incision is estimated to have been 12cm long, within normal range, and is now 10.75cm long (Nelson et al., 2016). Arms are along the sides with hands resting on the external side of each thigh (Giuffra et al., 2009). Pericardium is apparent without a heart and lungs were excised 2-3cm inferior to the xiphoid process (Nelson et al., 2016). Linen package in the anterior-lateral region of the abdominal cavity (Giuffra et al., 2009; Nelson et al., 2016). Other opaque packages in the left abdominal cavity and in the pelvis (Giuffra et al., 2009). Resin was clearly poured into the thoracic cavity during the mummification process, which is evident by a solidified layer (Nelson et al., 2016). The resin also indicates the mummy was not flat on its back as it dried on a 22° angle (Nelson et al., 2016). A thin layer of a high-density material is covering the abdomen, pelvis, and upper inner thighs

and may represent gilding (Nelson et al., 2016). The possible gilding, use of resin, and short evisceration incision could possibly indicate higher social status for Pisa 1 (Nelson et al., 2016).

There are numerous skeletal abnormalities not previously mentioned in studies on the mummy. There are cervical osteophytes from C5-C7 that likely pressed/displaced the esophagus in life as they are in contact with the trachea (Nelson et al., 2017). On the right side of the T4-L1 vertebrae are small to large flowing bridging osteophytes (Nelson et al., 2016). Additionally, there are small bridging osteophytes on the left surface of L3-L5 (Nelson et al., 2016). No vertebrae exhibit apophyseal or costovertebral fusion or sacroiliitis (Nelson et al., 2016). Although accurate assessment is difficult due to desiccated tissue, vertebrae demonstrate normal disc space height (Nelson et al., 2016). There is also possible extra spinal enthesophytes in both iliac crests, both ischial tuberosities, both tibial tuberosities, both popliteal tendon insertions, and the right Achilles tendon insertion (Nelson et al., 2016). These skeletal findings all coincide with a positive diagnosis of diffuse idiopathic skeletal hyperostosis (DISH) (Nelson et al., 2016). The diagnosis of DISH supports the findings of the individual being older, as it is most common in those over 40 and this being an advanced case, and of Pisa 1 being of high status as it is associated with obesity and metabolic syndrome caused by richer diets (Nelson et al., 2016).

Throughout the rest of spine, more findings indicate different diseases also being present. Degenerative disc disease (DDD) can be possibly seen in routine, nonbridging osteophytes with slight disc narrowing in the lumbar spine (Nelson et al., 2016). Juvenile kyphosis/Schmorl's disease may be present due to multilevel Schmorl's nodes in T4-5, T7-12, and L1-6 (Nelson et al., 2016). There is also multilevel interspinous ligament calcification, possibly from ossification (Nelson et al., 2016). Cross-over spinal syndromes are increasingly recognized, and Pisa 1 may be a case (Nelson et al., 2016). Cross-over spinal conditions also could explain the unfused sacral vertebrae, the only indicator of a younger age (Nelson et al., 2016).

There is a depression on the intracranial surface of the parietal bones, but it is most likely a normal variant (Nelson et al., 2016). Unlikely, but possible, the depression could be the result of a slow-progressing, likely benign, intracranial tumour (Nelson et al., 2016). The re-evaluated age also supports this as meningiomas are most common in 40-60 year-olds (Nelson et al., 2016).

There are numerous fractures found in Pisa 1, although it is not clear whether they happened before or after embalming (Nelson et al., 2016). A 9cm fracture runs across the left half of the frontal, 4cm of which has the appearance of a cut mark which may be associated with the unwrapping event (Nelson et al., 2016). Both clavicles exhibit undisplaced comminuted fractures on their acromial ends (Nelson et al., 2016). The CT scan makes viewing of the scapula difficult, but there appears to be a comminuted fracture for the left acromion and there may be similar fracturing on the right (Nelson et al., 2016). There is no soft tissue damage on the clavicle fractures or the acromial abnormality, implying they occurred perimortem (Nelson et al., 2016). There is an incompletely healed fracture of the rib, resulting in the appearance of pseudoarthrosis on the sternal end of the left and right first ribs (Nelson et al., 2016). The right ribs 10-12 and left ribs 9-11 show unhealed fractures on the shaft (Nelson et al., 2016). The right 10th rib has a large depression and is the only one associated with a break in soft tissue (Nelson et al., 2016). These rib fractures are likely due to a perimortem traumatic event as the resin has infiltrated the

fractures on the 10th and 11th left ribs, but the resin is not fractured or disturbed like it would be expected to be if the event occurred after the resin solidified (Nelson et al., 2016).

There is also a small, well-defined, lytic lesion on the right 6th rib, without a sclerotic border, but this is a non-specific finding (Nelson et al., 2016). There is a well-defined, small, bubbly tripartite lytic lesion with a sclerotic border on the left femoral head (Nelson et al., 2016). This is likely from a cyst related to femoroacetabular impingement but could also be from a herniation pit (Nelson et al., 2016).

The permanent teeth have fully erupted, but are not in good condition. There are lesions in maxillary and mandibular first molars and a lesion that has destroyed the crown of the left maxillary second premolar (Nelson et al., 2016). There is also an abscess at the apex of the root of the left maxillary second premolar (Nelson et al., 2016).

References

Brooks, S.T., & Suchey J.M. 1990. Skeletal age determination based on the os pubis: a comparison of the Acsádi-Nemeskéri and Suchey-Brooks methods. *Human Evolution*. 5(3): 227-238.

Caramella, D., Cosmacini, P., Giuffra, V., Lauretti, D., Sabato, M., & Fornaciari, G. 2010. Radiological evaluation of ancient Egyptian mummies in Italian museums. Paper presented to ECR 2010.

Giuffra, V., Ata Pangoli, D., Cosmacini, P., Caramella, D., Silvano, F., Fornaciara, G., Ciranni, R., 2009. Paleopathological Evaluation and Radiological Study of 46 Egyptian Mummified Specimens in Italian Museums. *Egitto e Vicino Oriente* 32: 121-155.

Nelson, AJ, Beckett, R, Conlogue, G, Garvin, G, Saleem, S, Natale, G, Caramella, D & Wade, A. Diagnosis by consensus in Pisa: a case study I interdisciplinary interpretation of mummified pathological conditions. Paper presented to the 9th World Congress on Mummy Studies, Lima, Perú, August 2016.