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Paleopathological Approach to the Study of a Christian Relic: The Case of the Blessed Maria Lorenza Longo

Mirko Traversari

Laboratory of Ancient DNA, Department of Cultural Heritage (DBC), University of Bologna, Ravenna, Italy

ABSTRACT

The Blessed Maria Lorenza Longo, founder of the hospital of Santa Maria del Popolo degli Incurabili and the Order of the Capuchin Poor Clares in Naples, Italy, died on 21 October 1539 and was recently beatified on 9 October 2021. The relic, a fully skeletonized cranium, underwent visual and radiological inspection. The biological profile supports the attribution of female sex of the relic, whereas the age at death is estimated to be younger than that reported by historians. A paleopathological survey was conducted to evaluate the historical reports of poisoning or rheumatoid arthritis affecting Maria Longo. Given the limited skeletal data, it was not possible to confirm the presence of these claims. No obvious indicators of dietary deficiencies were observed, and the tertiary syphilis hypothesized by textual sources was excluded. Postmortem alterations of the relic were clearly visible on the superior aspect of the cranium and testified to the worship of the relic.

Key words: *paleoanthropology, paleoradiology, paleopathology, relics, neurosyphilis*

Introduction

The Blessed Maria Lorenza Longo, founder of the hospital of *Santa Maria del Popolo degli Incurabili* and the Order of the Capuchin Poor Clares in Naples, Italy. The place and year of the birth of Maria Lorenza Longo are not precisely known. The contemporary biographers reported 1463 as the year of birth, although later historians considered alternative years ranging from 1463 to 1473. She was verified to be of Catalan origin, and probably born in Lleida; her relationship with the noble Requesens family, however, is still debated among historians. She married Joan Llonc (translated in Italian as Giovanni Longo) at a very young age. Giovanni Longo was a member of the *Generalitat de Catalunya* under the Crown of Aragon, and after was appointed as chancellery regent of King Ferdinand the Catholic. In their first years of marriage, Maria Longo suffered from a disabling disease commonly attributed to poisoning by a maid during a dance party. In 1506, the new sovereign of Spain, Ferdinand (1452–1516) arrived in Naples with three ministers from the Catalan Council, including Giovanni Longo. Despite her illness, Maria Longo followed her husband to Naples upon advice of her confessor. Unexpectedly, Giovanni Longo died in 1508 and Maria Longo remained in Naples. In 1510 she was led on a pilgrimage to the Shrine of Loreto where she miraculously experienced a sudden recovery. After returning to Naples and arranging for the accommodation of her daughter Speranza, she devoted herself to the charity of the poor and unhealthy peoples of the city. In 1519, encouraged by Ettore Vernazza[a], she pursued the foundation of the so-called *Ospedale degli Incurabili*, which was opened on March 23, 1522. The professed "incurable" patients were mainly victims of the "French Disease", i.e. syphilis or the more general lues. Between 1495–1497 Naples was the stopover for Charles VIII's army, and here the syphilitic disease reached an epidemic level[1]. Afterwards, Maria Longo took vows and founded a new cloistered institution. On February 19, 1535, Paul III authorized the building of a monastery under the Rule of St. Clare near the hospital. In July 1535, the first religious members entered the new monastery of Santa Maria in Gerusalemme. A recrudescence of the disease affected Maria Longo in her later days, and she died in 1539 in odor of sanctity.

[a] Ettore Vernazza (1469–1524), Italian philantropist and the first founder of the Hospital for Incurables (https://www.europacristiana.com).

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One year following the death of Maria Longo, her close friend and assistant, Maria de Ayerbe Duchess of Termoli, who expressed desire to be buried beside Maria Longo, died. At the time of Maria de Ayerbe's burial, the body of the Longo was reported to be "uncorrupted". Unfortunately, in the following decade, following a new inspection of the burial, the nuns had observed an advanced state of corruption of both bodies. Thus, to preserve the relics of Maria Longo, the nuns severed and retained her head. In the 1585, the nuns moved to a new monastery, and a witness reported that during the procession the "nuns mixed the head of Maria Longo with the heads of other nuns and now the attribution of the head to Maria Longo is uncertain"[2]. However, during the centuries, the cranium attributed to Maria Longo was considered miraculous but suffered from several accidental postmortem damages due to mishandling. These postmortem damages were reported for the first time during the third inspection of the relic in 1935[3]. Recently, the canonical investigation, which began in 1880 came to an end, and Maria Lorenza Longo was beatified in Naples, Italy, on October 9, 2021. On April 29 of the same year, a new scientific inspection of the relic attributed to the Blessed Maria Longo was approved by the Abbess of the Monastic Complex of Santa Maria in Gerusalemme. Besides poisoning, several etiologies were hypothesized for the condition that had affected Maria Longo. One contemporary historian, Giuliano Passaro, attributed her illness to syphilis[4]. More recently, Felice D'Onofrio ruled out syphilis and hypothesized rheumatoid arthritis due to the chronic-relapsing nature of her symptoms that seemed to particularly affect the extremities[5].

The aims of this study are three-fold: to perform a bioanthropological analysis of the remains and to reconstruct the biological profile for the relic, and to perform a paleopathological survey to evaluate (by differential diagnosis) the veracity of claims for Maria Longo's health condition. The preliminary results on the state of health obtained through both direct observation and radiological imaging of the relic are reported here and discussed considering the traditional accounts and historical evidence of Maria Longo's life and health.

Material and Methods

According to the mandate of the ecclesiastical authority, this study was carried out exclusively through visual inspection and radiological analysis, avoiding destructive sampling to preserve the integrity of the relic. A full osteological and dental inventory was conducted using recognized bioanthropological standards. Anthropomorphic traits were scored, and measurements were calculated (as indices) according to international standards[6]. Sex estimation was performed by observing discrete morphological characteristics of cranial elements [7]. Estimation of age at death was conducted primarily using dental wear[8], with ecto and endocranial suture closure used conservatively as a complementary method[7,9]. The paleopathological survey was conducted according to Ortner[10] and Aufderheide and Rodríguez-Martìn[11]. Non-metric traits and anatomical variants were investigated following Mann, Hunt and Lozanoff[12]. To investigate the internal structure of the relic and to preserve a digital replica of the remains, the cranium was CT scanned at the Diagnostic Imaging Unit, Department of Advanced Biomedical Sciences, University of Naples "Federico II" (Naples, Italy). High quality DICOM images were generated using an Astelion (Canon) CT 16-slice system (150–200 mA, 120 Kv × 500 μm voxel size), with multiplanar reconstructions and volumetric (3D) rendering[13–15]. Conventional X-ray images were also acquired, through GMM Opera (General Medical Merate) equipment with antero-posterior (AP), latero-lateral (LL) and basal projections.

Results

Inventory

The relic attributed to Blessed Maria Lorenza Longo is represented by a completely skeletonized partial cranium. In particular, the relic is missing the right temporal bone, part of the right greater wing of sphenoid, the entire right lacrimal bone, and the orbital lamina of the right ethmoid bone. Furthermore, the right parietal bone displays a large postmortem break, manifesting as a large gap ending at the sagittal suture. This break was documented during the previous historical inspections and attributed to an accidental fall of the cranium[3]. The dental elements 13, 16, 17 (broken), 22 (only the root), 23, 24, 25, 26 are present in the alveolus. The other teeth are absent and, given the lack of alveolar bone resorption, this is attributed to postmortem loss.

Biological profile

The biological profile, in accordance with Acsadi and Nemeskeri[7] (threshold values: F(emale) –2, –1, 0, +1, +2 M(ale); final score: F <–0.4, Ind(eterminate) –0.4 / +0.4, M> +0.4) suggests the relic to be the remains of a female (nuchal crest score: 1, mastoid process score: –2, supra orbital margin score: 1, supraorbital glabella score: 0; final score: –0.43). The estimated age at death, according with Lovejoy 1985[8], Meindl and Lovejoy 1985[9] and Acsadi and Nemeskeri 1970[7] falls between 44 to 50 years old (dental attrition range: 40–50; ectocranial suture closure range: 28–44; endocranial suture closure range: 30–60; minimum range: 44–50). The anthropometric measurements and indices, undertaken using the digital DICOM files from the CT survey, are summarized in Table 1. These values fall within the range for females[7].

Paleopathological survey

Direct observation revealed several wormian ossicles along the coronal, sagittal and occipital sutures; these features are usually of epigenetic nature. Enthesopathies were additionally observed at the superior nuchal line, which is the insertion line of several muscles including

TABLE 1

MAIN INDICES CALCULATED FROM THE CT IMAGES

Index Values	Mean	Classification
Cranial Index	79.92	Mesocranial
Transverse Cranio - Facial Index	90.76	Criptozygy
Cranial Height - Width Index	96.13	Metriocrane
Cranial Height - Length Index	76.73	Hypsicrane
Upper Facial Index	55.87	Leptene

splenius capitis, trapezius and occipitalis (Figure 1a). These localized enthesopathies are usually secondary to repetitive mechanical strain.

A similar indicator of chronic muscle strain is observed on the superior temporal line of the frontal bone, represented by the insertion of the temporal fascia (Figure 1b). Numerous small grooves/developmental lines are visible on the parietal bones, which are anatomical variants of unknown etiology that can be misinterpreted as trauma or postmortem damage[12]. A good bone density was observed, and no areas affected by cribrosity was identified. However, slight porosity and vermiform pattern on the surface of the glabella is evident, which gives the bone a rough appearance (Figure 2).

Slight periosteal activity is evident along the orbital rim of the zygomatic bone, which can be associated with a moderate inflammatory process[12] (Figure 3a). Furthermore, the endocranium is characterized by marked vascular impressions, with some areas affected by deep arachnoid granulations (projections of the arachnoid membrane (villi) into the dural sinuses).The granulations are typically of CSF density and protrude into the calvaria or a dural venous sinus causing a filling defect. They may simulate a dural venous sinus thrombosis but are usually easily differentiated given their round well-defined shape and classic location[16] (Figure 3b).

Additionally, the DICOM images revealed a small, rounded osteoma on the endocranial surface of the frontal bone (Figure 3c). The cranial diploe is observed to be

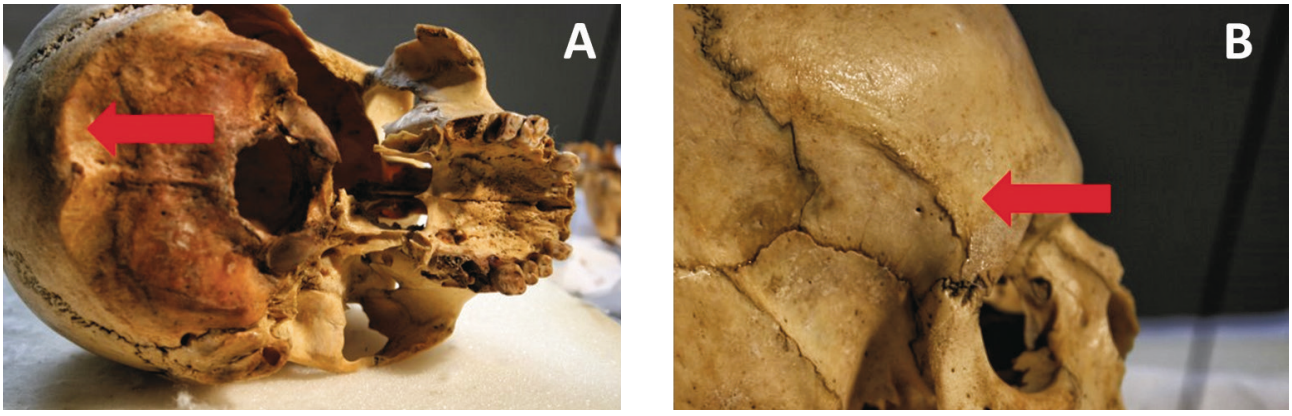

Fig. 1. a: the arrow points to the well-developed superior nuchal line; b: the arrow indicates moderate enthesopathy of the temporal line of the frontal bone.

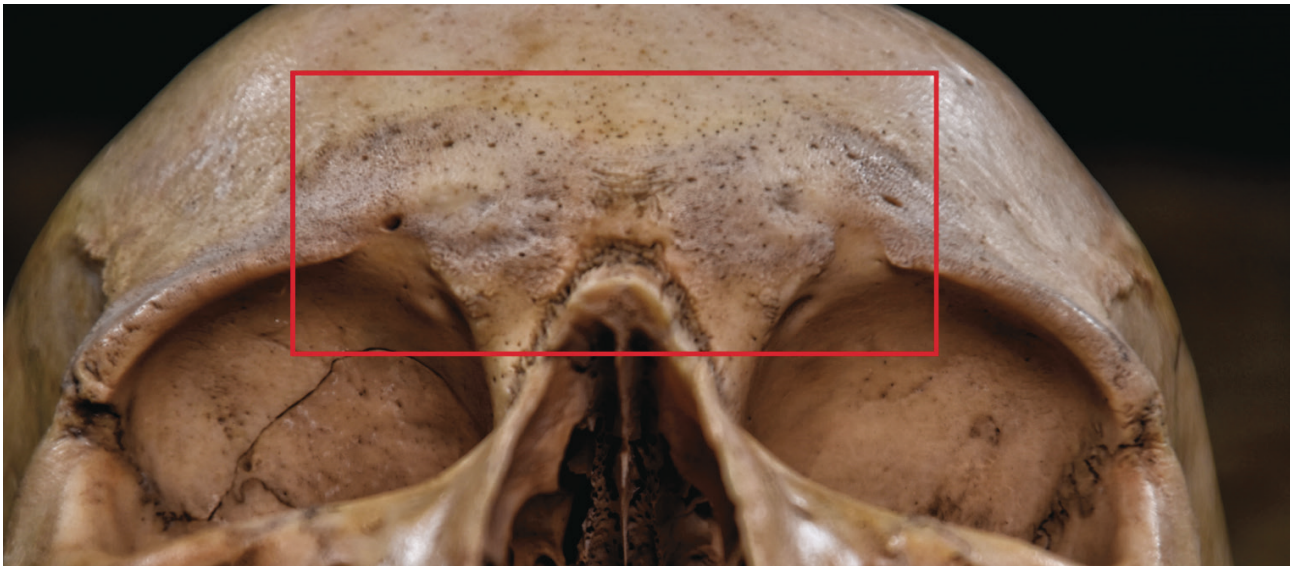

Fig. 2. The inset over the frontal bone delineates the rough, vermiform appearance of the frontal bone.

Fig. 3. The arrows indicate: a: an inflammatory response along the left orbital rim; b: the area of deep cavitation on the diploe in this CT image; c: the osteoma on the endocranial surface of the frontal bone from this 3D model.

moderately thickened, involving the parietal and frontal bones. In this region, a patent hole around bregma is visible (Figure 4a); the hole, circular and with no visible bone reaction, is orthogonal to the parietal bone with regular and clean borders (thus, not an entry and/or exit wound). The color of the exposed thickness is similar to the surface of the parietal and frontal bone. Moreover, a large ellipsoidal region featuring numerous parallel lines and grooves on the frontal bone and both parietals is observed along the sagittal suture. This area of the external table has led to the exposure of the diploe, in particular on the frontal bone (Figure 4b,c). The edges of this abraded area are polished (often due to repeated friction, such as rubbing, of the bone surface)[17]. The postmortem nature of the hole and the described abrasions are confirmed radiologically to lack bone re-modelling. Finally, the buccal aspect of the dentition present appears to a large extent spared from deposits of dental calculus and carious lesions, as observed in individuals with a variegated diet. Apical inflammatory pathologies or periodontitis were further not observed.

Discussion and Conclusion

The present study demonstrated an overall consistency regarding the available historical sources. However, the anthropometric measures revealed an age of death (ranging from 44–50 years old) that was earlier than that traditionally reported by historians (ca 65–75 years old)[18]. The specific surface pattern, if observed on the surface of the glabella and along the brow ridges, can be associated with an osteoporotic state, a typical aspect of old age[12,19]. This latter feature was therefore considered degenerative, and not traumatic, neoplastic, metabolic or infectious in nature. Considering the paucity of historical documents discussing the birth year of the Blessed Longo, these new findings may shed light on her first years of life. The absence of clear indicators related to health deficiency states, as well as the lack of obvious pathology to the dentition, argue in favor of an affluent lifestyle, including access to a varied diet. This is in line with the environment in which she lived for most of her life, as the wife and later widow of the chancellery regent of King Ferdinand.

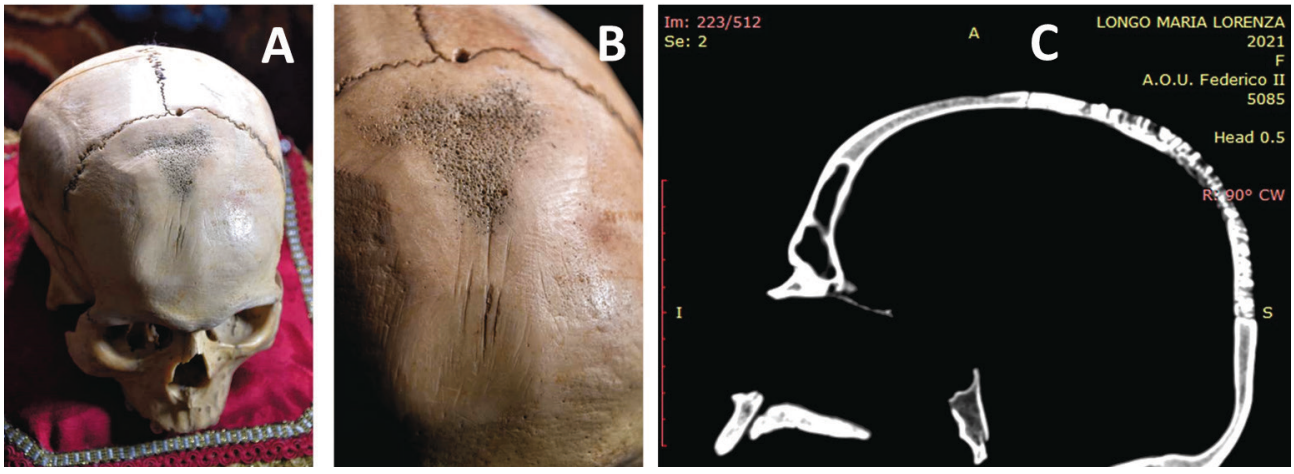

Fig. 4. a: overall view of the postmortem damage affecting the anterosuperior aspect of the cranium; b: the detail of the mechanical damage on the frontal bone; c: sagittal CT view in which mechanical modification is evident on the cranium to the level of the diploe, and the absence of a physiological response.

Overall, this proposed relic of the Blessed reveals a mature woman in good nutritional status. By contrast, the historical hypotheses concerning the pathology that affected the Blessed Longo, namely poisoning and rheumatoid arthritis, cannot be refuted or verified on this relic. As for the poisoning, the prevention of bone sampling and the absence of soft tissues for analyses restricted the validation of this hypothesis. Conversely, although rheumatoid arthritis may be consistent with the disabling and chronic-relapsing nature of her symptoms, the absence of the post cranial joints and no bony changes to the temporomandibular joint further prevents the evaluation of the possible osteoarchaeological lesions typical of this condition. By contrast, syphilis is excluded due to the lack of lesions typically affecting the cranium during the tertiary stage of the disease (caries sicca caused by the gummatous lesions of syphilis)[20]. It may be that the historians suggested this condition considering the Blessed Longo's dedication to treating the so-called "incurable" syphilitic patients through the foundation of the Hospital. Moreover, the described abrasive lesions to the anterosuperior region of the cranium may have been misinterpreted as luetic. Conversely, these postmortem abrasions can provide important indications about the devotion to the relic. In fact, the historical sources reported the thaumaturgic use of the relic of the Blessed Longo through the centuries. In particular, the latest miraculous healing of a nun, Sister Maria Cherubina, that occurred in 1881 after the placement of the relic on her body, was considered scientifically unexplainable by physicians[18]. This event led to the recent beatification of Maria Lorenza Longo. Thus, it is evident that this relic has always emanated great charisma and attraction for the faithful, so much that it was probably displayed suspended within a reliquary through the hole observed around the bregma, as well as revered and touched to recover either small fragments or bone dust, ensuring private relics to the devotees.

The peculiar characteristics observed regarding the hole strongly lean towards its anthropogenic nature. This habit has been previously proposed for the lesion observed in other Christian relics[21,22] and could explain the postmortem abrasion observed here on the cranium. The thaumaturgic power attributed to the relics represents an important issue to consider. In Christianity, miraculous proofs reassert God's power through the constant manifestation of the Saint's gifts[23]. It was believed that at the moment of death, this charismatic power migrated from the dead body to the relics, which became thaumaturgic[24]. St. Augustine of Hippo, initially hostile, finally became favorable toward the recognition of the thaumaturgic power of the relics, as widely asserted in the Book XXII of his *De Civitate Dei*[23]. Many examples of this phenomenon have been said to have occurred since the 16th century. The symbolic use of relics by King Philip II (1527–1598), as well as their role in the construction of spiritual and national identity in Spain was thoroughly investigated according to the testimony of the Hieronymite friar José de Sigüenza (1544–1606)[25]. His massive relic collection in the Escorial palace proves the Spanish king's devotion to the cult of Saints and his support to the principles of Tridentine Church. In his final days, the king himself asked to have relics corresponding to his aching limbs directly applied to his open wounds, claiming that the contact with them soothed his pains[25]. Another interesting example is represented by the Jesuit Lenaert Leys (1554–1623), a Flemish theologian who became object of veneration immediately after his death[24]. He had suffered from terrible aches in his legs and abdomen during his life and, based on many supposed miraculous healings, his relics were believed to have thaumaturgic powers. According to historical sources, miraculous healings took place at his tomb, and devotees had been miraculously cured of their illnesses or pains.

Finally, from a conservation perspective, the direct analysis approach, and, above all the radiological investigation, has allowed for the preservation of the relic. The CT data further allow for possible future study and, if necessary, the possibility to virtually restore the missing bones of the cranium to obtain a digital facial reconstruction of the Blessed Maria Lorenza Longo. This may lend further credence to the confirmation that the proposed relic is indeed the remains of Maria Longo.

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M. Traversari

Laboratory of Ancient DNA, Department of Cultural Heritage (DBC), University of Bologna, Via degli Ariani 1, 48121, Ravenna, Italy

e-mail: mirko.traversari@gmail.com

PALEOPATOLOŠKI PRISTUP PROUČAVANJU KRŠĆANSKE RELIKVIJE: SLUČAJ BLAŽENE MARIJE LORENZE LONGO

S A Ž E T A K

Blažena Maria Lorenza Longo, utemeljiteljica bolnice Santa Maria del Popolo degli Incurabili i Reda kapucinskih klarisa u Napulju, Italija, umrla je 21. listopada 1539. i nedavno je proglašena blaženom 9. listopada 2021. Relikvija, potpuno skeletizirane lubanje, podvrgnuta je vizualnom i radiološkom pregledu. Biološki profil podupire atribuciju ženskog spola relikvije, dok se procjenjuje da je dob u trenutku smrti mlađa od one koju navode povjesničari. Provedeno je paleopatološko istraživanje kako bi se procijenili povijesni podaci o trovanju ili reumatoidnom artritisu. S obzirom na ograničene skeletne podatke, nije bilo moguće potvrditi ove tvrdnje. Nisu primijećeni pokazatelji nedostataka u prehrani, a tercijarni sifilis pretpostavljen tekstualnim izvorima je isključen. Postmortalne promjene relikvije koje su jasno vidljive na gornjem dijelu lubanje svjedoče o štovanju relikvije.