

Articoli/Articles

RENAISSANCE AND MODERN AGE FUNERARY  
EMBALMING IN THE BASILICA OF SAN DOMENICO  
MAGGIORE IN NAPLES (15<sup>TH</sup> -18<sup>TH</sup> CENTURIES)

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SUMMARY

*EMBALMING IN THE BASILICA OF SAN DOMENICO MAGGIORE  
IN NAPLES (15<sup>TH</sup> -18<sup>TH</sup> CENTURIES)*

*In the middle 1980's, a systematic investigation was started on the series of tombs in the Sacristy of the Basilica of San Domenico Maggiore in Naples, with 20 well-preserved mummified bodies. X-ray and autopsies were performed on each individual for palaeopathological study. These examinations allowed for a better understanding of the techniques for embalming, and they included different modes of evisceration, craniotomy type, and identification of the embalming materials used to fill the body cavities. Embalming in the Renaissance became a true surgical practice and, in the contemporary surgical literature, the Authors provided an accurate description of the embalming methods: craniotomy, total or partial evisceration, defleshing, washing or immersion in preserving fluids, filling with embalming materials, wrapping with bandages, dressing of the body and final deposition in coffin.*

*Key words:* Embalming - Mummies - Renaissance - Naples - Aristocracy

### *1. Embalming in the Modern Era*

Beginning in the 12<sup>th</sup> century, there are examples of surgery carried out on the bodies of kings of France or England who died outside their land<sup>1</sup>. However, it is mainly in England that embalming became a fairly frequent practice, owing to the fact that many leaders died in distant countries and their bodies were brought back home. The body of Henry I, who died in France in 1135, was completely eviscerated. The same procedure was used in 1199 for the body of Richard I, and in 1216 for that of John Lackland<sup>2</sup>. In France, starting from the 13<sup>th</sup> century, the embalming practice became more common as a result of the more frequent deaths of kings living abroad.

However, embalming was a rather long-winding process; moreover, specific tools, different materials and substances were used, but generally with scarce results. For these reasons, during the Crusades another type of treatment was implemented, known under the expression “body boiling”, which consisted in immersing the corpses in salted water, with aromatic and antiseptic substances to skeletonize the bodies and facilitate their preservation and transport to the final burial site. Generally, the soft parts of the body, separated from the skeleton, were buried at the place of the king’s or prince’s death, while the skeletons were taken back to their home country to receive appropriate funerals and to be housed in private chapels or cathedrals.

The excommunication of “body boiling” decreed by Pope Boniface VIII led to a greater implementation of the practice of surgical embalming, up until the formulation of a standard process in the Renaissance period<sup>3</sup>. The surgical literature of the Modern age outlined the procedure to be followed, which consisted in craniotomy for decerebration, thoracoabdominal evisceration, defleshing, and filling the cavities with aromatic plants, wool, oakum, sponges or lime. These rituals were followed by defleshing of the limbs, and by treatment of the bodies with substances (e.g. firewater) believed to

fight putrefaction. Finally, before applying the techniques of bandaging and dressing, the surgeons treated the body with aromatic herbs and resins<sup>4</sup>.

*2. The artificial mummies of the Basilica of San Domenico Maggiore*

The Basilica of San Domenico Maggiore, which dates back to the beginning of the 14<sup>th</sup> century, is one of the largest and most important churches in Naples. The humanist Giovanni Pontano and the philosophers Tommaso Campanella and Giordano Bruno studied in this Abbey, while Saint Thomas Aquinas taught in the annexed convent of the Dominicans<sup>5</sup>.

On an overhanging wooden balcony, about four meters high, along the three sides of the sacristy of the Basilica, there are 44 wooden sarcophagi, covered with silk drapes, brocades and precious fabrics,



Fig. 1. The Sacristy of the Basilica of San Domenico Maggiore in Naples, and the royal coffins.

containing the bodies of the Neapolitan nobility and of the princes of the 15<sup>th</sup> and 16<sup>th</sup> centuries, among which 12 Aragon kings and princes<sup>6</sup> (Fig. 1). The smaller coffins of the lower row are generally of anonymous individuals, while the larger coffins of the upper row are identified by the coats-of-arms and names of the personages buried inside<sup>7</sup>. In particular, they include the Aragonese kings Alfonso I (who died in 1458), Ferrante I (1494), Ferrante II (1496), Queen Giovanna IV (1518) and the Marquis of Pescara Ferdinando d'Avalos, who won the famous battle of Pavia against the French King François I in 1525<sup>8</sup>. This is certainly not the original arrangement, since the sarcophagi were originally distributed over the entire Church without a precise order. In 1594 Philip II, King of Spain, ordered the caskets to be placed in the sacristy, but the current position of the sarcophagi on two overlapping rows of the balcony certainly dates back to after 1709, after the renovation works conducted in the sacristy.

The sarcophagi contain 18 artificial mummies, 12 natural mummies and 4 disconnected skeletons, whereas three sarcophagi of the upper row and four of the lower row are empty. Between 1984 and 1987 Prof. Gino Fornaciari and his team exhumed and studied the series of mummies preserved in the Basilica of San Domenico Maggiore in Naples<sup>9</sup>. For the study of the embalming technique, in addition to the autoptic approach, radiology applied to mummified bodies (i.e. paleoradiology)<sup>10</sup> and the macroscopic determination of the substances used to fill the cavities were fundamental.

In this study, the eighteen artificial mummies are considered in chronological sequence, so as to compare the historical data with those obtained from anthropological analyses.

We describe the embalming technique and materials<sup>11</sup> used for each artificial mummy, identified at the time of the field study with the original acronym NASD (NAPles San Domenico) and a number.

The historical identification of the individuals, and the chronology of the unidentified individuals were based on the cross-breeding of

anthropological, epigraphic and archaeological data. Particularly important, <sup>14</sup>C dating and dendrochronological examination of the wooden sarcophagi a part, was the dating of the funerary clothes.

### *3. Study of the artificial mummies*

NASD22. The large sarcophagus contains the artificial mummy of Ferrante I of Aragon (1424-1494), King of Naples.

The calvarium has a circular opening at the squama of the occipital bone, and the cranial cavity is filled with sponges mixed with resinous substances. The abdomen shows a longitudinal incision, extending from the xiphoid process of the sternum to the pubis. The thoracic and abdominal cavities appear to have been covered in the back with a reddish clay layer, overlaid with another blackish, compact layer, and filled with marine sponges, probably embedded with resinous substances, joined together with a rope.

NASD20. The large sarcophagus houses the artificial mummy of Ferrante II of Aragon (1469-1496), King of Naples.

The fragmented calvarium has a circular opening in the squama of the occipital bone, and the cranial cavity is filled with sponges mixed with resinous substances. At the height of the front abdominal wall, there is evidence of a xiphopubic incision. The thoracic and abdominal cavities are covered in the back with a reddish clay layer, overlaid with another hard, blackish layer, and filled with marine sponges probably embedded with resinous substances, joined together with a rope.

NASD11. The large sarcophagus contains the artificial mummy of Ferdinando Francesco d'Avalos, Marquis of Pescara (1482-1525).

The skull exhibits a wide circular cut running over nearly the entire squamous region of the occipital bone and a portion of the right parietal bone. The skull cavity appears to be completely filled with wadding. The chest and the abdomen have a long longitudinal inci-

sion, extending from the jugular region to the pubis, and the cavities, covered in the back with a lime layer, are filled with clumps of wadding mixed externally with lime.

NASD2. The small sarcophagus contains the artificial mummy of a baby of about 2-6 months, dated back to the 16<sup>th</sup> century.

The calvarium shows a horizontal circular craniotomy, from frontal to occipital squama. The body shows two extensive cross-incisions, jugular-pubic and transverse-umbilical respectively. The cavities were filled with wadding mixed with resins. The X-ray shows the presence of drops of mercury. The lower limbs were subjected to defleshing, and the muscle masses were replaced with resins.

NASD16. The large sarcophagus contains the artificial mummy of Maria of Aragon (1503-1568), Marquise of Vasto.

The skull has no craniotomy. The chest and the abdomen have a long longitudinal incision, extending from the median breast region to the left inguinal region. Two other transverse incisions run from side to side, perpendicular to the previous one. The thoracic and abdominal cavities are filled with a layer of lime towards the back, overlapped with artemisia leaves, laurel leaves and myrtle sprigs that fill the cavity.

NASD6. The large sarcophagus probably contains the skeletonized mummy of Ferdinand Francesco of Avalos (1530-1571), Marquis of Vasto and Pescara.

The skull shows a horizontal circular craniotomy from the low frontal squama to the occipital bone. Remains of the anterior abdominal wall still show part of a longitudinal incision, most probably a xipho-pubic cut. The chest and the abdominal cavities appear filled with a sort of “wadding”, or “felt” of animal hair, probably wool.

NASD14bis. In the space between the inner casket and the sarcophagus NASD14 of Ferdinando Orsini, duke of Gravina, is the artificial

mummy, skeletonized and disconnected, of Flavio Orsini (1532-1581), Cardinal and Archbishop of Cosenza. There are some large clusters of lime, mixed with sprigs of rosemary and bay leaves: one of these clusters adapts perfectly to the hollow of the small pelvis.

NASD8. The large sarcophagus contains the artificial mummy of an anonymous adult male of 35-45 years dated back to the second half of the 16<sup>th</sup> century.

The calvarium shows a vertical craniotomy of the occipital and parietal bones. The cranial cavity is filled with resinous dark-coloured material mixed with animal hair and droplets of mercury. The abdomen has a longitudinal incision extending from the xiphoid process of the sternum to the pubic region. Another incision, transversal and perpendicular to the previous one, is found in the right hypochondrium. The chest and abdominal cavities appear filled with a kind of “felt”, mixed with resins and mercury droplets. The posterior cavities are covered with a layer of dust. There are also multiple longitudinal cuts defleshing the limbs, glutei, and back.

NASD9. The small sarcophagus of the lower row contains the artificial mummy of an anonymous male child of about 5 years dated back to the second half of the 16<sup>th</sup> century.

The calvarium, filled with solidified lime mixed with laurel leaves, shows a posterior circular craniotomy. The abdomen has a long longitudinal incision, from the xiphoid process of the sternum to the pubic region. The abdominal and thoracic cavities are filled, under a large solid compact mass of lime, with rosemary twigs, bay leaves and myrtle branches.

NASD24. The small sarcophagus of the lower row contains the artificial mummy of an anonymous child of about 2 years dated back to the second half of the 16<sup>th</sup> century.

The calvarium shows a circular horizontal craniotomy from the frontal squama to the region behind the ears. The cranial cavity is filled with a sort of animal hair wadding, mixed with dirt and resinous substances. The chest and the abdomen have a long longitudinal cut from the jugular region to the pubic region. The chest and abdominal cavities appear to have been filled with the same animal hair wadding already found in the skull, mixed with a thick layer of dirt covering the cavities. The small pelvic cavity is filled with wadding mixed with resins.

NASD28. The sarcophagus of the lower row contains the artificial mummy of an anonymous male individual of 34-42 years dated back to the second half of the 16<sup>th</sup> century.

The calvarium shows a circular horizontal craniotomy, with the cranial cavity filled with a sort of “felt” of yellowish animal hair. The chest and abdomen show a long longitudinal incision, sutured with coarse stitches, from the jugular to the pubic region. Another transverse umbilical incision, perpendicular to the previous one, runs from side to side. Abundant resinous material is present around and within the sutures. The thoracic and abdominal cavities seem to have been filled with “felt” made of animal hair, perhaps wool. The cavities on the back are covered with a blackish layer made of resinous substances.

NASD36. The small sarcophagus contains the artificial mummy of an anonymous newborn dated back to the end of the 17<sup>th</sup> century.

The body, totally bandaged with resinous bandages, shows a sutured circular-horizontal craniotomy and a long longitudinal incision from the jugular to the pubic regions, and the cavities appear filled with oakum, vegetal fibres and incense. At the back, there are a deep not-sutured right incision, and another sutured interscapular incision from the neck to the waist, which demonstrate the practice of defleshing.



NASD37. The small sarcophagus contains the artificial mummy of an anonymous small child of about 6 months dated back to the second half of the 17<sup>th</sup> century.

The body, almost totally skeletonized, apart from the forearms and the feet, shows a horizontal craniotomy obtained with a transversal cut of the frontal squama, two longitudinal cuts up to the parietal tuberosities and a long sutured longitudinal incision from the jugular to the pubic regions. The skull and body cavities appear to have been filled with oakum and resins.

NASD38. The small coffin contains the artificial mummy of an anonymous newborn, with <sup>14</sup>C dating to 1649±70.

The body, totally skeletonized, shows a horizontal craniotomy like the one of the individual NASD37, with a transversal cut of the frontal squama and two longitudinal cuts up to the parietal tuberosities. The skull and body cavities appear to have been filled with dirt and resins.

NASD33. The large sarcophagus contains the artificial mummy of an anonymous adult male individual of 50-60 years dated back to the first half of the 18<sup>th</sup> century.

The occipital region shows a sutured “V” inverted incision, with craniotomy. The skull cavity is filled with material like felt and raw fibres, quite likely wool. The chest and the abdomen show a long longitudinal incision extending from the jugular region to the pubic region. The thoracic and abdominal cavities are filled with the same type of red felt previously found in the skull. Towards the back, the cavities appear coated with a layer of clay-like material of a dark reddish colour.

NASD39. The small coffin contains the artificial mummy of Joachin Napoleon Agar (02/08/1811-27/06/1812), son of Jean Antoine

Michel Agar, Minister of Finance of the Kingdom of Naples from 1809 to 1815.

The embalming procedure involved a low circular craniotomy, of a horizontal type, followed by evisceration of the thoracic-abdominal cavity carried out with a single, sutured, jugular-pubic incision. The body was wrapped in strips of linen and cotton.

NASD40. The small coffin contains the artificial mummy of Letizia Agar (30/08/1810-10/09/1811), daughter of Jean Antoine Michel Agar, Minister of Finance of Gioachino Murat from 1809 to 1815.

The embalming process consisted in a horizontal circular craniotomy, probably followed (the body of Letizia was not unwrapped, but examined only by X-Ray) by jugular-pubic incision. The body was wrapped in strips of linen and cotton. X-rays of the mummy show a stratification of the filler material in the posterior part of the cranium and thorax due to the supine position of the corpse. The calcifications in the thorax are probably due to the thickening of the embalming material.

NASD41. The coffin contains the artificial mummy of Caroline Agar (04/08/1808-31/07/1813), daughter of Jean Antoine Michel Agar, Minister of Finance of the Kingdom of Naples from 1809 to 1815.

Embalming was performed by posterior oblique craniotomy and by evisceration of the skull, thorax and abdomen. X-ray detected a radiopaque material in the cavities (the body was not unwrapped, but examined only by X-Ray). The body was wrapped in strips of linen and cotton with needles that pierced through the flesh.

#### *4. Embalming in the Kingdom of Naples: objective data and historical sources*

In conclusion, of the 42 sarcophagi explored, 8 were found to be empty, while one contained a double deposition. 18 individuals, equal to

51%, had been submitted to embalming, while 13, equal to 47%, had not been treated. Finally, 4 are skeletonised, and a diagnosis cannot be made. Therefore, most individuals had been embalmed (Table 1) and this is certainly not surprising, considering the high social class of the individuals buried in San Domenico<sup>12</sup>. For the preservation of the adult bodies, the embalming process was obviously very important. In this respect, 7 individuals, including 4 small children and 3 adults, had been eviscerated by a long anterior incision running from the jugular region to the pubic symphysis. In order to penetrate the thorax, the sternum was cut or sewn or even removed; otherwise, the ribs or costal cartilages were cut sideways with shears; in one case both operations were performed. Six individuals, which were 1 child and 5 adults, only presented an abdominal incision running from the xiphoid process of the sternum to the pubis. In this case the thorax was necessarily eviscerated through the diaphragm. Of the 18 cases of embalmed individuals, 16 had the brain removed by craniotomy, which was horizontal and circular in 9 cases, or posterior and mainly circular, in 7 cases. Widespread defleshing of the muscular masses was observed at the level of the dorsum, the glutei, and the limbs in 4 cases, which included 2 new-born babies and 2 adults. The embalming material consisted principally of resinous substances, which were present in 10 cases; wool or similar material, and clay or dust, were present respectively in 7 and 6 cases; lime was found in 4 cases as well as leaves or twigs, while oakum, sponges and mercury were only used twice. Finally, in 7 cases, including 2 newborns, 2 children and 2 adults, the body was wrapped in bandages previously soaked in resinous substances. These very complex evisceration and embalming methods show long-practised and diffused customs. Preservation of the bodies may have been favoured also by the peculiar microclimatic conditions of San Domenico Maggiore, as well as by the disposition of the coffins, placed near the windows of the sacristy, at about 4 m of height.

This very complex approach to evisceration had been described by some Neapolitan authors of the time, such as Cinzio d'Amato (17<sup>th</sup> century), a barber surgeon, and Marco Aurelio Severino (1580-1656), who explained the way in which embalming was practised in Naples in a surgical manuscript stored at the Lancisian Library in Rome. In providing the instructions on how to embalm bodies, D'Amato recommends to carry out two distinct incisions on the chest and abdomen, the first with a cross, cutting "*First the belly, initially vertically, and then horizontally, that is, side to side,*" in order to remove the bowels; the second to open "*the chest from both sides, where the ribs end in cartilage*". The body, first washed with hot water and then with cold water and finally with aqua vitae or spirits, is filled with a powder of aromatic substances and oakum soaked in brandy spirits. Once the cavities have been eviscerated and filled, it is necessary to move on to brain extraction by "*perforating the skull or dried (as we say) with a heather*", and then to proceed with the cleaning and filling of the skull. The embalmed body is then finally wrapped in a waxed sheet, stained in naval tar<sup>13</sup>.

Severino also proposes a similar embalming procedure, which includes two incisions, one longitudinal and another horizontal, in order to extract the abdominal organs. A second incision is then carried out horizontally on the chest to eviscerate this area. The cavities are filled with oakum soaked in spirits<sup>14</sup>. Once the removal of the brain has been completed, the cavities are washed first with cold water, then with vinegar and finally with brandy or spirits, and lastly with a powder specially prepared and filled with "*oakum or padding soaked in brandy*". The corpse is then wrapped in a waxed sheet, "*in such a way that each piece remains separate from the other,*" and covered with navel tar. In order to ensure optimum results, Severino also recommends to perform complete removal of the flesh and muscles.

As regards the assertion of surgical embalming as the safest system for preservation of the bodies, we find further evidence in another

famous Neapolitan author of the 17<sup>th</sup> century, Giuseppe Donzelli (1596-1670) who, in *Petitorio Napolitano*, reports that in Europe and above all in the Kingdom of Naples, the “great” or important individuals were often embalmed<sup>15</sup>.

This author recommends that embalming takes place the day after death, starting with a bath of wine in order to cleanse the corpse. Embalming should then proceed with extraction of the internal organs, incision of the large vessels and removal of the flesh. The cavities then need to be washed with brandy and vinegar, and finally covered with aromatic powder and balsam, for which the author also provides the recipe.

Four mummies, including two newborns, have signs of removal of the fatty tissue and muscle masses along the back, buttocks and limbs. The removal of flesh, through incisions used to remove fat and muscle, as well as filling of the cavities is frequently indicated in the literature by the French surgeons of the time<sup>16</sup>.

Three coffins preserve the mummies of the children of Jean Michel Antoine Agar, Minister of Finance of Naples's Kingdom during the Monarchy of Joachim Murat. They died between the 1811 and 1813. The only mummy unwrapped and analysed is that of the male, named Joachim Napoleon. He was eviscerated with a vertical cut from the chin to the pubis; the skull was excerebrated through a horizontal incision across the forehead.

The systems used to embalm Agar's children can be compared to the method described by P. Pelletan (1782-1845) in his article *Embaumement* of the *Dictionnaire encyclopedique des sciences medicales*. From this work it emerges that the mummification techniques used by the physicians and surgeons in France at the beginning of the 19<sup>th</sup> century were based on a combination of new techniques and recovery of ancient funerary habits: the cavities were eviscerated and washed, probably with mercurial solutions, then filled with tows and perfumed substances. The conservation of the natural traits of

the corpse becomes fundamental and is obtained through aesthetic and cosmetic treatments, including the use of colouring and cosmetics to reproduce the colours of the skin, glass eyes, hair dyes, so that the deceased may preserve the aspect he had during life<sup>17</sup>. The habit to preserve the bodies of the relatives at home, embalmed, dressed, deposited vertically, was widespread in France between the end of the XVIII century and the beginning of XIX century.

The mummy of Joachim Agar is likely to have been preserved in a glass casket. Thickening of the embalming material at the basis of the skull and at the bottom of the trunk demonstrates that the body of the child had been, at least for some time, deposited in vertical position; the eyeballs were extracted to insert the glass eyes; the wrapping pattern of the head was left uncovered on the superior part of the face.

The Agar mummies are wrapped with bandages surrounding the upper limbs together with the torso, and the inferior limbs are joined together. Even the head, covered first by squared pieces of cloth, was then wrapped with bands and wrapping along with the rest of the body in order to form a single block.

The technique employed to embalm the three Agar children reflects the influence that the Egyptian Campaign had on French culture during this time in history. Many authors studied Egyptian mummies and repeated these antique embalming techniques by using natron to preserve the bodies wrapped in bandages, and this reflected the fascination and influence exerted by ancient Egyptian mummies on 19<sup>th</sup> century funerary customs<sup>18</sup>.

In conclusion, we can state that the series of mummies preserved in San Domenico Maggiore does not only offer important paleopathological data, but also represents an important example of funerary rituals from the early Modern Age to the beginning of the XIX century. The data obtained from the analysis of the mummies demonstrate that the techniques adopted by surgeons for embalming are the same as those described by the authors of medical texts.

Starting from the 1830-40's, surgeons began to practise embalming by following the improved techniques of intravascular injections of anti-putrefaction solutions, such as arsenic, corrosive sublimate and alcoholic liquors<sup>19</sup>.

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